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Effects of Residential Xeriscape Conversions on Property Values: A Baseline Case Study

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Abstract

The conversion of grass lawns to xeriscape has become more prevalent in the desert Southwest, including here in the Las Vegas Valley. The purpose of this thesis was to determine whether the conversion of residential landscapes from grass lawn to xeriscape influences the property value of a home. This case study involved the comparison of property values for residential homes that had participated in the Southern Nevada Water Authority's Water Smart Landscapes rebate program and non-participant homes with similar amenities before and after the landscape conversion. The results of the analysis show that xeriscape does have a potentially positive impact on the sale price of a home.

Acknowledgements

In connection with this thesis there are several people whose assistance I would like to recognize. I would like to thank Doug Bennet and Kent Sovocool of the Southern Nevada Water Authority (SNWA) for allowing me to use data from the SNWA's Water Smart Landscapes Program for this thesis. Thanks to Kent Sovocool also for scrutinizing the content of this project and providing feedback on my analyses. I would like to extend thanks to Dr. Helen Neill who was a wonderful class advisor and provided unstinting support throughout the thesis process. Finally, I would like to thank my classmates in ENV 499A/B for their suggestions, ideas and moral support.

Introduction

An emphasis on the use of xeriscape, or desert landscaping, for residential homes has become quite prevalent in the arid Southwest, in cities such as Tucson and Phoenix, as a method of water conservation. Here in the Las Vegas Valley, the SNWA and its member agencies have been promoting the concept of xeriscape for both new installations and landscape conversions for a number of years. The SNWA began by conducting a multi-year Xeriscape Conversion Study, begun in 1995, to determine the potential water savings of xeriscape conversions (Sovocool & Rosales, 2002). In 2000, the SNWA began offering a general rebate for the conversion of grass lawns to xeriscape. The declaration of drought in 2003 has dramatically increased participation in this incentive program.

The affects of increased xeriscaping have also been compounded by the rapid growth here in the Valley. The Las Vegas Valley has been listed as one of the fastest

growing areas both in terms of population (U. S. Census Bureau, 2004b) and in terms of the number of new houses built (U. S. Census Bureau, 2004a) for the last several years.

Grass lawns have generally been considered the safest and easiest option when landscaping even though they take a substantial amount of water to maintain. A well-maintained grass lawn is also considered an asset to the value of a home. Xeriscape can completely alter the setting of a home and, as with any major alteration, the final result depends significantly on how well the job was planned and implemented.

There is some disagreement as to how the conversion of grass lawns to xeriscape influences the property value of a home. Critics claim that replacing grass with desert landscaping is detrimental and will lower the value of the home. Advocates, on the other hand, claim that a conversion, properly done, actually increases the home's property value. Currently, very little research is available to assist in resolving this debate.

When you consider the growing popularity of xeriscape, the question of its affect on property values becomes increasingly important. The purpose of this research project is to attempt to determine whether, here in the Las Vegas Valley, the conversion of a residential landscape from grass lawn to desert landscape influences the property value of a home.

The remainder of this thesis includes a review of the research currently available related to this topic, a discussion of the research method used, a description of the data collected, a description and discussion of the analysis performed, and, some concluding remarks.

Literature Review

A considerable body of literature exists on the effects of environmental externalities on property values. The externalities studied cover a wide range of subjects, including the effects of airport noise (O'Byrne, Nelson, & Seneca, 1985), open spaces (Irwin, 2002), and proximity to manufactured housing (Wubneh & Shen, 2004). The breadth of research available demonstrates the significance of the potential affects externalities have on property values.

The effect on property values of the specific environmental externality of landscape has also received a significant amount of attention. The majority of studies on landscape generally focus on two areas. One of these is the proximity of a property to a desirable landscape feature, such as water (Bourassa, Hoesli, & Sun, 2004) or a golf course (Do & Grudnitski, 1995). Do and Grudnitski determined that houses located on a golf course have property values 7.6% higher than properties not on a golf course (1995).

The other major area of focus is on the affect of a specific feature in the landscape, such as the existence of mature trees (Anderson & Cordell, 1988; Mather & Emery, 1999) or quantifying the varying impacts of an assortment of landscape attributes (Des Rosiers, Thérault, Kestens, & Villeneuve, 2002). Studies suggest that “landscape plantings can increase home property values by up to 20% or more” ((Hardy et al. 2000 as cited in Martin, Peterson, & Stabler, 2003, p. 9), and the presence of mature trees in a landscape has been “associated with 3.5%–4.5% increase in sales prices” (Anderson & Cordell, 1988, p. 153).

The impact of xeriscaping, or converting from grass lawn to xeriscape, on property values, however, has received minimal attention. There have been some studies

on the effectiveness of xeriscaping programs, but they generally study the water savings or the economic savings from reduced maintenance and water use (Sokulsky, Nieswiadomy, Gregg, Cobos, Gleason, & Mullarkey, 1994; Sovocool & Rosales, 2002, 2005).

There are numerous non-scientific articles and commentaries regarding how xeriscape/desert landscape affects property values. Advocates claim that, not only do xeriscapes save water, but also that “attractive, water-efficient, low maintenance landscapes can increase home values” (Bianco, 2003, p. 1). Opponents, on the other hand, claim “carpets of grass ... signal a well-tended neighborhood” and, despite the growing popularity of xeriscape conversions, “bluegrass is still king in the suburbs” which “is reflected in home values” (Donovan, 2004, p. 4). Whether the impacts are believed to be positive or negative often appears to depend on whether the author is an advocate or an opponent of xeriscape.

The purpose of the research project discussed in this paper was to attempt to determine whether here, in the Las Vegas Valley, the conversion of a residential landscape from grass lawn to desert landscape influences the property value of a home. The hypothesis being tested is:

H_0 : The conversion of a residential landscape from grass lawn to xeriscape has no effect on the property value of a home;

H_a : The conversion of a residential landscape from grass lawn to xeriscape has an effect on the property value of a home.

My initial assumption was that this research project would show that the conversion of a landscape from a grass lawn to xeriscape does influence the property

value of that home. However, I was uncertain whether the net influence would be positive or negative—when dealing with the impact of any landscape change on the property value of a home, the result likely depends heavily on the appearance of the finished landscape.

Method

As noted in the literature review, an abundance of research has been performed on the affects of various environmental externalities on property values. However, most of this research involved either analyzing the affect of an existing, unchanged externality or basing the analysis on hedonic price method or a subject’s willingness-to-pay. Given these factors, the research project described in this paper could not readily follow the methodology of another paper. Therefore, while the method used in this research project drew on methodology from other papers, it was also independently formed.

The two papers that were primarily used for methodological assistance were “A Five-Year Investigation into the Potential Water and Monetary Savings of Residential Xeriscape in the Mojave Desert: Preliminary Findings” by Sovocool and Rosales (2002) and “Golf Courses and Residential House Prices: An Empirical Examination” by Do and Grudnitski (1995).

This research project was a case study initially involving 37 randomly selected homes that had converted some portion of their landscape from grass lawn to desert landscape in 2003 and had successfully participated in the SNWA’s Water Smart Landscapes program (for map of locations see Appendix A). The decision to include only those properties that *successfully* participated in the conversion program was to ensure that all the conversions met a minimum installation standard (see Appendix B).

Each conversion site, where possible, has one or more corresponding comparison sites that closely match its location and amenities (e.g. square footage, number of bedrooms, pool, etc.). These sites will have some grass lawn and will not have performed a landscape conversion. Comparison sites were selected to help “neutralize the effect of all other location-specific variables” (Do and Grudnitski, 1995, p. 263) and to provide a basis for comparative analysis.

The program SPSS and the handbook *SPSS for Introductory Statistics: Use and Interpretation* (Morgan, Leech, Gloeckner, & Barrett, 2004) were used to assist in performing the analysis.

Data

The conversion sample set consists of residential properties that had successfully participated in the SNWA’s Water Smart Landscapes program. Addresses and conversion information for the primary sample sites were obtained from the SNWA Conservation Division. This set was limited to sites that both initiated and completed a xeriscape conversion in 2003 and had sold their home at least twice between 2000 and 2004—once before the conversion and once after.

General property information (e.g. square footage, number of bedrooms, pool, etc.) was obtained from the Clark County Assessor’s website for both the conversion and comparison sample sites. This was also the principal information source for selecting comparison sample sites that were comparable to each conversion sample site.

Sale price information was also obtained from the Clark County Assessor’s website. This data includes, where possible, sale prices both prior to and following the landscape conversion for both the conversion and comparison sites.

Table 1: Descriptive Statistics for Pre and Post-conversion Sale Prices by Participant Groups

	N	Mean	Median	Minimum	Maximum	Std Deviation	Variance	Skewness	
								Value	Std Error
Conversion Sites Post-conversion	26	320507.31	302445	171000	585000	96790.25	9.4E+09	1.12	0.456
Comparison Sites Post-conversion	75	246207.97	229150	119000	680000	86408.29	7.5E+09	1.886	0.277
Conversion Sites Pre-conversion	26	182619.04	169550	127000	370000	54184.03	2.9E+09	2.128	0.456
Comparison Sites Pre-conversion	33	178360.21	174424	118000	308118	40649.80	1.7E+09	1.165	0.409

Aerial photographs of the Las Vegas Valley provided by the Clark County

Assessor’s Office website were used to assist in selecting comparison sample sites with turf grass landscapes in close proximity to each conversion sample site.

All of the data collected for this case study was secondary data. No direct contact was made with the property owners.

Results

The purpose of the research project discussed here was to attempt to determine whether, here in the Las Vegas Valley, the conversion of a residential landscape from grass lawn to desert landscape influences the property value of a home. The hypothesis being tested is:

H₀: The conversion of a residential landscape from grass lawn to xeriscape has no effect on the property value of a home;

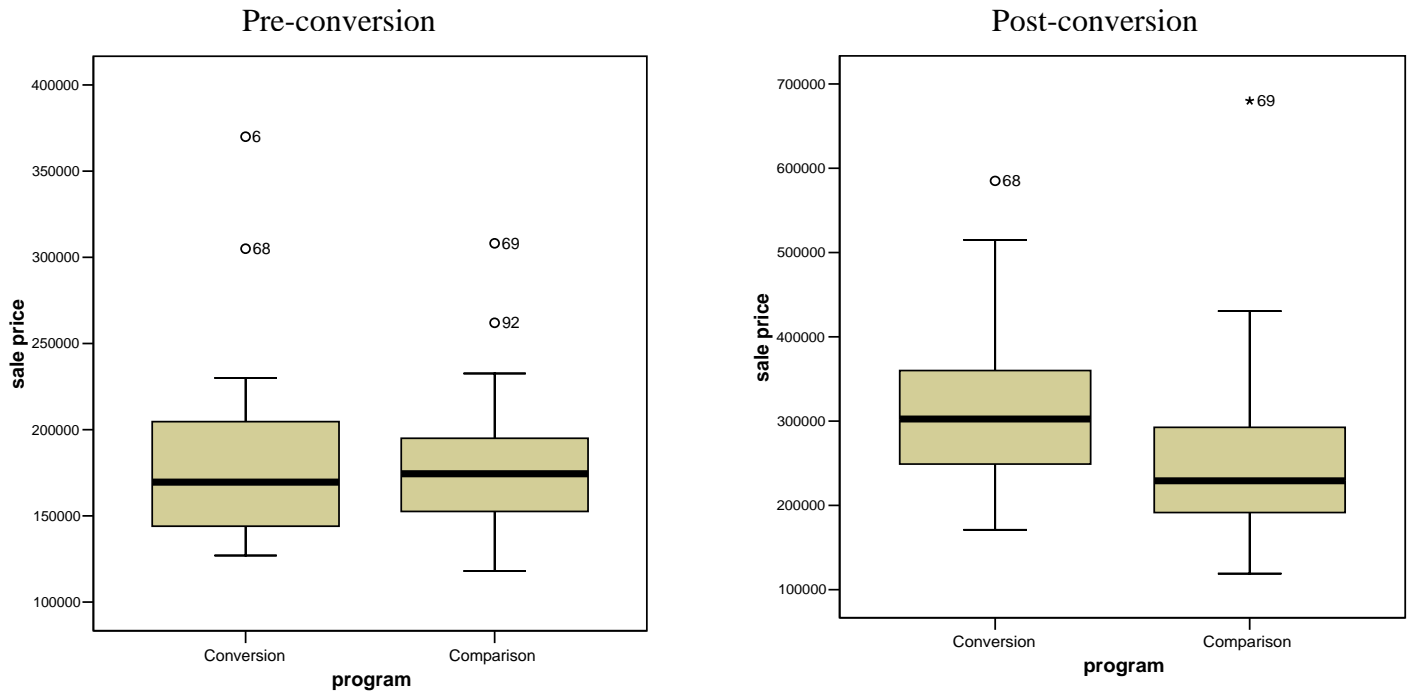
H_A: The conversion of a residential landscape from grass lawn to xeriscape has an effect on the property value of a home

Only 26 of the original 37 conversion sites in this case study were used in the analysis.

This was due to the fact that comparison sites could not be found for the other 11 sites.

The descriptive statistics shown in Table 1 provide some general data about the sales prices for each of the four groups. The difference in the mean values and the median values suggest that some potential outliers exist in the data.

Figure 1: Boxplots with Potential Outliers



The boxplot graphs above (Figure 1) show the potential outliers for each of the four groups. Examination of these potential outliers, however, showed no errors in the data.

The skewness values being greater than 1 (Table 1) implies that the data is not normally distributed (Morgan, Leech, Gloeckner, and Barrett, 2004). Accordingly, a test for normality was performed to check the distribution of data.

Table 2: Tests of Normality for Pre and Post-conversion Sale Prices by Participant Group

	Kolmogorov-Smirnov(a)			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.

Conversion Sites Post-conversion	0.131	26	.200(*)	0.917	26	0.038
Comparison Sites Post-conversion	0.112	75	0.022	0.873	75	0.000
Conversion Sites Pre-conversion	0.192	26	0.015	0.786	26	0.000
Comparison Sites Pre-conversion	0.132	33	0.154	0.928	33	0.031
* This is a lower bound of the true significance.						
a Lilliefors Significance Correction						

The test for normality was significant, $p < 0.05$ or better (Shapiro-Wilk), for all four groups. This confirms that the data is not normally distributed. Given the lack of normal distribution, non-parametric tests were used for the remainder of the analysis.

Table 3: Mann-Whitney U Test of Sale Prices by Participant Group

	Post-conversion	Pre-conversion
Mann-Whitney U	495	416.5
Wilcoxon W	3345	767.5
Z	-3.729	-0.191
Asymp. Sig. (2-tailed)	0.000	0.849

The Mann-Whitney test shows a significant difference between the post-conversion sale price of the conversion and comparison sites, $p=0.001$. The pre-conversion sale price for the conversion and comparison sites was not significantly different, $p=0.849$.

Table 4: Kruskal-Wallis Test for Sale Prices by Sale Year

	Post-conversion	Pre-conversion
Chi-Square	40.559	7.96
df	4	5
Asymp. Sig.	0.000	0.158

The Kruskal-Wallis test compared the mean ranks for each sale year in the post-conversion sale price and did the same for the pre-conversion sale price. The difference between the post-conversion sale price by year proved to be significant, $p=0.001$. The pre-conversion sale price by year was not significant, $p=0.158$.

The results of these analyses reveal that the conversion of landscape from turf grass to xeriscape does have a positive effect on the property value of a home here in the Las Vegas Valley. Therefore, H_0 is rejected.

Discussion

The analysis performed for this research project showed that xeriscape conversions do seem to have an impact on property values. The Mann-Whitney and the Kruskal-Wallis tests were both significant for the post-conversion sale price but not significant for the pre-conversion sale price. Overall, this impact appeared to be slightly positive. Given that the size of this case study was quite small the actual significance of these findings are diluted and may not be attributable to conversions in the Las Vegas Valley's population at large.

A number of random factors that could influence the price for which a house is sold were treated as level for the purposes of this analysis. These include physical characteristics of the homes, such as the visual appeal of the various landscape types, the maintenance of the house, any small interior changes or minor renovations. Possible random factors also include situational differences, such as a homeowner accepting a lower sale price to expedite a sale due to personal circumstances.

Additionally, the impacts of time of sale and rising home values were not factored out of the findings to my complete satisfaction. Not all of the homes were sold in the

same year for either the pre- or the post-conversion groups. The rapid growth here in the Valley and the accompanying rapid rise in home values might also have affected the outcome of the analysis. Further analysis, with improved consideration of these factors, would be warranted on both this data and on future research.

As mentioned previously, research into the impacts of conversion from turf grass to xeriscape on property values is quite minimal. Most existing research on xeriscape conversions focuses on the potential water savings. Opinions on the effects of xeriscaping versus turf grass on property values are primarily discussed in non-scientific articles and commentaries and depend on whether the author is an advocate or an opponent of xeriscape. Given this fact, there is little with which to compare the results of this project.

The data collected for this research project was also used for a paper presented at the international ARES 2005 Meeting in Santa Fe, New Mexico on April 14, 2005 (Rollins, Baker, and Neill; see Appendix E). The regression analysis performed for that paper showed similar results to the analysis that was performed here—there was a somewhat significant positive impact of 6-8%; however, the findings were inconclusive for the overall population due to the small sample size (Rollins et al.). These findings are not surprising given that the same data set was used for both analyses.

Conclusion

This research project was performed in an attempt to determine whether the conversion of a residential landscape from grass lawn to desert landscape (xeriscape) influences the property value of a home in the Las Vegas Valley. This question was of

interest to me due to the increasing prevalence of xeriscape conversions occurring in the area.

The research was performed in the form of a case study involving randomly selected homes that had converted from grass lawn to xeriscape under the SNWA's Water Smart Landscapes program in 2003 and a set of comparison sites with similar locations and amenities.

The results of the analyses performed show that xeriscape conversions do appear to have a potentially positive impact on property values. Given the small sample size involved in this analysis, however, these results may not be attributable to the overall population here in the Las Vegas Valley.

Given the lack of research on the relationship between xeriscaping and property values, there is an abundance of potential future research in this area. A more in-depth case study of the effect of conversion from turf grass to xeriscape with additional factors considered and a more robust sample size would be desirable. A more in-depth analysis, such as multiple regression (like in Rollins et al. 2005) would also be advisable. This would provide a better understanding of which factors are affecting the sale prices and how much of a roll xeriscape plays. Another possible research topic might be comparing how a change in property price due to xeriscape might be influenced by the visual appeal of the landscape. Currently there is a doctoral dissertation underway on the effects of people's preferences in regards to landscape (turf grass vs. xeriscape) on property values (for additional information on the dissertation contact Carole Rollins (see Appendix E) or Dr. Helen Neill).

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