The last lot: An examination of the social and economic effects of conservation in residential subdivision design

by

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This is to certify that the master’s thesis of

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has met the thesis requirements of Iowa State University

Signatures have been redacted for privacy
DEDICATION

This work is dedicated to those who have come before to lay the groundwork for this study and to those to come who will benefit. May we leave this world such as we found it.

"If in a city we had six vacant lots available to the youngsters of a certain neighborhood for playing ball, it might be 'development' to build houses on the first, and the second, and the third, and the fourth, and even the fifth, but when we build houses on the last one, we forget what houses are for. The sixth house would not be development at all, but rather it would be mere short-sighted stupidity. 'Development' is like Shakespeare's virtue, 'which grown into a pleurisy, dies of its own too-much.'

....Likewise, might our sixth lot be a corner lot, and hence very valuable for a grocery store or a filling station. I still insist it is the last lot for a needed playground, and this being the case, I am not interested in grocery stores or filling stations, of which we have a fair to middling supply elsewhere."

- Aldo Leopold, A Plea for Wilderness Hunting Grounds, Outdoor Life, November 1925
# TABLE OF CONTENTS

**ABSTRACT**

**CHAPTER 1: INTRODUCTION**
- Statement of Problem 1
- Study Objectives 5
- Thesis Organization 5
- Literature Cited 5

**CHAPTER 2: CONSERVATION IN RESIDENTIAL SUBDIVISIONS**
- Introduction 10
- Background 11
- Methods 16
- Results 19
- Discussion 21
- Conclusion 25
- Literature Cited 26

**CHAPTER 3: VALUATION OF CONSERVATION IN RESIDENTIAL SUBDIVISIONS**
- Introduction 39
- Background 40
- Methods 45
- Results 48
- Discussion 51
- Conclusion and Policy Implications 54
- Literature Cited 55
CHAPTER 4: CONCLUSION

General Conclusions

Literature Cited

APPENDIX A: RESIDENT SURVEY COVER LETTER

APPENDIX B: RESIDENT SURVEY INSTRUMENT
ABSTRACT

As urban populations expand and household sizes shrink, residential development places disproportionately greater pressure on important ecosystems along the urban/rural interface. There has been renewed interest in conservation subdivisions as a way to protect natural systems and cultural areas while maintaining comparable housing densities. While conservation subdivisions are designed to minimize the impacts of development on the environment, there is also a need to examine social and economic impacts of conservation design on residents. This study explores the sociological and economic effects of development on residents of three conservation subdivisions and three traditional subdivisions in Cedar Rapids, Iowa using a survey to assess sense of community, quality of life, organizational participation, consumer perceptions and willingness to pay. A market analysis comparing sales, assessments, and transactional data was also completed.

Residents living in conservation subdivisions report a greater sense of community and express greater satisfaction with their quality of life than residents of traditional subdivisions. Communal ownership of conservation features also seems to be an important factor affecting resident participation in neighborhood associations. Whereas most survey respondents expressed some willingness to pay for additional open space features in their neighborhood, survey respondents from conservation subdivisions indicated a greater willingness to pay for additional conservation features despite having an already abundant supply. There were no differences in assessed value, number of sales, or length of residency. However, houses in conservation subdivisions appreciated at a greater rate than similar houses in traditional subdivisions during the 5-year period examined. Our findings indicate that there are social and economic benefits of conservation subdivisions to both residents and developers. Both
developers and city officials should consider these results when dealing with residential
growth issues. Conservation subdivision design can help address both environmental and
social concerns related to housing growth, and its use can be profitable to both developers
and consumers.
CHAPTER 1: INTRODUCTION

Urban land use and development cause drastic changes to the environment surrounding city centers and place enormous pressure on natural systems. These changes can have serious effects on ecosystem function and life within those ecosystems. For example, previous research has shown that housing development and the resulting habitat fragmentation has damaging effects on animal species (Kluza et al., 2000). Furthermore, the change in imperviousness from soil to pavement driven by the addition of roads and structures has a strong negative effect on the biology of surrounding streams (Booth and Jackson, 1997) and some research shows that it is a key indicator of overall urban land use effects on streams (Schueler, 1994). The preservation of natural systems in an urban environment can alleviate some of the pressures of urban land use. Urban forests, for instance, can help alleviate air quality problems by removing hydrocarbons and reducing ozone formation rates (McPherson et al., 1998). Consequently, there has been expressed interest from conservation professionals in Iowa on ways to implement development designs that generate more conservation and ecosystem benefits.

Conservation Subdivision Design

In recent years, there have been several new subdivision design methodologies that focus on preserving primary environmental systems and thereby mitigating local impacts of development. Conservation subdivision design is one commonly referenced approach promoted by Arendt (1996, 1999) that aims to protect important ecological areas while still maintaining similar housing densities. His technique relies on four steps that, unlike traditional design, designate conservation areas first, and then build housing around those areas. This concentration on preservation of key ecosystems through undeveloped open
spaces, and especially forest systems, may help preserve biodiversity in urban environments (Blair, 1996).

**Barriers to Change**

Despite the mediation of some environmental effects of development and the possibility of safeguarding certain aspects of biodiversity, there are few instances of the implementation of conservation subdivision design in the Midwest, especially in Iowa. Instead, there seem to be barriers to change that are impeding the use of conservation in subdivisions. Therefore, it is important to explore the social and economic effects of conservation to assess the authenticity of these possible hindrances to conservation use that may include developer and planner worries over both resident social well-being and consumer preferences. By examining these aspects of subdivision design, it may be possible to identify areas that differ between conservation and traditional subdivision designs, and thus either validate or alleviate concerns over conservation subdivision design use.

**Measuring Social Effects of Conservation in Subdivisions**

Conservation in development is not a new concept. Conservation policy based in biblical literature dates back at least to the 13th century B.C (Correll et al., 1978). More recently, Howard (1902), Perry (1929), and Whyte (1964) have all promoted the use of open space areas for the promotion of human welfare and conservation of nature. However, until recently there were few studies on the social effects of natural areas in subdivisions. Previous theory and research suggests that the environment in a neighborhood can influence social structure in the important areas of sense of community (Plas and Lewis, 1996) and quality of life (Sirgy and Cornwell, 2002). However, there has been little literature providing a comprehensive comparison of conservation and traditional subdivision residents that
examines these two social aspects using validated quantitative instruments over a replicated set of study areas.

There have been several instruments created for measuring sense of community (Chipuer and Pretty, 1999). The most widely used and validated of these is the Sense of Community Index (Perkins et al., 1990) based on the McMillan and Chavis (1986) conceptual framework of sense of community that incorporates the four major community components of membership, influence, reinforcement of needs and shared emotional connection (Chipuer and Pretty, 1999).

Quality of life, a multi-dimensional grouping of life domains, is typically assessed through the use of social and economic indicators (Diener and Suh, 1997; Diener, 1984). One recent validated assessment instrument is the Community Well-being Questionnaire created to examine the physical, social, economic, political, and psychological aspects of a community through indicators of community quality of life (Christakopoulou et al., 2001).

Measuring the Economic Impact of Conservation in Subdivisions

Implementation of conservation subdivision design requires more than simply planning and construction. Even if the design is environmentally sound and provides social benefits, there must be an available consumer market that creates the demand for the subdivisions that would be created. Previous researchers have developed several techniques to assess consumer preferences and willingness to pay for different aspects of residential housing.

Contingent valuation is a survey-based approach that uses a series of questions to gauge stated differences in preferences. Breffle and coworkers (1998) used this methodology to assess consumer willingness to pay for vacant property near their subdivision. Contingent
valuation is useful in capturing non-use value, such as disposition toward nature; however, these non-use values can become embedded in larger issues, such as political values (Kahneman and Knetsch, 1992). As a result, it may be best to couple a contingent valuation study with a market-based approach to assess trends in non-use values.

Market analysis approaches, such as hedonic price modeling and market appreciation methods, use real-world sales or assessment data to evaluate revealed consumer preferences for certain housing features. The framework for modern market analysis comes from Lancaster (1966), who along with Rosen (1974), advanced the theory into the housing market, argued that the utility of a particular good (such as a house) is based on a sum of the utility of the characteristics of that good rather than the good itself. For example, a house beside a nice park will have a different utility than the same house if it was found in a slum. This allows for the utility of a specific characteristic to be derived from a comparison of similar goods.

Several studies have used the hedonic price model approach to examine market value of parks (Weicher and Zerbst, 1973), greenbelts (Correll et al., 1978), and open spaces (Peiser and Schwann, 1993) on housing prices. Additionally, market appreciation analysis has been used to study price differences between open space and traditional neighborhoods (Lacy, 1990).

Study Objectives

This study had several objectives aimed at examining how conservation features in subdivisions affect the lives of residents through a comprehensive approach that included both social and economic elements. First, we explored the social aspects of residents in conservation and traditional subdivisions using a survey instrument to measure differences in
sense of community, quality of life and organizational participation. Second, we examined the economic characteristics of conservation and traditional subdivisions and residents by using a survey and through examining sales, assessments, and transactional data to assess market conditions and consumer preferences.

Thesis Organization

This thesis contains four chapters: Chapter 1, Introduction; Chapter 2, Conservation in Residential Subdivisions: Effects on Sense of Community, Quality of Life, and Organizational Participation (to be submitted to the Journal of Society and Natural Resources); Chapter 3, Valuation of Conservation in Residential Subdivisions (to be submitted to the Journal of Environmental Management); and Chapter 4, Conclusions.

Literature Cited


Indicators Research 59:79-114.


CHAPTER 2: CONSERVATION IN RESIDENTIAL SUBDIVISIONS: EFFECTS ON SENSE OF COMMUNITY, QUALITY OF LIFE, AND ORGANIZATIONAL PARTICIPATION.

A paper to be submitted to the Journal of Society and Natural Resources

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Abstract

As city populations expand, residential development places disproportionately greater pressure on ecosystems along the urban/rural interface. Consequently, there has been a renewed interest in conservation subdivision design as a way to protect natural systems while maintaining housing densities. Although conservation subdivisions are designed to minimize the environmental impacts of development, there is also awareness of social aspects of conservation design. This study explores the sociological effects of development on residents of three conservation subdivisions and three traditional subdivisions in Cedar Rapids, Iowa using a survey to assess sense of community, quality of life, and organizational participation. We find that residents living in conservation subdivisions report a greater sense of community and express greater satisfaction with their quality of life than residents of traditional subdivisions. Communal ownership of conservation features also appears to be an important factor affecting resident participation in neighborhood associations. This suggests that conservation subdivision design has both social and environmental benefits that city planners and developers should consider.
Introduction

Over the past 50 years, residential development in the United States has been characteristically inefficient in its use of land (Wilson et al., 1998). As populations expand from city centers, there has been increasing debate about the social and environmental consequences of typical patterns of suburban development. Areas of rapid increase in both population and land conversion expansion face increased pressure, since development often outpaces changes in land use and planning policy.

One result of this situation is a renewed interest on the part of planners and other groups to examine conservation or low-impact subdivision design that protects sensitive environmental areas, while still allowing for comparable housing density. Some research has studied the economic effects of open space and conservation design on resident housing (Lacy, 1990). However, little research has been done to explore the specific social effects of conservation design on residents. Recent proponents of conservation in development have claimed that there are positive social benefits of natural areas and open space on community residents (e.g. Plas and Lewis, 1996; Bow and Buys, 2003). These parties have suggested that conservation design in subdivisions promotes a better quality of life and a stronger sense of community. Historical supporters of similar approaches (e.g. Howard, 1902; Perry, 1929) postulated that open space or garden areas in a community or neighborhood would have positive social effects on its residents. However, strong empirical data to support these claims are lacking. This article reports on a study conducted to explore the relationship between conservation in subdivision developments and residents' sense of community and quality of life using previously validated social assessment instruments.
Study Area

Cedar Rapids, Iowa was chosen for this study because it is one of the state’s most rapidly urbanizing cities and because of the potential impact of residential development on natural resources (the Cedar River and its tributaries as well as abundant gallery forests) that are uniquely valuable in the intensively managed predominantly agricultural landscape of the state. In 2000, the metropolitan population of Cedar Rapids was 237,230, an increase of 12.6% over the previous decade (US Census Bureau, 2003). This has made Cedar Rapids both the second-largest and second-fastest growing metropolitan area in Iowa. In addition, Cedar Rapids is expanding its land base at a rate that greatly exceeds its population growth rate. Previous studies in the area have explored the biophysical impacts of development on stream and forest systems; other current studies are exploring economic aspects of conservation in subdivision design in the Cedar Rapids area.

Background

Conservation Subdivisions

The concept of conservation in subdivision design is neither recent nor novel. The idea of maintaining a centralized garden or open space for the benefit of residents was the central theme of both the "Garden City" concept of Howard (1902) and the "Neighborhood Unit" idea of Perry (1929). Whyte (1964) advocated the use of clustered housing and an interconnected network of suburban open space. Modern conservation subdivision design (CSD) encourages the clustering of houses in specific development areas with the intent of maintaining natural ecosystem features and processes in other areas. The majority of contemporary CSD theory and practice is based on the work of Arendt (1996, 1999). Unlike previous clustered housing designs, Arendt’s four-step methodology promotes the protection
of ecologically or culturally sensitive areas on development sites as a primary goal along with the maximization of open space views for residents.

It should be noted that while there are no true conservation subdivisions in Cedar Rapids (in the sense that they are advertised as such or that they were designed using Arendt's methodology), there are subdivisions that contain similar or incidental but still significant conservation features. A conservation feature for this study is defined as an undeveloped natural area in the subdivision plat to which residents have visual or physical access. Examples include preserved forest areas, grass meadow swales and protected wetlands.

_Sense of Community_

The concept of a Psychological Sense of Community (SOC), or the feeling of belonging and commitment that members of a community share, was proposed as a social construct by Sarason (1974). To facilitate the study of SOC, several theories were subsequently formulated. One accepted interpretation is that of McMillan and Chavis (1986). They describe sense of community as "a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members' needs will be met through their commitment to be together" (McMillan and Chavis, 1986, p.9). This construct breaks an individual's sense of community into four major components: membership, influence, reinforcement of needs, and shared emotional connection. The membership component is the element of shared identification and safety of community members. The influence component is comprised of the feelings of influence of a person over a group and that group's influence over the person. The integration and fulfillment of needs component is a measure of the feeling of fulfillment of the desires and wants of a
person by the community. The shared emotional connection component is an assessment of the shared history and spirit of the community.

Additional research has explored the general relationship between neighborhood environment and its effect on sense of community although not necessarily employing the construct of McMillian and Chavis. Guest and Lee (1983) showed that the neighborhood environment can sometimes lead to a distinct neighborhood or district identity. However, they also demonstrated that satisfaction with a community does not necessarily lead to attachment to a community. Hallman (1984) argued that geographic proximity directly influences the formation and sense of community within a neighborhood. Unger and Wandersman (1985) included the effects of neighborhood aesthetics within the cognitive component of their theoretical construct of SOC. Eyles (1990) described a link between "environmental quality" and sense of community. Plas and Lewis (1996) also investigated the connection between SOC and the built environment of the planned community of Seaside, FL, finding that residents would often correlate physical aspects of the town with their sense of community. Kingston et al. (1999) in their examination of neighborhood and individual level effects on neighborhood sense of community, reported that they found no correlation between physical aspects of a neighborhood and sense of community. However, they also reported little variance in physical characteristics between their study areas, allowing them to only explore differences attributed to one physical variable (the presence of arterial roads). Bow and Buys (2003) also described strong connections between place attachment, individual's sense of community, and the natural environment. Brown and Cropper (2001) reported in their comparison of standard subdivisions and "New Urban"
subdivisions that the physical design differences between the two types of subdivisions did not seem to affect the overall sense of community of residents.

Sense of Community Index

A widely used and validated instrument to measure SOC is the Sense of Community Index (Chavis et al., 1986; Chipuer and Pretty, 1999). Chavis and coworkers (1986) used the McMillan and Chavis theoretical basis to create their Sense of Community Index (SCI) from neighborhood questionnaire responses that were passed through a Brunswick's lens model (Brunswick, 1947, 1952), and then tested the construct in several urban areas.

Perkins and colleagues (1990) subsequently created a shorter form of the SCI that has been used in recent SOC research. The short-form SCI contains 12 close-ended questions broken into four subscales to measure the four elements described by McMillan and Chavis (1986). The scale has been used to assess a variety of situations, such as SOC in the workplace (Pretty et al., 1992), SOC among adolescents (Pretty et al., 1996), and SOC for residents of standard versus "new urban" subdivision design (Brown and Cropper, 2001).

Quality of Life

Quality of life, or life satisfaction, has been correlated with sense of community in the past. For example, Glynn (1981) found that residents expressing higher life satisfaction also expressed a greater sense of community.

Quality of life has been studied through the development of social and economic indicators and subjective well-being theory (Diener and Suh, 1997). Quality of life is a multidimensional grouping of life domains that cover different aspects of individuals’ lives (Andrews and Withey, 1976; Diener, 1984). The effects of these domains on overall quality of life have been linked through the "bottom-up spillover theory" which models life
satisfaction as a pyramid comprised of many life domains with overall quality of life at the top (Campbell et al., 1976; Andrews and Withey, 1976; Diener, 1984). As the satisfaction with individual life domains increases, the overall satisfaction with life increases. For example, Sirgy and Cornwell (2002) reported that a neighborhood's physical features can affect overall life satisfaction through a hierarchy comprised of neighborhood, housing, and community satisfaction.

A recently developed assessment instrument for community-level quality of life is the Community Well-being Questionnaire (Christakopoulou et al., 2001). The questionnaire was created to provide a comprehensive examination of community well-being by examining the physical, social, economic, political, and psychological aspects of a community through indicators that have been found to be significantly correlated with community well-being (Christakopoulou et al., 2001). This assessment tool breaks well-being into nine scales: satisfaction with the built environment, satisfaction with environmental quality, personal safety, informal interaction, satisfaction with services and facilities, community spirit, income sufficiency, decision-making process, and place attachment.

**Organization Participation**

Organizational participation has long been a major component of social capital theory (Putnam, 1995). Recently, Perkins and Long (2002) proposed expanding the definition of social capital to include sense of community, finding that it was highly correlated with the other aspects of social capital (including organizational participation). Results of previous studies examining the relationship of participation in community groups to sense of community have been mixed. Brodsky and coworkers (1999) found that certain aspects of social organization (including participation in neighborhood groups) were good predictors of
sense of community in urban Baltimore neighborhoods. However, Kingston et al. (1999) found no such relationship. Other research has shown that elements of neighborhood design including parks and walkways have positive effects on organization participation (Roman and Moore, 2004), and overall social capital (Leyden, 2003).

Research Questions

Because relatively few CSDs exist in the Midwest, we have been studying barriers to the use of CSD in this region. From an ecological and environmental standpoint, most work suggests that CSDs function well. But less conclusive information exists about the social effects of this form of development. This study sought to explore three primary questions related to the social aspects of conservation design. First, how do conservation features in subdivisions affect residents' sense of community? Second, does the presence of conservation areas affect residents' quality of life? Finally, do conservation features in neighborhoods affect resident participation in neighborhood organizations? With respect to resident participation, we explored an additional secondary question: does communal ownership of open space encourage residents to be more involved in their subdivision organization?

Methods

Study Area and Sample Selection

Mail-return surveys were hand-delivered to single-family housing residents in six subdivisions across Cedar Rapids, IA. Three subdivisions were “traditional” subdivision designs (TSD) and three subdivisions contained significant conservation features (conservation-oriented subdivision design, COSD). To better focus on responses and preferences based on conservation features, we controlled for other factors in the selection
process (i.e. mean age of homes, assessed value of homes, mean size of homes). All six subdivisions contained homes that were developed within the last 10 years. The mean assessed price of houses in selected subdivisions was between $200,000 and $250,000 according to data from the city assessor’s office.

Subdivisions containing COSD features were selected with the assistance of the Linn County soil conservationist and local design and engineering professionals. Two of the six subdivisions selected were part of older, larger subdivisions, so survey recipients were only selected from plat additions with housing in the specified age and price range. One COSD subdivision had plat additions with no direct access (visually or physically) to the conservation features, which were not included in the sample.

Conservation features were measured using GIS data obtained from the Linn County Planning Department. Open spaces were estimated using ArcView GIS (ESRI, Redlands, CA) to measure total area.

Survey Methodology

Surveys were created using Dillman’s Tailored Design Method (Dillman, 2000) and consultation with the Center for Survey Statistics and Methodology at Iowa State University. The surveys asked for respondents’ opinions on social factors related to their neighborhood. Specifically, we used two instruments, the short-form Sense of Community Index (SCI) scale (Perkins et al., 1990) and selected statements modeled after the Community Well-Being Questionnaire (Christakopoulou et al., 2001), to elicit respondents’ perceived sense of community and their assessment of the quality of life in their neighborhood. The Sense of Community Index (SCI) was expanded from its original true/false scale to a 5-point Likert scale similar to those of Peterson and Reid (2002) and Loomis et al. (2004). Overall quality
of life questions and statements modeled after the Community Well-being Questionnaire (Christakopoulou et al., 2001) were also measured using a 5-point Likert scale. In addition, residents were asked to describe how the quality of life in their neighborhood was changing over time using a 3-point scale. For all scales, the lower number responses indicated a strong agreement with the statements.

Queries regarding membership in neighborhood and environmental groups were presented as yes or no questions. Contribution to neighborhood groups was measured by the number of hours a resident spent working for the group in the last 3 months. Contribution to environmental causes was measured by yes/no responses to the categories of time, money, or time and money.

Two hundred and ninety-six (296) surveys were hand-delivered to residents in all six subdivisions (approximately 50 per subdivision) in Spring, 2004. Up to three attempts were made to deliver surveys; on the third attempt, surveys were left in a conspicuous location at the residence. Residents were randomly selected using the city assessor’s database of homeowners for each area.

Non-response bias was tested through follow-up telephone interviews to 5 random non-respondent residents in each neighborhood. The telephone interviews were brief scripted six-question interviews that included questions about overall quality of life within the neighborhood.

Data and Analysis

Data were analyzed using SAS software (SAS System for Windows V8.2, 2001). Survey responses were averaged over each subdivision using the PROC MEANS procedure and differences in responses were tested using the PROC GLM procedure to perform paired
t-tests using the LSMEANS function. For the Sense of Community Index, Cronbach's alpha was calculated and used to test for internal consistency.

Statistical significance was determined for comparisons with $p \leq 0.05$ and slight significance with $p \leq 0.10$. Values of Cronbach's alpha greater than 0.70 were considered acceptable (Nunnaly, 1978).

**Results**

*Survey Respondents and Subdivision Characteristics*

The return rate for surveys was 51%. One survey was returned as refused and one was returned with no subdivision identifier. 82 responses came from COSDs and 68 came from TSDs (Table 2.1).

Survey respondents were 54% male, 96% white and an average of 44 years old (Table 2.1). The average household size was 3.4 people with 1.3 children. 13% of the households had a child in either private or home school. The mean respondent had a college degree and had a household income between $75,000 and $150,000. The mean length of residence was 5.5 years. The average respondent’s house was 8 years old, 2294 sq. ft. in size, and had an assessed value of $221,586. There were no significant differences in any of the demographic variables or housing characteristics between the TSDs and COSDs studied (Table 2.1). There were significant differences in open space availability between TSD and COSD neighborhoods (Table 2.2). TSDs had an average of 12% open space and COSDs had an average of 38% open space.

*Sense of Community*

The SCI was calculated for TSDs and for COSDs (Table 2.3). Responses from both types of neighborhoods were internally consistent (TSD $\alpha=0.850$, COSD $\alpha=0.840$). COSD
respondents indicated a stronger overall SOC (22.5) than TSD residents (25.9). The four subscales of the index were also calculated (Table 2.2). There was no difference in the Membership subscale between the two groups. There were differences among residents in three of the subscales: Influence (COSD: 6.4, TSD: 7.2), Reinforcement of Needs (COSD: 4.7, TSD: 5.6) and Shared Emotional Connection (COSD: 5.5, TSD: 6.6). However, the value of Cronbach’s alpha for each of the individual subscales indicated a lack of internal consistency (Table 2.3).

Quality of Life

COSD residents perceived a greater overall quality of life (1.5) than did TSD residents (1.7) (Table 2.3). There was no difference found between TSD and COSD residents’ perceptions of how quality of life was changing. Both TSD and COSD residents felt that their quality of life was either remaining the same or improving.

Significant differences in responses between residents from TSDs and COSDs occurred for only three of the 19 individual statements used to assess quality of life. Residents in COSDs (1.9) indicated a statistically greater attachment to their neighborhood than those in TSDs (2.4). There was also a difference in the feelings of belonging between COSD (1.9) and TSD (2.3) residents. Residents in COSDs (1.9) also indicated a greater feeling that they could have an effect on the neighborhood than residents in TSDs (2.2) (Table 2.4).

Residents in both types of subdivisions reported that while they plan on living in the neighborhood a long time, they would live somewhere else if possible. Both COSD and TSD residents indicated that there was acceptable resident involvement in their neighborhood, and that they also spoke and visited with their neighbors often. Residents in both types of
subdivisions also reported that they did not have enough money to live comfortably. Safety inside and outside the home was not reported as a concern for either type of resident (Table 2.4).

There were no significant differences in residents' perceptions of certain features of their built environment including cleanliness, road condition, traffic, air quality, or noise. Both COSD and TSD residents indicated that all were at acceptable levels. Residents in both COSDs and TSDs reported insufficient recreational opportunities. Both TSD and COSD residents also indicated that access to shopping and good schools was acceptable (Table 2.4).

Organizational Participation

There were no differences found between any responses of residents with respect to organizational participation statements (Table 2.5). Both COSDs and TSDs indicated low levels of membership and contribution to both neighborhood associations and environmental causes or groups. However, among individual subdivisions, residents in one COSD did report a greater level of participation in their neighborhood association (Table 2.6).

Non-response Bias

There was one difference in non-respondents surveyed in follow-up phone interviews. Residents in both types of neighborhoods expressed a higher perception of their quality of life than respondents to the original survey.

Discussion

This study explored the effect of conservation features on social indicators as perceived by residents of traditional and conservation-oriented subdivisions. We examined differences in sense of community, quality of life, and organizational participation. Overall,
we found that conservation features may have significant effects on sense of community and certain quality of life indicators.

**Survey respondents and subdivision characteristics**

The entire survey sample represents residents from both subdivision types that have greater than average income for the Cedar Rapids metropolitan area (Table 2.1). This is an artifact of the price for housing in conservation-oriented subdivisions in Cedar Rapids, and our efforts to match housing characteristics for the two subdivision types to control for variation in other factors known to be important for SOC and QOL. Although we selected TSD sites based only on housing size and age, those selection criteria led to very similar demographic characteristics among residents of the two subdivision types. The racial profile of survey respondents is very similar to overall characteristics for Cedar Rapids (Table 2.1, City of Cedar Rapids, 2004). We found some evidence of possible non-response bias in follow-up telephone interviews with randomly selected residents from both subdivision types that did not respond to the hand-delivered questionnaire. The response disparity could be influenced by a range of possible factors including the difference in time, sample size, and survey format; however, this discrepancy should be considered when examining the quality of life results.

Our GIS analysis highlights important differences in the availability of conservation features between the two subdivision types (Table 2.2). Although respondents’ perceptions of open space availability were not significantly different between the two subdivision types (Bowman et al., in prep), the COSD neighborhoods included an average of 38% open space, significantly different from the average of 12% for TSD neighborhoods. Because we
carefully controlled for other potential variation, we believe this is the only significant physical difference between the subdivisions studied.

**Sense of Community**

Although many workers have called for an examination of SOC in relation to neighborhood environmental variables, few have rigorously measured it with the combination of three important factors: control for physical features of the study areas, use of previously validated indices, or adequate replication of neighborhoods/subdivisions. Our experimental design included consideration of all three.

Conservation subdivision residents expressed a stronger overall SOC and stronger responses across three of the four subscales of the SCI (Influence, Reinforcement of Needs, Shared Emotional Connection) than did residents of traditional subdivisions (Table 2.3). Although the differences expressed are small (e.g. 22.5 vs. 25.9 relative to a maximum possible of 64 for the overall SCI), due to careful control of other variables as well as good internal consistency the evidence does support a link between the presence of conservation features and SOC.

Other studies have suggested a link between SOC and the presence of "distinct physical attributes" (e.g. Kingston et al., 1999), "natural environment" (Bow and Buys, 2003), "ecological sustainability" (Brown and Cropper, 2001), or "environmental factors" (Plas and Lewis, 1996), but did not present explicit evidence that such a link exists (due to a variety of shortcomings).

Our study provides stronger evidence for a relationship between physical subdivision features and SOC and QOL, although the items of the scale do not speak directly to conservation features of the subdivision environment, thus causality is not implied. Our
results do indicate, however, that further work to add such items to the scale is warranted, as earlier suggested by Chavis and Pretty (1999).

Quality of Life

Our purpose in assessing residents' perceived quality of life (QOL) was twofold, first to confirm findings based on the SCI for the same population of respondents, and second, to examine residents' perceptions of other possible factors that might affect their SOC (items not addressed in the SCI include things such as traffic, neighborhood cleanliness, proximity to good schools, recreation, and safety, Table 2.4).

Residents in COSDs expressed greater overall satisfaction with their quality of life, including greater attachment, belonging, and feeling of effectiveness than did residents in TSDs (Table 2.4). These results corroborate findings of the SCI items dealing with Shared Emotional Attachment, Reinforcement of Needs, and Influence, respectively. In addition, these results are consistent with differences observed between TSD and COSD residents for Membership items on the SCI scale, although those were not statistically significant.

The lack of other statistically significant differences for items on the QOL scale also point to the effectiveness of our efforts to control for other possible variables that affect SOC. In essence, residents perceived the same level of access to amenities such as good schools and shopping, and were equally unconcerned about traffic or safety issues. Interestingly, residents of both types of subdivisions also reported about the same moderate level of access to recreational opportunities, even though the physical data indicates much greater availability of open space for recreation for COSD residents.
Although we did not try to assess possible mediating factors for QOL, our results do reinforce earlier studies that identified links between satisfaction with neighborhood physical features and overall life satisfaction (e.g. Sirgy and Cornwell, 2002).

Organizational Participation

Membership, participation, and contribution to neighborhood or environmental causes or groups were uniformly low across all respondents, for both COSD and TSD residents. This may be more closely related to demographic variables common to the two groups – middle-income, middle age, two-parent households with live-in children, with limitations in terms of both disposable income and time to commit to other activities. Lack of involvement with environmental groups or causes for residents in COSDs was a surprising result, and suggests that resident’s choice of homes is not linked to previous environmental concerns or subsequent immersion in a conservation environment.

At the individual subdivision level, however, residents of one COSD reported greater involvement in their neighborhood association. For all of the TSDs, and the other two COSDs, open spaces associated with the subdivisions were privately held by individual homeowners or were given by easement to the City. The COSD reporting more participation had conservation features that were communally held by a neighborhood association. This suggests that the mere presence of conservation features does not influence engagement among residents, but that communal ownership of those spaces may.

Conclusion

In addition to the environmental benefits offered by conservation subdivision design, our results provide stronger support for earlier assertions on the potential social benefits in terms of residents’ overall Sense of Community and Quality of Life. Urban planners, other
civic officials, and developers often express interest in the social aspects of subdivision design, although there has been limited empirical evidence to suggest that conservation features may engender greater SOC or QOL. Our results indicate that planners and developers should embrace conservation design as a vehicle that addresses both environmental and social concerns that have been expressed with respect to traditional subdivision design. In addition, our findings suggest that communal ownership of conservation features may engender greater levels of resident participation in neighborhood associations, also important for civic officials and planners to integrate in future subdivision planning.

Acknowledgments

The data analysis for this paper was generated using SAS software, Version 8.2 of the SAS System for Windows. Copyright © 2001 SAS Institute Inc. SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc., Cary, NC, USA.

Literature Cited


ESRI, Inc. ArcView GIS. Version 3.2. Redlands, CA.


Table 2.1: Survey Response Rate, Respondent Characteristics, and Housing Descriptors for Traditional (TSD) and Conservation-Oriented (COSD) Subdivisions in Cedar Rapids, IA.

<table>
<thead>
<tr>
<th>Survey Response Rate, Respondent Characteristics, and Housing Descriptors for Traditional (TSD) and Conservation-Oriented (COSD) Subdivisions in Cedar Rapids, IA.</th>
<th>Survey Delivered</th>
<th>TSD</th>
<th>COSD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Respondents</td>
<td>150</td>
<td>67</td>
<td>83</td>
</tr>
<tr>
<td>Percent Surveys Returned</td>
<td>51%</td>
<td>46%</td>
<td>55%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Percent Male Respondents</th>
<th>Survey Overall</th>
<th>s.d.</th>
<th>TSD</th>
<th>s.d.</th>
<th>COSD</th>
<th>s.d.</th>
<th>Cedar Rapids Metropolitan Area</th>
<th>Pr&gt;&lt;t</th>
</tr>
</thead>
<tbody>
<tr>
<td>White or Caucasian</td>
<td>95.8%</td>
<td>6.7%</td>
<td>94.2%</td>
<td>10.0%</td>
<td>97.4%</td>
<td>2.2%</td>
<td>94.1%</td>
<td>NS</td>
</tr>
<tr>
<td>Black or African-American</td>
<td>0.7%</td>
<td>1.8%</td>
<td>1.4%</td>
<td>2.5%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>2.5%</td>
<td>NS</td>
</tr>
<tr>
<td>Hispanic</td>
<td>2.1%</td>
<td>3.6%</td>
<td>2.9%</td>
<td>5.0%</td>
<td>1.3%</td>
<td>2.2%</td>
<td>1.4%</td>
<td>NS</td>
</tr>
</tbody>
</table>

| Ave. Age of Respondents | 44 | 2.8 | 47 | 1.9 | 44 | 5.0 | 36.68 (Median) | NS |
| Ave. Persons in Household | 3.5 | 0.5 | 3.3 | 0.5 | 3.6 | 0.6 | 2.41 | NS |
| Ave. Children Living at Home | 1.3 | 0.5 | 1.2 | 0.4 | 1.4 | 0.6 | 1.85 | NS |
| Ave. Children in Private School | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | NS |

| Ave. Respondent Education Level | College Degree | $92,808.30 | College Degree | $9,195.72 | College Degree | $9,371.42 | College Degree | $95,846.86 | College Degree | $9,791.90 | College Degree | $84,918.17 | NS |

| Ave. Annual Household Income | 5.5 | 1.8 | 5.1 | 2.1 | 5.9 | 1.8 | 5.5 | 1.8 | NS |
| Ave. Years at Residence | 1996 | 1997 | 1995 | 1995 | 2 (yrs) | 2 (yrs) | 2 (yrs) | NS |
| Ave. 2004 Assessed Value of Home | $221,587 | $21,187 | $223,591 | $23,269 | $219,583 | $23,848 | NS |
| Ave. Size of House (Sq. Ft) | 2294 | 201 | 2328 | 120 | 2260 | 288 | NS |

1 (Cedar Rapids, 2004)
Table 2.2: GIS Analysis of Area of Conservation Features in Traditional (TSD) and Conservation-Oriented (COSD) Subdivisions in Cedar Rapids, IA

<table>
<thead>
<tr>
<th>Subdivision</th>
<th>Total Hectares</th>
<th>Open Space Hectares</th>
<th>Percent Open Space</th>
<th>Open Space Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSD 1</td>
<td>7.61</td>
<td>1.17</td>
<td>15%</td>
<td>Drainage Field</td>
</tr>
<tr>
<td>TSD 2</td>
<td>27.19</td>
<td>0.77</td>
<td>3%</td>
<td>Drainage Field</td>
</tr>
<tr>
<td>TSD 3</td>
<td>13.76</td>
<td>2.27</td>
<td>17%</td>
<td>Drainage Field</td>
</tr>
<tr>
<td>COSD 1</td>
<td>59.00</td>
<td>29.91</td>
<td>51%</td>
<td>Forest, Riparian Area</td>
</tr>
<tr>
<td>COSD 2</td>
<td>33.63</td>
<td>10.85</td>
<td>32%</td>
<td>Forest, Wetland</td>
</tr>
<tr>
<td>COSD 3</td>
<td>14.57</td>
<td>4.49</td>
<td>31%</td>
<td>Grassy Meadow</td>
</tr>
</tbody>
</table>
Table 2.3: Average Respondents' Ratings of Sense of Community Using Short Form Sense of Community Index (SCI) for Residents of Traditional (TSD) and Conservation-Oriented (COSD) Subdivisions in Cedar Rapids, IA

<table>
<thead>
<tr>
<th></th>
<th>TSD s.d.</th>
<th>α³</th>
<th>COSD s.d.</th>
<th>α</th>
<th>Pr&gt;t</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average Overall SCI¹</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N=67</td>
<td>25.9 1.4</td>
<td>0.850</td>
<td>22.5 1.0</td>
<td>0.840</td>
<td>0.025</td>
</tr>
<tr>
<td><strong>Average SCI Subscales²:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Membership</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recognize Most People</td>
<td>2.4 0.2</td>
<td>0.730</td>
<td>2.3 0.2</td>
<td>0.69</td>
<td>NS</td>
</tr>
<tr>
<td>Feel at Home</td>
<td>1.6 0.2</td>
<td>0.730</td>
<td>1.3 0.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neighbors Know Me</td>
<td>2.7 0.4</td>
<td>0.730</td>
<td>2.4 0.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Influence</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neighbors Thoughts Matter</td>
<td>2.1 0.3</td>
<td>0.54</td>
<td>2.0 0.2</td>
<td>0.56</td>
<td>0.0650</td>
</tr>
<tr>
<td>Influence Over Neighborhood</td>
<td>2.5 0.0</td>
<td></td>
<td>2.3 0.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problems Get Solved</td>
<td>2.6 0.3</td>
<td></td>
<td>2.1 0.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reinforcement of Needs</td>
<td>5.6 0.5</td>
<td>0.710</td>
<td>4.7 0.4</td>
<td>0.62</td>
<td>0.0700</td>
</tr>
<tr>
<td>Good Place to Live</td>
<td>1.3 0.2</td>
<td></td>
<td>1.1 0.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share the Same Values</td>
<td>2.4 0.3</td>
<td></td>
<td>1.9 0.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Want the Same Things</td>
<td>1.9 0.1</td>
<td></td>
<td>1.7 0.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shared Emotional Connection</td>
<td>6.6 0.2</td>
<td>0.650</td>
<td>5.5 0.1</td>
<td>0.64</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Important to Live in Neighborhood</td>
<td>2.7 0.1</td>
<td></td>
<td>2.4 0.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>People Get Along</td>
<td>1.8 0.3</td>
<td></td>
<td>1.3 0.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expect Long Residence</td>
<td>2.0 0.1</td>
<td></td>
<td>1.8 0.2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ Overall SCI is the composite score of respondent ratings of 12 statements selected to reflect four subscales. Each statement was rated on a scale from 1 to 5 where 1 equaled strong agreement and 5 equaled strong disagreement. (Range: 12 to 60)

² There are four SCI subscales that are composites of respondent ratings of three statements. The statements making up each subscale and mean respondents' ratings to the statements are shown under each subscale heading. (Range: 3 to 15)

³ Cronbach's alpha is a measure of internal consistency for the index. Scores range from 0 - 1 with higher scores indicating greater consistency. An alpha value of 0.7 is considered acceptable (Nunnaly, 1978).
Table 2.4: Comparison of Mean Quality of Life Indicators for Residents of Traditional (TSD) and Conservation-Oriented (COSD) Subdivisions in Cedar Rapids, IA. ¹

<table>
<thead>
<tr>
<th>Indicator</th>
<th>TSD N=67</th>
<th>s.d.</th>
<th>TSD N-R³</th>
<th>COSD N=83</th>
<th>s.d.</th>
<th>COSD N-R³</th>
<th>Pr&gt;t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Quality of Life</td>
<td>1.7</td>
<td>0.1</td>
<td>1.3</td>
<td>1.5</td>
<td>0.1</td>
<td>1.5</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>How Quality of Life is Changing ²</td>
<td>1.8</td>
<td>0.2</td>
<td>1.9</td>
<td>1.8</td>
<td>0.1</td>
<td>1.8</td>
<td>NS</td>
</tr>
<tr>
<td>Attachment to Neighborhood</td>
<td>2.4</td>
<td>0.2</td>
<td>1.9</td>
<td>1.5</td>
<td>0.2</td>
<td>1.8</td>
<td>0.02</td>
</tr>
<tr>
<td>Belonging to Neighborhood</td>
<td>2.3</td>
<td>0.2</td>
<td>1.9</td>
<td>1.5</td>
<td>0.2</td>
<td>1.8</td>
<td>0.07</td>
</tr>
<tr>
<td>Living in Neighborhood Long Time</td>
<td>2.0</td>
<td>0.1</td>
<td>1.8</td>
<td>1.5</td>
<td>0.1</td>
<td>1.8</td>
<td>NS</td>
</tr>
<tr>
<td>Too Much Traffic</td>
<td>3.6</td>
<td>0.3</td>
<td>3.5</td>
<td>0.2</td>
<td></td>
<td></td>
<td>NS</td>
</tr>
<tr>
<td>Acceptable Air Quality</td>
<td>1.6</td>
<td>0.1</td>
<td>1.6</td>
<td>0.2</td>
<td></td>
<td></td>
<td>NS</td>
</tr>
<tr>
<td>Acceptable Noise</td>
<td>1.9</td>
<td>0.4</td>
<td>1.8</td>
<td>0.3</td>
<td></td>
<td></td>
<td>NS</td>
</tr>
<tr>
<td>Neighborhood Cleanliness</td>
<td>1.3</td>
<td>0.1</td>
<td>1.4</td>
<td>0.1</td>
<td></td>
<td></td>
<td>NS</td>
</tr>
<tr>
<td>Good Road Condition</td>
<td>1.5</td>
<td>0.2</td>
<td>1.7</td>
<td>0.3</td>
<td></td>
<td></td>
<td>NS</td>
</tr>
<tr>
<td>Recreational Opportunities</td>
<td>2.5</td>
<td>0.9</td>
<td>2.4</td>
<td>0.3</td>
<td></td>
<td></td>
<td>NS</td>
</tr>
<tr>
<td>Close to Good Schools</td>
<td>1.5</td>
<td>0.1</td>
<td>1.7</td>
<td>0.2</td>
<td></td>
<td></td>
<td>NS</td>
</tr>
<tr>
<td>Good Access to Shopping</td>
<td>1.8</td>
<td>0.6</td>
<td>1.7</td>
<td>0.2</td>
<td></td>
<td></td>
<td>NS</td>
</tr>
<tr>
<td>Visit with Neighbors Often</td>
<td>2.5</td>
<td>0.4</td>
<td>2.4</td>
<td>0.3</td>
<td></td>
<td></td>
<td>NS</td>
</tr>
<tr>
<td>Speak with Neighbors Often</td>
<td>2.2</td>
<td>0.1</td>
<td>2.3</td>
<td>0.2</td>
<td></td>
<td></td>
<td>NS</td>
</tr>
<tr>
<td>Would Live Somewhere Else if Richer</td>
<td>1.5</td>
<td>0.3</td>
<td>1.5</td>
<td>0.1</td>
<td></td>
<td></td>
<td>NS</td>
</tr>
<tr>
<td>Enough Money to Live Well</td>
<td>3.4</td>
<td>0.2</td>
<td>3.4</td>
<td>0.2</td>
<td></td>
<td></td>
<td>NS</td>
</tr>
<tr>
<td>Resident Involvement in Neighborhood</td>
<td>2.3</td>
<td>0.2</td>
<td>2.1</td>
<td>0.3</td>
<td></td>
<td></td>
<td>NS</td>
</tr>
<tr>
<td>Residents Can Affect Neighborhood</td>
<td>2.2</td>
<td>0.1</td>
<td>1.9</td>
<td>0.0</td>
<td></td>
<td></td>
<td>0.01**</td>
</tr>
<tr>
<td>Safety at Home</td>
<td>1.4</td>
<td>0.3</td>
<td>1.3</td>
<td>0.0</td>
<td></td>
<td></td>
<td>NS</td>
</tr>
<tr>
<td>Safety Walking</td>
<td>1.4</td>
<td>0.3</td>
<td>1.3</td>
<td>0.0</td>
<td></td>
<td></td>
<td>NS</td>
</tr>
</tbody>
</table>

¹ Responses to indicator statements were measured using a 5-point Likert-style scale where 1 indicated strong agreement to the statement and 5 indicated strong disagreement.

² Changes in quality of life were measured on a 3-point scale where 1 indicated changing for the better, 2 indicated no change, and 3 indicated changing for the worse.

³ N-R = Non-respondent telephone interview responses to the statements.
# Table 2.5: Neighborhood Organizational Participation for Residents of Traditional (TSD) and Conservation-Oriented (COSD) Subdivisions in Cedar Rapids, IA

<table>
<thead>
<tr>
<th></th>
<th>TSD</th>
<th>s.d.</th>
<th>COSD</th>
<th>s.d.</th>
<th>Pr &gt; t</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=67</td>
<td></td>
<td>N=83</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ave. % Membership in Neighborhood Association</td>
<td>3.1%</td>
<td>2.7%</td>
<td>25.3%</td>
<td>36.2%</td>
<td>NS</td>
</tr>
<tr>
<td>Ave. Hours Contributed to Neigh. Assoc. in Last 3 Months</td>
<td>0.03</td>
<td>0.05</td>
<td>0.44</td>
<td>0.43</td>
<td>NS</td>
</tr>
<tr>
<td>Ave. % Membership in Environmental Cause or Group</td>
<td>4.5%</td>
<td>7.9%</td>
<td>1.5%</td>
<td>7.8%</td>
<td>NS</td>
</tr>
<tr>
<td>Ave. % Contributing to Environmental Cause or Group</td>
<td>18.1%</td>
<td>15.9%</td>
<td>27.9%</td>
<td>4.2%</td>
<td>NS</td>
</tr>
<tr>
<td>Ave. % Contributing Time to Env. Group</td>
<td>9.2%</td>
<td>12.0%</td>
<td>5.9%</td>
<td>3.6%</td>
<td>NS</td>
</tr>
<tr>
<td>Ave. % Contributing Money to Env. Group</td>
<td>15.0%</td>
<td>10.6%</td>
<td>24.3%</td>
<td>4.4%</td>
<td>NS</td>
</tr>
<tr>
<td>Ave. % Contributing Both Time and Money to Env. Group</td>
<td>6.1%</td>
<td>6.9%</td>
<td>2.2%</td>
<td>3.8%</td>
<td>NS</td>
</tr>
</tbody>
</table>
Table 2.6: Involvement in Neighborhood Association for Traditional (TSD) and Conservation-Oriented (COSD) Subdivisions in Cedar Rapids, IA

<table>
<thead>
<tr>
<th>Subdivision</th>
<th>N</th>
<th>% Involved in Neighborhood Association</th>
<th>Current Owner of Open Space within Neighborhood</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSD #1</td>
<td>21</td>
<td>5.00</td>
<td>City of Cedar Rapids</td>
</tr>
<tr>
<td>TSD #2</td>
<td>24</td>
<td>4.20</td>
<td>City of Cedar Rapids</td>
</tr>
<tr>
<td>TSD #3</td>
<td>23</td>
<td>0.00</td>
<td>City of Marion</td>
</tr>
<tr>
<td>COSD #1</td>
<td>30</td>
<td>67.00</td>
<td>Neighborhood Association</td>
</tr>
<tr>
<td>COSD #2</td>
<td>26</td>
<td>0.00</td>
<td>City of Cedar Rapids</td>
</tr>
<tr>
<td>COSD #3</td>
<td>26</td>
<td>9.10</td>
<td>City of Cedar Rapids/Private Ownership</td>
</tr>
</tbody>
</table>
CHAPTER 3: VALUATION OF CONSERVATION IN RESIDENTIAL SUBDIVISIONS

A paper to be submitted to the Journal of Environmental Management

Troy A. Bowman, Janette R. Thompson, Joe P. Colletti

Abstract

As urban areas expand, residential development places increased pressure on natural areas along the urban/rural interface. Conservation subdivision design has been promoted as a way to protect ecologically sensitive places while maintaining comparable housing densities. Conservation subdivisions minimize the local environmental impacts of development, but many developers and planners question the appeal of conservation design to consumers citing clustered housing and smaller lot sizes as detrimental to demand. This study was conducted to assess and compare economic aspects of conservation versus traditional subdivision design in the Midwest where conservation subdivisions are relatively new. A survey was conducted of residents of three conservation subdivisions and three traditional subdivisions in Cedar Rapids, Iowa. All survey respondents expressed a willingness to pay for additional open space features in their neighborhood. Survey respondents from conservation subdivisions indicated a greater willingness to pay for additional conservation features despite having an already abundant supply. Also, a market analysis was conducted using assessment and transactional data from the six subdivisions. Whereas there was no difference in assessed value or other transactional variables, houses in conservation subdivisions appreciated at a greater rate than similar houses in traditional
subdivisions during the 5-year period examined. Our findings indicate that there is a market for conservation design that both developers and city planners should consider.

**Introduction**

As urban population increases and household size shrinks, metropolitan areas continue to expand out from their city centers into the surrounding landscape. Areas of particularly rapid population growth and land conversion face increased pressure since land use policy often lags behind development. This situation has lead to debate between developers, urban planners, and citizen groups about the social and environmental consequences of suburban development, and has created interest in alternative housing design patterns. Conservation subdivision and low impact design are oft-mentioned methodologies that can protect against some forms of environmental damage and still maintain comparable housing densities.

Past studies have shown that similar designs (cluster housing) show considerable promise with regard to market evaluation (e.g. Lacy, 1990) and other market-based findings have measured the effects of neighborhood parks (Kitchen and Hendon, 1967; Weicher and Zerbst, 1973; Lutzenhiser and Netusil, 2001) or greenbelts (Correll et al., 1978) on individual house prices. However, there are few data about consumer stated preferences for conservation design, especially in the Midwest region where the use of conservation design is relatively new. This article reports on a study that examines both conservation and traditional subdivision residents' willingness to pay for open space features as well as comparisons of sales, transaction data and (assessed) appreciation of houses located in those subdivisions.
Study Area

Cedar Rapids, Iowa was chosen for this study because as one of the state’s most rapidly expanding cities, there is a large potential impact of residential development on neighboring natural resources (the Cedar River, its tributaries and surrounding gallery forests) that are unique in the predominantly agricultural landscape of the state. The 2000 metropolitan population of Cedar Rapids was 237,230, an increase of 12.6% over the previous decade (US Census Bureau, 2003). As a result, Cedar Rapids has become both the second-largest and second-fastest growing metropolitan area in the state. In addition, Cedar Rapids is expanding at a rate that greatly exceeds its population growth rate.

Background

Conservation Subdivisions

The concern for preservation of natural areas during development is not a recent phenomenon. Both Correll and coworkers (1978) and Arthur Nelson (1985) comment on the inclusion of greenbelt and conservation policy in Old Testament literature dating to the thirteenth century B.C. At the turn of the twentieth century, influential works by Howard (1902) and Perry (1929) promoted the inclusion of centralized open spaces in communities for the benefit of residents. More recently, Whyte (1964) wrote advocating the clustering of subdivision residences that would allow for interconnected networks of suburban open space. The idea of clustered developments has become central to modern conservation subdivision design. Most contemporary conservation subdivision theory and practice is the work of Arendt (1996, 1999). His methodology promotes the preservation of important ecological and cultural areas as the main design goal while also seeking to provide adequate open space views for all residents.
We would like to note that while there are no true conservation subdivisions in Cedar Rapids (in the sense that they were designed according to Arendt methodology or advertised as such), there are subdivisions that include incidental, but significant conservation features. These features included grassy meadows, forested areas, and protected wetlands.

**Willingness to Pay**

Willingness to pay (WTP) is a measure used to assess the value that people place on goods and services and can be especially important when gauging public opinion on non-market items (e.g. air and water quality) (Mitchell and Carson, 1989). There are several ways to measure WTP and this study focused on two in particular: a stated preference method using contingent valuation and a market-based method using housing appreciation.

**Contingent Valuation**

Contingent valuation (CV) estimates WTP through a survey approach that elicits responses to a series of questions about individuals’ preferences for certain goods. This technique allows for the capture of the non-use value that respondents have for certain goods or services. However, Kahneman and Knetsch (1992) note that larger sets of principles can become embedded within responses. This requires that survey instruments have well-explained definitions of what goods are being examined and clear explanations of how respondents would pay for those goods.

There are relatively few studies using CV to measure WTP for natural features in subdivisions. Peiser and Schwann (1993) explored how a public open space between houses affected subdivision residents’ opinions on the value of their property. They found that while the greenway had a positive effect on stated value, there was little difference in the market value of houses adjacent to the open space. Breffle et al. (1998) used the technique to
estimate the WTP of neighborhood residents to preserve an undeveloped lot adjacent their subdivision. The authors found that WTP for the land decreased with distance from the lot and increased with income. Lorenzo et al. (2000) found that residents were willing to pay additional taxes to conserve urban trees in their community, and like Breffle et al. (1998), this willingness to pay was dependent on income.

**Market Appreciation**

Hedonic pricing analysis uses sales or assessed values to discover actual market values for housing characteristics. The hedonic price methodology is used to measure consumers' revealed preferences for goods and services by examining their demonstrated purchasing behavior. Lancaster (1966) explained this by describing the utility of a good as a sum of a series of characteristics rather than of the good itself. Rosen (1974) advanced this concept to housing markets by relating the hedonic price function to each individual characteristic's supply and demand functions.

Since Rosen (1974), there have been quite a number of hedonic price studies published that explore many different conservation or natural features and housing values. In general, studies have found that these features increase the value of houses near them. Kitchen and Hendon (1967) studying neighborhood parks and their relation to housing values found that as distance increases from the park the value of land decreases. Weicher and Zerbst (1973) discovered in a similar study that certain externalities can play a role in how parks affect housing value and that the type of park plays an important role in valuation. In this study, houses near heavily used public parks were valued less than houses facing scenic private parks. Correll et al. (1978) found that greenbelts could increase housing prices in their study of three subdivisions. While only one of the three subdivisions studied
demonstrated this trend, the authors assert that other property values would be likely to adjust over time. Furthermore, they concluded that the pricing influence of open space “depends critically on the ability of private developers and urban planners to integrate neighborhood development and access to open space” (Correll et al., 1978 p. 213).

Several more recent studies have explored how open space within a subdivision affects market value. Lacy (1990) compared market appreciation percentages between two sets of clustered and standard subdivisions over a 21-year period. He found that the clustered subdivisions with protected open space appreciated at a higher rate than the traditional subdivisions. He concluded that the residents had a greater desire for houses with access to open space rather than houses with larger lot sizes. In contrast, Peiser and Schwann (1993) looked at open spaces between houses in one subdivision. They found the increase in price due to the presence of public open space to be insignificant compared to the value of additional private lot size.

Lutzenhiser and Netusil (2001) examined how size and type of park influenced housing prices. They found (similar to Weicher and Zerbst, 1973) that different types of parks have different effects on prices. Golf courses and other similar parks had a positive effect on housing prices, while houses near large parks with natural vegetation had, on average, the largest sales increase.

Thorsnes (2002) explored how forest preserves and vacant lots affect the prices of subdivisions that are adjacent to them. He found that the forested areas did increase lot values for houses near them (and for an even greater amount if the area contained a stream) and lot size and vacant lots did not.
Assessment Values

Many hedonic studies use the assessment value of homes to compare market values. While this is the easiest way to obtain market information because of a consistent availability of comparable data, Kitchen and Hendon (1967) show that this can ignore certain externalities that can affect a real sale price. Furthermore, assessment value can lag behind true market value when housing prices are increasing and can also contain bias from property owners (Goolsby, 1997). We use both assessed value and sales value in this study.

Research Questions

Even though conservation subdivision design addresses many environmental concerns associated with development, there are relatively few conservation subdivisions in the Midwest. In addition to environmental benefits, recent work has also shown CSD to be effective in promoting a stronger sense of community and a higher quality of life for residents (Bowman et al., in review). Despite this, there appear to be barriers to the implementation of conservation design. In this study, we sought to examine several economic aspects of CSD to discover if there were any market forces impeding its use. First, we investigated consumer willingness to pay (WTP) for open spaces within their neighborhoods and examined how WTP differs between traditional and conservation subdivision residents. Second, we explored the assessment value of homes in traditional and conservation subdivisions. Third, we studied market transactions to determine whether demand and appreciation differed between traditional and conservation subdivisions.
Methods

Study Area and Sample Selection

Residences in six subdivisions were selected for collection of market and assessment data, and to receive hand-delivered mail-return surveys. Three subdivisions were developed using traditional subdivision designs (TSD) and three subdivisions were designed with significant conservation features (conservation-oriented subdivision design, COSD). We controlled for several factors (mean age of homes, current assessed value, and mean size of homes) in the selection process in order to focus only on the effects of conservation features. All residences selected for this study were constructed within the last 10 years and had a mean assessed price between $200,000 and $250,000 according to data from the city assessor’s office.

COSD subdivisions were selected with the help of the Linn County soil conservationist and local design professionals. Two areas included were part of larger subdivisions and survey recipients were selected only from plat additions with housing in the specified age and price range. One COSD subdivision had plat additions with no direct access to the conservation features that were not included in the sample.

Conservation features were measured using GIS data obtained from the Linn County Planning Department and total area of subdivision open spaces was calculated using ArcView GIS (ESRI, Redlands, CA).

Survey Methodology

Surveys were created using Dillman’s Tailored Design Method (Dillman, 2000) and guidance from the Center for Survey Statistics and Methodology at Iowa State University. The survey asked about residents’ perception of open space in their subdivision and their
willingness to pay for their desired amount of open space availability. Residents' perception of the amount of current open space availability and residents' desired level of open space were measured using a rising 1 to 10 "Open Space Scale" (1 indicated few open spaces and 10 indicated many open spaces). Stated willingness to pay was measured using two questions. First, residents were asked if they would have been willing to pay an additional $2000 over the price of their home if their desired level of open space was provided. Next, residents were asked to report the maximum amount they would have been willing to pay over the price of their home if their subdivision contained their desired amount of open space.

Two hundred and ninety-six (296) surveys were hand-delivered to residents in the six subdivisions (approximately 50 per subdivision) in spring, 2004. Up to three attempts were made to deliver surveys after which surveys were left in a conspicuous location at the residence. Residents receiving surveys were randomly selected using the city assessor's list of homeowners for each area.

Assessment and Transactional Data

Assessment data were obtained from both the Cedar Rapids and Linn County assessor's offices. 2004 data were collected from online databases, while first housing assessment values were collected from hard copy assessment records. Data for 1997/1998 were the oldest available records with a sufficient sample size for the subdivisions included. Our transaction data for traditional subdivisions was limited during this time period, so we supplemented the data by including records from another traditional subdivision that had the same housing characteristics but did not receive the survey.
Sales and housing data were obtained from the Cedar Rapids assessor's online database and from Linn County assessor's books. Data collected included year built, total square footage, total number of sales, length between sales, and transaction amounts. Days on market data were obtained from the Iowa REALTORS® Association Multiple Listing Service.

Non-Response Bias

Non-response bias was tested using follow-up telephone interviews to 5 random non-respondents in each of the subdivisions. Telephone interviews consisted of six questions about open space availability and willingness to pay for open spaces.

Data and Analysis

The change in assessment values between the first assessment and the 2004 assessment were calculated as a percentage change using the following formula:

\[
\% \text{ Change} = \frac{(2004 \text{ Assessment} - 1997(8) \text{ Assessment})}{1997(8) \text{ Assessment}} \times 100
\]

The differences between first assessment and first transaction values were calculated as percentages using this formula:

\[
\% \text{ Difference} = \frac{(First \ Sale - First \ Assessment)}{First \ Assessment} \times 100
\]
We used a technique similar to Lacy (1990) to calculate market appreciation using a subset of the available data. Only houses that sold exactly five years after their construction were included in the analysis. The 5-year market appreciation was also calculated as a percentage using the following formula:

$$\% \text{ Appreciation} = \frac{(2002(3) \text{ Transaction Value} - 1997(8) \text{ Transaction Value})}{1997(8) \text{ Transaction Value}} \times 100$$

Data were analyzed using SAS software (SAS System for Windows V8.2, 2001). Survey responses and transaction values were averaged over each subdivision using the PROC MEANS procedure and differences in responses were tested using the PROC GLM procedure to perform paired t-tests between the subdivision types using the LSMEANS function. Statistical significance was determined for comparisons with $p \leq 0.05$ and $p \leq 0.10$ (as indicated).

Results

Survey Respondent Profile and Subdivision Characteristics

Overall, 51% of the 296 surveys were returned. 86 responses were from COSD residents and 68 were from TSD residents (Table 3.1). Respondents were 54% male, 96% Caucasian, and had a mean age of 44 years (Table 3.2). The average household size was 3.4 people with 1.3 children living at home. Respondents, on average, had a college degree and earned between $75,000 and $150,000 with a mean of $92,808 (Table 3.2). The average length of current residence was 5.5 years. The mean respondent's house was 8 years old,
2294 sq. ft. in size with an assessed value of $221,586 (Table 3.3). There were no significant differences in any demographic or housing variables between TSD and COSD residents.

There were significant differences found in the amount of open space available in the TSD and COSD subdivisions. On average, the TSD subdivisions contained 12% open space while the COSD subdivisions contained 38% open space (Table 3.4).

**Perceived and Desired Open Space Availability**

There was no difference between TSD or COSD subdivision residents' perceptions of the current level of open space availability in their neighborhood or in their stated desired level of open space availability (Table 3.5). On the Open Space Scale (rising from 1 to 10), TSD residents reported their average current level of open space availability was 2.85 and their desired level was 4.94. COSD respondents indicated an average current level of 4.39 and a desired level of 5.98 (Table 3.5). There was also no difference between residents' perceived current level of open space availability and their desired level for the subdivision types.

**Respondent Stated Willingness to Pay**

Both TSD (53%) and COSD (72%) residents reported willingness to pay an additional $2000 dollars for their houses if their desired level of open space availability was met (Table 3.6).

COSD residents expressed a greater maximum willingness to pay (WTP) for their desired level of open spaces. TSD residents reported a mean maximum WTP of $1852 whereas COSD residents reported a mean maximum value of $4370 (Table 3.6).
Assessed Value of Homes

Assessor’s data indicated similar percentage changes for TSD and COSD homes between 1997(8) and 2004 assessment values. Assessed values for TSD houses grew by 16.4% over the 6 to 7 year period, while assessed values for COSD houses increased by 15.9% (Table 3.7).

There were also similar trends in first assessment versus first sale value for homes in both TSDs and COSDs. Residents in both types of subdivisions paid on average 9.9% over the assessed value of their home for the first recorded sale of the property (Table 3.7).

Transactional Analysis

There was no difference between the subdivision types regarding the mean number of sales for houses built over the 6-7 period examined. Both TSD and COSD houses sold an average of 1.5 times (Table 3.7). There was also no difference in the average length between sales: for TSD houses there was an average of 3.4 years between sales, and for COSD houses there was an average of 3.3 years between sales (Table 3.7).

Days on market (DOM) also did not vary between subdivision types: TSD houses were on the market an average 123 days between listing and sale, while COSD houses were on the market an average of 75 days (Table 3.7).

Based on more limited sales data, the five-year appreciation rate for houses built in 1997(8) and sold in 2002(3) was 4.35% for TSD houses and 10.85% for COSD houses (Table 3.7). There was no difference in the percent change of assessed value for the same houses during that time period. Over the same 5-year period, assessed value of houses increased an average of 13.85% for TSD houses and 16.28% for COSD houses (Table 3.7).
Non-Response Bias

Non-respondents from both subdivision types reported both higher perceived and higher desired levels of open space availability compared to survey respondents (Table 3.5). However, only COSD non-respondents reported a change in the unit difference of perceived and desired open space availability on the "Open Space Scale" over COSD survey respondents. COSD non-respondents stated an average unit difference of 2.6 compared to the survey respondent value of 1.58 (Table 3.5).

TSD non-respondents (60%) seemed more willing to pay an additional $2000 for their desired level of open space than survey respondents (53%) (Table 3.6). CSD non-respondents (61%), however, appeared less willing to pay an additional $2000 than survey respondents (72%). Both TSD and COSD non-respondents expressed a higher stated willingness to pay for open features than survey respondents (Table 3.6). However, non-respondents in both types of neighborhoods indicated a lower incremental maximum WTP than their survey respondent counterparts.

Discussion

This study examined the differences in traditional and conservation subdivision residents' stated and revealed willingness to pay through both a contingent valuation and a transactional analysis. Overall, there appears to be a possible market for conservation design features in subdivision development with residents in both types of subdivisions reporting a willingness to pay for additional open space features in their neighborhoods. Furthermore, conservation subdivision residents had both a higher stated and a higher revealed willingness to pay than traditional subdivision residents indicating that preference for open space features may be a driving force in housing decisions.
Survey respondents and housing characteristics

Though we selected subdivisions based on only housing characteristics, both subdivisions had similar demographic characteristics as well. The racial profile of our respondents was similar to that of overall characteristics of Cedar Rapids (Table 3.2). However, the mean income of our subdivisions is greater than the overall average for Cedar Rapids (Table 3.2). This disparity is a trait of the housing price for conservation-oriented subdivisions in Cedar Rapids and arises from our efforts to control for variation in housing size and features. We found some evidence of slight differences between respondents and non-respondents with regard to their perception of open space availability and WTP.

Open Space Availability and Resident Perceptions

The GIS analysis highlights some important differences in our subdivision types indicating a large difference in open space availability between subdivision types (Table 3.4). Surprisingly, though differences in actual availability of open space between TSD (12% of area) and COSD (38% or area) are considerable, respondent perceptions of open space showed little difference between subdivision types (Table 3.5). Furthermore, the desired level of open space availability also showed little difference. This difference between actual and perceived open space availability could be an indicator of a lack of effective integration of open space in the COSD neighborhoods.

Stated and Revealed Willingness to Pay

Both TSD and COSD residents expressed a willingness to pay for open space features (Table 3.6). While more research would be necessary to pinpoint exactly how much open space would be necessary to match resident desired levels of availability, the stated WTP demonstrates at the very least a monetary interest in open spaces that developers and civic
officials should consider. It was somewhat surprising that COSD residents expressed a much higher willingness to pay for additional open spaces given the current amount of open space already available in their subdivisions. This finding reflects the increased value that COSD residents have for their subdivision open spaces and suggests that open space availability plays a role in a resident's decision to purchase a home in a conservation subdivision. Furthermore, the increased value expressed by COSD subdivision residents when considered in the context of similarities between the perceived and desired levels of open space availability for both TSD and COSD residents suggests that COSD residents have a higher ideal level of open space. Unfortunately, determining whether this ideal level of open space was formed prior to residence in a COSD or was gained through experience with the subdivision was beyond the scope of this study.

**Housing Assessment**

We found no differences between the percentage appreciation of assessed value of TSD and COSD for the entire 1997(8)-2004 period (Table 3.7). There was also no difference between the assessed value appreciations for the more limited 5-year period that we used for market appreciation (Table 3.7). This discrepancy indicates there is a possible lag in the subdivisions' assessment values appreciation rates compared to the sale appreciation as suggested by Goolsby (1997).

**Transactional Analysis**

Conservation features in subdivisions appear to have no effect on any of our transactional variables. Houses in both TSDs and COSDs, on average, sold the same number of times with residents maintaining the same length of residence (Table 3.7). Though there appears to be a large difference in the mean days on market values between TSDs and
COSDs, the data from traditional subdivisions is very noisy and this large variability between TSDs makes this difference statistically insignificant. This result does suggest that conservation subdivision houses sell within a more consistent time frame than houses in a traditional subdivision.

Market Appreciation Analysis

Our five-year market appreciation findings, though limited to only 32 houses, do indicate that there is a difference (p=0.087) in mean market appreciation rates between COSD and TSD subdivisions at least for that time period (Table 3.7). Houses in COSDs appreciated at a mean rate 6.5% higher than the mean TSD appreciation rate. This supports the stated willingness to pay findings by revealing that COSD residents are willing to pay more to live in a subdivision with open space features. This result is consistent with Lacy’s (1990) findings comparing open space subdivisions in Massachusetts.

Conclusion and Policy Implications

Our results indicate that residents are willing to pay for conservation features if included within their subdivisions. Moreover, residents of conservation subdivisions demonstrated both a greater stated willingness to pay and a greater revealed willingness to pay for conservation features in their neighborhood.

The willingness to pay on the part of subdivision residents should be considered by both developers and city policy makers as an indicator of a public interest in the implementation of conservation in subdivision design. Consumers appear to be positively disposed toward offering more money for a return in open space. If implemented correctly, these findings indicate that open space in subdivision development can lead to possible increased payment from consumers to developers as well as to municipal governments.
through increased assessment taxes. However, caution should be taken to prevent land use policy from excluding lower income families from subdivisions with conservation features on less expensive properties.

Acknowledgments

The data analysis for this paper was generated using SAS software, Version 8.2 of the SAS System for Windows. Copyright © 2001 SAS Institute Inc. SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc., Cary, NC, USA.

Literature Cited


ESRI, Inc. ArcView GIS. Version 3.2. Redlands, CA.


Table 3.1: Resident Survey Response Rate for Traditional (TSD) and Conservation-Oriented (COSD) Subdivisions in Cedar Rapids, IA.

<table>
<thead>
<tr>
<th></th>
<th>Survey</th>
<th>TSD</th>
<th>COSD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>296</td>
<td>146</td>
<td>150</td>
</tr>
<tr>
<td>Number of Respondents</td>
<td>150</td>
<td>67</td>
<td>83</td>
</tr>
<tr>
<td>Percent Returned</td>
<td>51%</td>
<td>46%</td>
<td>55%</td>
</tr>
</tbody>
</table>
Table 3.2: Survey Respondent Characteristics for Traditional (TSD) and Conservation-Oriented (COSD) Subdivisions in Cedar Rapids, IA.

<table>
<thead>
<tr>
<th></th>
<th>Survey Overall</th>
<th>s.d.</th>
<th>TSD</th>
<th>s.d.</th>
<th>COSD</th>
<th>s.d.</th>
<th>Cedar Rapids Metropolitan Area</th>
<th>Pr&gt;t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent Male Respondents</td>
<td>53.9%</td>
<td>7.1%</td>
<td>55.0%</td>
<td>9.1%</td>
<td>52.8%</td>
<td>6.3%</td>
<td>47.8%</td>
<td>NS</td>
</tr>
<tr>
<td>Percent Respondents by Race</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White or Caucasian</td>
<td>95.8%</td>
<td>6.7%</td>
<td>94.2%</td>
<td>10.0%</td>
<td>97.4%</td>
<td>2.2%</td>
<td>94.1%</td>
<td>NS</td>
</tr>
<tr>
<td>Black or African-American</td>
<td>0.7%</td>
<td>1.8%</td>
<td>1.4%</td>
<td>2.5%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>2.5%</td>
<td>NS</td>
</tr>
<tr>
<td>Hispanic</td>
<td>2.1%</td>
<td>3.6%</td>
<td>2.9%</td>
<td>5.0%</td>
<td>1.3%</td>
<td>2.2%</td>
<td>1.4%</td>
<td>NS</td>
</tr>
<tr>
<td>Ave. Age of Respondents</td>
<td>44</td>
<td>2.8</td>
<td>47</td>
<td>1.9</td>
<td>44</td>
<td>5.0</td>
<td>36.68 (Median)</td>
<td>NS</td>
</tr>
<tr>
<td>Ave. Persons in Household</td>
<td>3.5</td>
<td>0.5</td>
<td>3.3</td>
<td>0.5</td>
<td>3.6</td>
<td>0.6</td>
<td>2.41</td>
<td>NS</td>
</tr>
<tr>
<td>Ave. Children Living at Home</td>
<td>1.3</td>
<td>0.5</td>
<td>1.2</td>
<td>0.4</td>
<td>1.4</td>
<td>0.6</td>
<td>1.85</td>
<td>NS</td>
</tr>
<tr>
<td>Ave. Children in Private School</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td></td>
<td>NS</td>
</tr>
<tr>
<td>Ave. Respondent Education Level</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>College Degree</td>
<td>$92,808.30</td>
<td></td>
<td>$9,195.72</td>
<td>$89,769.74</td>
<td>$9,371.42</td>
<td>$95,846.86</td>
<td>$9,791.90</td>
<td>$84,918.17</td>
</tr>
</tbody>
</table>

1 (Cedar Rapids, 2004)
<table>
<thead>
<tr>
<th></th>
<th>Overall Mean</th>
<th>Overall s.d.</th>
<th>TSD Mean</th>
<th>TSD s.d.</th>
<th>COSD Mean</th>
<th>COSD s.d.</th>
<th>Pr&gt;t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ave. Years at Residence</td>
<td>5.5</td>
<td>1.8</td>
<td>5.1</td>
<td>2.1</td>
<td>5.9</td>
<td>1.8</td>
<td>NS</td>
</tr>
<tr>
<td>Ave. Year House was Built</td>
<td>1996</td>
<td>2</td>
<td>1997</td>
<td>3</td>
<td>1995</td>
<td>2</td>
<td>NS</td>
</tr>
<tr>
<td>Ave. 2004 Assessed Value of Home</td>
<td>$221,587</td>
<td>$21,187</td>
<td>$223,591</td>
<td>$23,269</td>
<td>$219,583</td>
<td>$23,848</td>
<td>NS</td>
</tr>
<tr>
<td>Ave. Size of House (Sq. Ft)</td>
<td>2294</td>
<td>201</td>
<td>2328</td>
<td>120</td>
<td>2260</td>
<td>288</td>
<td>NS</td>
</tr>
</tbody>
</table>
Table 3.4: Open Space Analysis of Area of Conservation Features in Traditional (TSD) and Conservation-Oriented (COSD) Subdivisions in Cedar Rapids, IA

<table>
<thead>
<tr>
<th>Subdivision</th>
<th>Total Hectares</th>
<th>Open Space Hectares</th>
<th>Percent Open Space</th>
<th>Open Space Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSD 1</td>
<td>7.61</td>
<td>1.17</td>
<td>15%</td>
<td>Drainage Field</td>
</tr>
<tr>
<td>TSD 2</td>
<td>27.19</td>
<td>0.77</td>
<td>3%</td>
<td>Drainage Field</td>
</tr>
<tr>
<td>TSD 3</td>
<td>13.76</td>
<td>2.27</td>
<td>17%</td>
<td>Drainage Field</td>
</tr>
<tr>
<td>COSD 1</td>
<td>59.00</td>
<td>29.91</td>
<td>51%</td>
<td>Forest, Riparian Area</td>
</tr>
<tr>
<td>COSD 2</td>
<td>33.63</td>
<td>10.85</td>
<td>32%</td>
<td>Forest, Wetland</td>
</tr>
<tr>
<td>COSD 3</td>
<td>14.57</td>
<td>4.49</td>
<td>31%</td>
<td>Grassy Meadow</td>
</tr>
</tbody>
</table>
Table 3.5: Average Respondent Perception Ratings of Open Space Availability in Their Subdivision on the Open Space Scale\(^1\) in Traditional (TSD) and Conservation-Oriented (COSD) Subdivisions in Cedar Rapids, IA.

<table>
<thead>
<tr>
<th></th>
<th>TSD s.d.</th>
<th>TSD N-R(^2)</th>
<th>COSD s.d.</th>
<th>COSD N-R(^2)</th>
<th>Pr&gt;t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ave. Respondent Rating of Perceived Current Level of Subdivision Open Space Availability on the Open Space Scale(^1)</td>
<td>2.85 0.63</td>
<td>4.67</td>
<td>4.39 1.89</td>
<td>5.11</td>
<td>NS</td>
</tr>
<tr>
<td>Ave. Respondent Rating of Desired Level of Subdivision Open Space Availability on the Open Space Scale(^1)</td>
<td>4.94 0.21</td>
<td>7.08</td>
<td>5.98 1.23</td>
<td>7.71</td>
<td>NS</td>
</tr>
</tbody>
</table>

\(^1\) Open space availability was queried using a 10-point scale where 1 indicated a low availability of open space and 10 indicated a high availability of open space.

\(^2\) N-R = Non-respondent telephone interview responses to the statements.
Table 3.6: Resident Stated Willingness to Pay (WTP) for Open Space Availability in Traditional (TSD) and Conservation-Oriented (COSD) Subdivisions in Cedar Rapids, IA.

<table>
<thead>
<tr>
<th></th>
<th>TSD N=67</th>
<th>s.d.</th>
<th>TSD N-R^1 N=15</th>
<th>s.d.</th>
<th>COSD N=83</th>
<th>s.d.</th>
<th>COSD N-R^2 N=15</th>
<th>Pr&gt;t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ave. Percent of Respondents Willing to Pay an Add'l $2000 over Original House Price for Desired Level of Open Spaces in Subdivision^1</td>
<td>53.0%</td>
<td>16.0%</td>
<td>60.0%</td>
<td>72.0%</td>
<td>9.0%</td>
<td>61.0%</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>Ave. Maximum WTP of Original House Price for Desired Level of Open Spaces in Subdivision</td>
<td>$1,851.54</td>
<td>$109.71</td>
<td>$2,583.33</td>
<td>$4,370.26</td>
<td>$978.14</td>
<td>$5,055.56</td>
<td>0.01</td>
<td></td>
</tr>
</tbody>
</table>

^1 For Respondents' mean expressed desired level of open space availability, see Table 3.5.

^2 N-R = Non-respondent telephone interview responses to the statements.
Table 3.7: Assessment Values and Transactional Sales Comparisons for Housing in Traditional (TSD) and Conservation-Oriented (COSD) Subdivisions in Cedar Rapids, IA.

<table>
<thead>
<tr>
<th></th>
<th>TSD</th>
<th>s.d.</th>
<th>COSD</th>
<th>s.d.</th>
<th>Pr&gt;t</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=91</td>
<td></td>
<td>N=70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ave. Percent Change in 1997(8) Assessment Value and 2004 Assessment Value</td>
<td>16.4</td>
<td>2.3</td>
<td>15.9</td>
<td>1.2</td>
<td>NS</td>
</tr>
<tr>
<td>Ave. Percent Difference in 1997(8) Assessment Value and First Recorded Sale Price</td>
<td>9.9</td>
<td>2.7</td>
<td>9.9</td>
<td>1.7</td>
<td>NS</td>
</tr>
<tr>
<td>Ave. Number of Sales Between 1997(8) and 2004</td>
<td>1.48</td>
<td>0.21</td>
<td>1.47</td>
<td>0.13</td>
<td>NS</td>
</tr>
<tr>
<td>Ave. Time Between Sales (yrs)</td>
<td>3.43</td>
<td>0.31</td>
<td>3.27</td>
<td>0.69</td>
<td>NS</td>
</tr>
<tr>
<td>Ave. Days on Market for Housing Sales</td>
<td>123.04</td>
<td>52.44</td>
<td>75.47</td>
<td>11.96</td>
<td>NS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>TSD</th>
<th>s.d.</th>
<th>COSD</th>
<th>s.d.</th>
<th>Pr&gt;t</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=12</td>
<td></td>
<td>N=20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ave. Percentage Appreciation in Houses Built in 1997(8) and Sold in 2002(3)</td>
<td>4.35</td>
<td>1.45</td>
<td>10.85</td>
<td>4.77</td>
<td>0.087</td>
</tr>
<tr>
<td>Ave. Percent Change in Assessment Values for Houses Built in 1997(8) and Sold in 2002(3)</td>
<td>13.85</td>
<td>1.43</td>
<td>16.28</td>
<td>2.07</td>
<td>NS</td>
</tr>
</tbody>
</table>
CHAPTER 4: CONCLUSION

Population and household dynamics are fueling urban growth that places increasing pressure on natural and cultural areas. In order to make informed decisions, developers and civic officials need to see clearly defined social and economic effects of the choices that they have available. To that end, this thesis examined the social and economic dynamics of the use of conservation in residential subdivisions.

Overall, our findings indicate that conservation subdivision design has many social benefits for residents. Although differences we observed between the subdivisions in social and economic criteria were modest, our careful control of other variables, the internal consistency of our instruments, and the strength of statistical tests support our evidence.

Our results show that residents living in conservation subdivisions report a greater sense of community. Conservation subdivision residents expressed stronger sense of community responses across all 12 statements of the Sense of Community Index (Perkins et al. 1990) than did residents of traditional neighborhoods. This indicates that conservation features play an important role in how members of subdivisions feel they relate to one another.

Our findings also show that conservation subdivision residents express greater satisfaction than traditional subdivision residents with not only their overall quality of life, but many of the other indicators that we used as well. Residents of conservation subdivisions reported greater feelings of attachment, belonging, and efficacy than did residents of traditional subdivisions. Furthermore, other indicators such as access to amenities and safety which can influence sense of community and quality of life were not significantly different between the subdivision types.
Interestingly, the mere presence of open spaces appears to have little effect on resident participation in neighborhood associations. Instead, our results suggest that the communal ownership of those open spaces is a more important factor.

Generally, our results indicate that consumers are willing to pay more for conservation features and that residents of conservation subdivisions find more value in open spaces than traditional subdivision residents. Surprisingly, residents of both conservation and traditional subdivisions perceived the same level of open space availability, even though, conservation subdivision residents have a much greater level of actual availability. This suggests that conservation subdivision residents have a higher ideal amount of subdivision open space than traditional residents. This is supported by our finding that while most types of residents expressed a willingness to pay for additional open spaces in their neighborhood, conservation subdivision residents indicated a much greater willingness to pay. Conservation subdivisions residents see more value in open space than traditional residents.

Furthermore, conservation subdivision residents not only held a higher stated preference for open space than traditional subdivision residents, they demonstrated this preference through higher market appreciation for houses in their neighborhood. Houses in conservation subdivisions appreciated at a greater rate than similar houses in traditional subdivisions during the 5-year period that we examined.

Implications for Policy and Planning

These findings have several ramifications that could enlighten current urban policy. First, conservation subdivisions appear to be an effective way to promote social ties and increase social capital of residents through neighborhood participation as well as protecting
important ecosystem functions. This can provide planners a way to protect designated areas while helping to stimulate the civic involvement of residents living in and near those areas.

Second, the overall resident stated willingness to pay combined with the revealed market appreciation of conservation subdivision houses suggests that consumers are willing to pay more for housing with additional conservation features. This willingness to pay could provide additional profits for developers and additional tax revenue for municipalities. However, it is also important to recognize the demographics of our study in this instance. Respondents to our survey were wealthier than most other Cedar Rapids area residents and therefore could possibly afford to pay more money for conservation amenities. Other residents may not have as much disposable income and could not afford to pay for additional conservation features. Urban officials and developers should take this into account when considering the use of conservation subdivision design as not to exclude lower income individuals from also enjoying the benefits of open spaces and environmental conservation.

A Note on Conservation Subdivision Development

While this study has demonstrated the social and economic benefits that conservation subdivision design has for residents, it is important to note that the methodology does have limitations to consider. Conservation subdivision design should not be viewed as a solution to sprawl or unrestricted urban growth. Subsequent development will simply bypass protected areas and continue to expand past the conservation development. Conservation development is a tool that helps to mediate local environmental effects by preserving vital ecosystems as open space. Through this environmental protection, it is may be to preserve some kinds of biodiversity within the development. Larger-scale biodiversity and ecosystem
protection would require an effort to link open space area across the landscape much like Whyte (1964) envisioned.

**Literature Cited**


April 29, 2004

«First» «Last»
«Address»
«City», «State» «ZIP»

Dear «First» «Last»,

Members of the Natural Resource Ecology and Management Department at Iowa State University, in collaboration with the Iowa Department of Natural Resources Forestry Bureau and Trees Forever, are conducting a research study in Cedar Rapids. The purpose of this study is to examine the patterns and processes of residential development and their impacts on people and the landscape near where they live (i.e. streams, forests, etc.).

You are being asked to participate in this study because your address was randomly selected from among those in 6 neighborhoods that we are focusing our efforts on. If you agree to participate in this study, please complete the enclosed questionnaire soliciting your opinion about the residential area in which you live. It should take approximately 25 minutes to complete the questionnaire. A self-addressed, stamped envelope has been included for you to return the survey to us.

You may skip any question that you do not feel comfortable answering. If for some reason you choose not to participate, please let us know by returning the uncompleted questionnaire. If you do choose to participate, your answers will be kept completely confidential and will be released only as a part of statistical summaries of a large number of survey respondents. When you return the questionnaire, your name will be permanently deleted from our mailing list.

There will be no direct risk or benefit to you, personally, as a result of your decision to participate in this study. However, the information you provide will assist Cedar Rapids and other municipalities in future decision-making regarding residential development.

If you have any questions or concerns about this study, or would like a copy of the results, please feel free to contact us at the address or phone on the letterhead above.

We would like to thank you for considering participation in this important study.

Sincerely,

Jan Thompson
Assistant Professor
Department of Natural Resource Ecology and Management
Iowa State University

Troy Bowman
Research Assistant
Department of Natural Resource Ecology and Management
Iowa State University
Iowa State University Cedar Rapids Resident Survey 2004

Thank you for choosing to participate in this survey. Your answers will help us evaluate the effects of neighborhood design on the lives of residents and the value that residents place on their neighborhood’s open spaces. This survey should take about 15 to 25 minutes to complete. Your responses will be kept confidential and any results released will not include information that could identify you.

Please answer the questions on the following pages and return this form using the envelope provided. If you have any questions, please contact Dr. Jan Thompson or Troy Bowman by phone at 515-294-1458, by email at forester@iastate.edu, or by the mailing address on the cover letter included with this survey.

Please circle the answer that best describes your opinion on the following statements:

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Somewhat agree</th>
<th>No opinion</th>
<th>Somewhat disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I think my neighborhood is a good place for me to live.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>People in this neighborhood do not share the same values.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>My neighbors and I want the same things from the neighborhood.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>I can recognize most of the people who live in my neighborhood.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>I feel at home in this neighborhood.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Very few of my neighbors know me.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>I care about what my neighbors think of my actions.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>I have no influence over what this neighborhood is like.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>If there is a problem in this neighborhood people who live here can get it solved.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>It is very important to me to live in this particular neighborhood.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>People in this neighborhood generally don’t get along with each other.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

2. Overall, how would you rate the quality of life in your neighborhood?
   1 – Very High
   2 – High
   3 – Medium
   4 – Low
   5 – Very Low
3. Would you say the quality of life in your neighborhood is changing for the better, the worse, or remaining the same?
   1 – Better
   2 – Worse
   3 – The same

4. For the next group of statements, please circle the answer that best describes your opinion.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly agree</th>
<th>Somewhat agree</th>
<th>No opinion</th>
<th>Somewhat disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel attached to my neighborhood.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I feel that I belong to this neighborhood.</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I would like to be living in this neighborhood 3 years from now.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I think there is too much traffic in this neighborhood.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I find that the air quality is acceptable.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The level of noise is acceptable.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>This neighborhood is clean and well-kept.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The roads in this neighborhood are in good condition.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>There are enough recreational opportunities in my neighborhood.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>My neighborhood is close to good city schools.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>My neighborhood has good access to shopping areas.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I visit with my neighbors often.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I speak with my neighbors on a regular basis.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>My income is enough to live in this neighborhood comfortably.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I would most likely live somewhere else if I had more money.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Residents are involved in what happens around the neighborhood.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Residents can have an effect on changes to the neighborhood.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I feel safe being alone at home.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>It is safe to walk alone in my neighborhood.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
5. Are you member of your neighborhood association?

1 - Yes
2 - No

If so, about how many hours in the last 3 months have you worked on activities relating to your neighborhood association? _____ hrs

6. Are you or have you been a member of an environment group or cause (i.e. Sierra Club, World Wildlife Foundation, Trees Forever) within the last year?

1 - Yes
2 - No

7. Have you contributed time or money to an environmental group or cause in the last year?

1 - Time
2 - Money
3 - Both Time and Money
4 - No Time or Money Contributed

8. Would you buy a home in a neighborhood with a wide range of housing types including single family, townhouses and apartments?

1 - Definitely Yes
2 - Definitely No
3 - Maybe

9. When you purchased your home, how important were the following factors to you?

<table>
<thead>
<tr>
<th>Factor</th>
<th>Very important</th>
<th>Somewhat important</th>
<th>No opinion</th>
<th>Somewhat unimportant</th>
<th>Very unimportant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Location</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Home amenities (Covered patio, Basement, etc)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Distance to work</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Distance to public schools</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Distance to public transportation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Distance to shopping</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Home Looks/Appearance</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Neighborhood Open Spaces/Natural Areas</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

10. How concerned are you about the impact that building homes has on the environment?

1 - Not at all concerned
2
3
4
5 - Very concerned
11. Which of the following statements best describes your opinion of the rate of development in the Cedar Rapids area?

1 – Growth is too slow
2 – Growth is about right
3 – Growth is too fast
4 – Don’t know, or not sure

12. Please read the following definition and then circle the answer that best describes your opinion on the statements below:

**Open spaces are undeveloped areas in your neighborhood that can include open fields, forests, or parks.**

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly agree</th>
<th>Somewhat agree</th>
<th>No opinion</th>
<th>Somewhat disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>My neighborhood has a good amount of open spaces.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Open spaces provide good places for children to play.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Having open spaces near my house adds to its value.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Open spaces make neighborhoods more livable.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Open spaces or natural areas make neighborhoods more beautiful.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Developers should leave more open spaces when creating housing.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I feel that Cedar Rapids’ natural areas should be more protected.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I wish my neighborhood had more open spaces.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

13. Do you (or anyone in your household) use your neighborhood’s open spaces?

1 – Yes ---------> How often do you (or anyone in your household, use your neighborhood’s open spaces?
2 – No

<table>
<thead>
<tr>
<th>Frequency</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Several times a week</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Once or twice a week</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Once or twice a month</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than once a month</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

14. Please briefly describe how you use your neighborhood’s open areas (You may check more than one category):

- Walking
- Running
- Bird-Watching
- Enjoying Nature
- Other
15. Would you say that your neighborhood’s open spaces have allowed you to meet new people or make new friends?
   1 – Yes
   2 – No

16. Do you consider your neighborhood’s open areas to be:
   1 – Very Safe
   2 – Somewhat Safe
   3 – No Opinion/Don’t Know
   4 – Somewhat Unsafe
   5 – Very Unsafe

17. Please circle the number that best represents the amount of the open spaces within your neighborhood at the current time.

   0 1 2 3 4 5 6 7 8 9 10
   No open spaces Many open spaces

18. Please circle the level you would most like to have within your neighborhood.

   0 1 2 3 4 5 6 7 8 9 10
   No open spaces Many open spaces

   In the next series of questions, we will ask you about your willingness to pay for the amount of open spaces in your neighborhood. By responding, you will not receive a bill or payment of any kind from any government body. These questions will allow us to estimate the value you place on your neighborhood’s open spaces.

19. If your neighborhood had the amount of open spaces that you would most like to have, would you have been willing to pay $2000 more for your house?
   1 – Yes
   2 – No

20. What is the most that you would have been willing to add to the price of your house for the amount of open spaces that you would most like to have? $________

21. If you answered $0.00 to the question above, please indicate the reasons for your answer below (You may choose more than one answer).
   □ I do not find that open spaces add value to my home.
   □ I do not think it is appropriate to place dollar values to open spaces in my neighborhood.
   □ I do not understand the question asked.
   □ I value open space, but I cannot afford it.
   □ Other ________________________________
Now, we would like to know a little about you:

22. What is your gender?
   1 – Male
   2 – Female

23. What do you consider your ethnicity? (You may check more than one box)
   ○ White or Caucasian
   ○ Black or African-American
   ○ Hispanic
   ○ Asian
   ○ Native American
   ○ Other ______________________

24. How old are you? ________ yrs

25. How many people are currently living in your household? ______

26. How many members of your household are school-aged (under 18 years old)? ______

27. Do you have any children currently being home-schooled or attending a private school?
   1 – Yes
   2 – No

28. How long have you been living in this house? ________ yrs

29. What is the highest level of education that you have completed?
   1 – Elementary/Middle School
   2 – High School/GED
   3 – Some College
   4 – 2-year College Degree
   5 – 4-year College Degree
   6 – Post-Graduate Degree

30. What is your current household income?
   1 – Less than $25,000
   2 – $25,000 - $50,000
   3 – $50,000 - $75,000
   4 – $75,000 - $100,000
   5 – $100,000 - $150,000
   6 – $150,000 - $200,000
   7 – More than $200,000

Thank you for your time.

If you would like to receive the results of this survey, which way would you prefer?

- By mail. Mailing Address: ________________________________
- By email. Email address: ________________________________