

Landscape Preferences and Attitudes Toward Water Conservation: A Public Opinion Survey of Homeowners in Las Cruces, New Mexico



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Two decades ago, a court ordered the Denver Water Department to promote water conservation in urban landscapes (Hagan, 1988). Since then, numerous experiments have investigated ways to change landscape preferences and reduce urban water use (Lohr and Bummer, 1992; Thayer, 1982). Currently, many leaders of municipalities in the Southwest are considering ways to influence people's landscape choices or methods to reduce landscape water use.

Efforts to change landscape choices have had some success, and there are indications that the public finds diverse landscape types attractive. Landscape preference studies indicate elements of desert landscapes, and desert landscapes themselves, may be preferred over other landscapes (Herzog and Barnes, 1999; Lyons, 1983). People consistently respond positively to plants with blooms or plants that are unusual (Schulhof, 1989). Indeed, when landscape plants were grown with a reduced water budget, Lockett et al. (2002) found flowers, healthy leaves and indications of plant robustness most appealed to viewers.

Educational programs have been used to change attitudes toward water-conserving landscapes (Lohr and Bummer, 1992) and to encourage using native plants (Arizona Municipal Water Users Association, 1998). These programs have relied, in part, on the data generated from research. However, one of the areas that has received limited attention is what factors determine landscape preferences and landscape water use in an arid environment. Therefore, we conducted this study to identify the factors homeowners in Las Cruces, N.M. consider when selecting their managed landscapes.

The purpose of this research report is to summarize the information collected from this study. Information summarized here was collected in spring 2002, using a public opinion survey.

METHODOLOGY

Population Sample

The population for this study included homeowners with residential landscapes in Las Cruces, N.M. According to the city of Las Cruces' Information Technologies Department, the number of residential homes with yards in Las Cruces numbered about 25,000 in 2001. The office provided a random sample of residential homeowners with yards from the tax assessment database. House/land assessments in Las Cruces include a category for landscape as part of the valuation process, so it was possible to choose a random sample of homeowners with yards. Homeowners with yards are more likely to have made landscape choices and, thus, this is an appropriate population to study. The sample was stratified by randomly choosing 100 residences from each of four property value groups for a total sample of 400 residences. According to the Information Technologies Department, approximately 25 percent of homes in Las Cruces fall within each of the following property value categories: \$80,000 or under, \$81,000–\$130,000, \$131,000–\$175,000 and greater than \$176,000. The property values also were designated as low (\$80,000 or under), low/middle (\$81,000–\$130,000), middle/high (\$131,000–\$175,000) and high (above \$176,000). A target population of 25,000 requires a random sample of 378 subjects (Krejcie and Morgan, 1970). A random sample of 400 was drawn so that properties with out-of-city or out-of-state owners or properties owned by the city, a financial institution, a trust or a realty company could be eliminated, while still maintaining a sample of 378. Twenty-two addresses in the sample were removed, because the owners were out-of-city or out-of-state (15) or the city of Las Cruces (3),

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a financial institution (2), a realty company (1) or a construction company (1). The department provided the 400 names and addresses as a list and as two sets of preaddressed mailing labels, which were used to address two survey mailings.

Questionnaire Development

A questionnaire was developed to determine the factors that influence homeowners' landscape selection and landscape water use. The instrument consisted of Likert-scaled items, multiple choice and open-ended questions. Responses and their values for Likert-scaled items were as follows: strongly agree (1), agree (2), undecided/neutral (3), disagree (4) and strongly disagree (5). Many Las Cruces residents are bilingual; many consider Spanish their primary language. Both English and Spanish versions of all survey materials were mailed to subjects. Subjects were asked to complete and return either the English (appendix A) or Spanish version of the survey.

Validity and Reliability of the Questionnaire

A statistician, two professors with expertise in questionnaire development and others with expertise in research and horticulture reviewed the questionnaire for face and content validity. On March 7, 2001, the survey was pretested on a Master Gardener class (22 participants) through New Mexico State University's Cooperative Extension Service. The survey was reviewed based on the Master Gardeners' comments and concerns. After revisions, both English and Spanish versions of the survey were assessed for reliability using a test-retest method. The test-retest was given to respondents to verify that responses were consistent over time (two weeks). The English version was given to 20 volunteers who identified their first language as English and to 10 volunteers whose primary language was Spanish. A standard was set beforehand that specified 80% of responses would not deviate between the test and the retest by more than one response category (on a Likert scale that included five possible responses). If 20% of responses between the test and retest deviated by more than one response category, then the response would be rewritten and retested or discarded. Based on this criterion, two items were revised: the response "to screen the street or neighbors' houses/yards" was eliminated from the question "The most important reasons to landscape are" (question A, see survey in appendix A); and the response "to reduce yard work" was eliminated from the question about "landscaping with desert plants" (question D). Those items were eliminated because responses did not meet the standard of 80% agreement between the test and retest. To reduce the possibility of inadvertently marking a response that was different than intended, we edited a third question with a possible

response of either "would" or "would not," so that the space between the two responses was more clearly delineated.

Data Collection Procedures

Survey materials were mailed to 378 residents on Feb. 25, 2002. Survey materials included English (appendix A) and Spanish versions of the survey, cover letters, raffle entry forms and a preaddressed stamped envelope for returning the completed survey and raffle entry form. The raffle offered a chance to win one of 10 \$25 gift certificates to five local businesses: Wal-Mart stores, Hastings (media sales and rentals), Village Inn restaurant, McDonald's and Allen Movie Theaters. Of the 10 winning raffle entries, eight requested gift certificates for Wal-Mart and two for Hastings.

Survey booklets were color coded to allow easy identification of different property values. The cover colors by property value were low, green; low/middle, cream; middle/high, yellow; and high, tan. To facilitate survey tracking, the back cover of each survey was numbered to match the alphabetical list of names from the tax assessment database.

A total of 154 completed surveys (41% response rate) were returned by April 19, 2002, when a second mailing of the survey was sent to the 224 nonrespondents. Surveys in the second mailing again were numbered in a sequence to match the tax assessment list. Surveys from each of the two mailings were identified separately to discern differences between early and late responders.

An additional 44 completed surveys were returned after the second mailing for a total of 198 completed surveys (52% response rate). A cutoff date of June 7, 2002, was set as the final date for accepting returned surveys. Only one Spanish version of the survey was returned. The property values and the number of surveys returned in each category were as follows: low (35), low/middle (54), middle/high (61) and high (48). Because of differences in the number of respondents for each property value category, the survey results are not based on an equal response rate for each category.

Data Analysis

Data were analyzed using Statistical Analysis System (SAS) for Windows (Release 8.2, SAS Inc., Cary, N. C.). Chi-Square and t-tests revealed no statistical differences between the results from the early and late respondents. Therefore, the two data sets were combined for all statistical analyses.

Survey sections D (landscaping with desert plants), E (feelings about grass lawns), F (feelings about trees), G (statements related to landscape type) and I (what would cause you to reduce water use?), contain items that are similar (Appendix A). Although the analysis does not summate these items within their sets, Cronbach's Al-

Table 1. Most important reasons to landscape (least squares means rating and percent response to strongly agree (SA), agree (A), undecided/neutral (U), disagree (D) or strongly disagree (SD)), n = 187.

Item	SA	A	Percent Response			SD	Least Squares Means ¹
			U	D			
1. To make my yard more attractive	58.2	41.3	0.5	0	0	1.4 a	
2. To make my house more attractive	58.3	39.7	1.6	0.5	0	1.5 a	
3. To increase the property value	40.6	49.2	7.5	2.1	0.5	1.8 b	
4. To provide a place to play or relax	35.6	47.3	10.6	5.3	1.1	1.9 b	
5. To provide shade	28.0	47.9	13.4	9.1	1.6	2.1 c	
6. To express my landscape preferences	9.8	40.8	30.4	15.2	3.8	2.6 d	
7. To create an area that contrasts with the desert	6.5	18.4	39.5	25.4	10.3	3.1 e	

Note: Due to rounding, rows may not add up to 100.

¹Least squares means with the same letter do not differ significantly.

Table 2. Amount of vegetation in respondents' yards, n = 197.

Item	Percent Response		
	None	Some	Many/Much
1. Trees	4.6	68.7	26.8
2. Shrubs	8.1	67.7	24.2
3. Lawn area	15.7	57.1	27.3

Note: Due to rounding, rows may not add up to 100.

Table 3. Amount of vegetation respondents' would like to have in their yards, n = 193.

Item	Percent Response		
	Less	Same	More
1. Trees	5.6	55.1	39.3
2. Shrubs	7.1	58.7	34.2
3. Lawn area	34.6	51.8	13.6

pha was used to assess the intraclass correlation of these item sets. The alpha scores are as follows: D (0.86), E (0.72), F (0.73), G (0.86) and I (0.80).

Preliminary analyses of response variables either compared property value groups or controlled for property value group. In some cases, if the property value group effect was not significant, either the data or the estimates were pooled across property value group. For each survey item, two-way tables were used to summarize the response distribution for each property value group. Homogeneities of the property value group distributions were assessed using Monte Carlo estimates of Fisher's exact test p-values. This was done instead of the chi-squared approximation, because several of the cross-tabulations had expected cell frequencies too small for the approximation to be valid.

A hierarchical linear model was used to analyze selected item sets and assess differences between the

mean responses to items within a set. This model incorporated fixed effects for items and property value group as well as an interaction between property value group and item. Least significant difference ($p \leq 0.05$) was used to identify statistical differences among least squares means of selected item sets.

Logistic regression was used to explore associations between a dichotomous response variable and other variables while controlling for property value group. For those associations with no significant property effects (neither property value main effects nor interactions involving property value group), the data for the four samples were pooled and the simple association reported.

RESULTS

Features Homeowners Value in their Landscapes

Respondents indicated that the most important reasons to landscape were to make their home and yard attractive (table 1). There was a significant difference ($p = 0.03$) between property value groups for the item "To make my house more attractive;" 94% of the lowest property value group strongly agreed or agreed with that statement compared with 98% for low/middle, 100% for middle/high and 98% for the highest property value group. Only 24.9% of respondents agreed that a reason to landscape was to create an area that contrasts with the desert (table 1).

Almost 16% of respondents surveyed did not have a lawn area (table 2). When asked whether they would like to decrease or increase the vegetation in their yard (table 3), 34.6% stated they would like to have less grass than they currently have. Only 5.6% of respondents wanted fewer trees; 39% wanted more trees.

Table 4. Respondents' ground cover preferences, n = 194.

Item	Percent Response
1. Turf grass (buffalo grass, Bermuda grass, etc.)	31.3
2. Landscaping stone or gravel	29.2
3. Natural ground cover, including soil, sand or rocks	16.4
4. Native ornamental grass, native ground cover or native turf grass	12.8
5. Other ¹	5.7
6. Brick, paving stones or concrete	4.6

¹Eleven respondents wrote that they would like a combination of several of the ground covers listed above as the preferred ground cover for their yard.

Nonnative turf grass was the most preferred ground cover (table 4). Natural ground cover, including soil, sand or rocks (table 4), was preferred over an item that included three native plant materials (table 4). There was a significant difference between property value groups ($p = 0.009$) for ground cover preferences. Only 8.6% of the low property value group rated landscape gravel as their preferred ground cover, while 36% of the low/middle, 38% of the middle/high and 26% of the high property value group chose landscape gravel as the most preferred ground cover.

Response to "I would like to change the landscaping in my yard" varied according to property value groups as follows: low (60%), low/middle (52%), middle/high (38%) and high (30%). Of the residents who indicated that they would like to change the landscaping in their yard, 23% wrote that they would like to remove some or all of the grass from their yard. Removing grass was the most frequently mentioned reason for wanting to change landscaping. A lack of money was the most frequently cited answer to the question that followed: "What prevents you from changing your home landscaping?"

"Grass provides a play area for children" was one of the most agreed upon reasons for having a grass lawn (table 5). While respondents agreed that grass required a lot of maintenance (table 5), many (86.8%) agreed with the statement "Trees are part of the landscape I desire" (table 6).

Desert Plants as Vegetation in a Landscape

A much greater percentage of respondents agreed they would use desert plants to landscape their front yard (80.3%) than their backyard (56.3%) (table 7). While a majority reported they would use desert plants for their landscape (table 7), the number of respondents who actually have desert landscaping is much lower (table 8). Residents consistently showed a greater acceptance of desert plants to landscape the front yard (50.5%) than the backyard (23%).

An important factor related to using desert landscaping appears to be whether respondents agreed with the statement: "Do desert plants and desert landscaping fit well with the style of your home?" Of 186 responses, 28 (15%) felt desert landscaping did not go well with the design of their home. Of those 28, all but one (96%) also reported not having desert landscaping in their front yard or backyard. There was a significant difference ($p = 0.02$) between property value and responses to "Do desert plants and desert landscaping fit well with the style of your home?" Seventy percent of respondents in the lowest property group agreed that desert plants fit with their home, compared with 82% (low/middle), 93% (middle/high) and 81% (high) for the other property value groups.

One of the study's objectives was to determine if a perceived lack of variety or availability influenced whether desert plants were used for landscaping. A majority of respondents (57%) either agreed or strongly agreed that desert plants provide the variety they desire (table 9). Furthermore, respondents felt that desert plants are available.

Relationship Between Time Spent in Desert, Rural or Undeveloped Areas and Desert Landscaping Acceptance

No association was found between years spent in the Southwest or years spent in rural areas with a willingness to use desert landscaping in a front yard. There also was no association between length of time spent in rural areas and a willingness to use desert landscaping in a backyard. However, logistic regression of willingness to use desert landscaping in the backyard on length of time in the Southwest revealed a significant association suggesting that a quadratic function could be used to model the relationship (linear coefficient $p = 0.0034$; quadratic coefficient $p = 0.0095$). The relationship's form can be described as follows: 85% of respondents who had spent seven years or less in the Southwest stated they would use desert landscaping in a backyard, compared with only 52% who had lived in the Southwest eight to 50 years. These results contrast with the results for another item, "My attitudes about desert plants have become more positive over time" (table 10, Item 4), to which 85% of respondents strongly agreed or agreed.

There was a significant association ($p = 0.005$) between property value and lifelong residency in the Southwest. Seventy-six percent of respondents in the lowest property value group identified they had always lived in the Southwest compared with 48% (low/middle), 39% (middle/high) and 44% (high) for the other property value groups.

A logistic regression indicates that the association between front yard landscape type (Southwest desert

Table 5. Respondents’ feelings about grass lawns (least squares means rating and percent response to strongly agree (SA), agree (A), undecided/neutral (U), disagree (D) or strongly disagree (SD)), n = 185.

Item	Percent Response					Least Squares
	SA	A	U	D	SD	Means ¹
1. Grass provides a play area for children.	35.3	54.6	7.0	2.1	1.1	1.8 a
2. Grass requires a lot of maintenance.	39.0	45.5	3.2	9.6	2.7	1.9 a b
3. A grass lawn is cooler.	27.0	53.0	13.5	6.0	0.5	2.0 b c
4. Grass is familiar.	17.3	61.1	14.1	5.4	2.1	2.1 c d
5. Grass provides a contrast to the desert.	12.5	62.5	16.9	4.9	3.3	2.2 d e
6. Grass provides a place to lay outside.	16.9	48.9	18.5	14.7	1.1	2.3 e
7. Grass is desirable for landscaping.	16.0	47.6	18.2	11.8	6.4	2.4 e
8. Grass often looks unattractive.	8.1	28.7	18.4	30.8	14.1	3.2 f

Note: Due to rounding, rows may not add up to 100.

¹Least squares means with the same letter do not differ significantly.

Table 6. Respondents’ feelings about using trees in a yard (least squares means rating and percent response to strongly agree (SA), agree (A), undecided/neutral (U), disagree (D) or strongly disagree (SD)), n = 186.

Item	Percent Response					Least Squares
	SA	A	U	D	SD	Means ¹
1. I value the shade provided by trees.	48.7	44.4	5.8	0.5	0.5	1.6 a
2. Trees make an area more beautiful.	47.9	46.8	2.1	3.2	0	1.6 a
3. Trees are part of the landscape I desire.	34.2	52.6	7.9	4.2	1.1	1.9 b
4. Trees increase the value of a home.	29.8	43.1	20.7	5.9	0.5	2.1 c
5. Trees produce too much pollen.	8.8	24.3	32.6	25.4	8.8	3.0 d
6. Trees create too much litter.	4.3	28.0	22.0	35.5	10.2	3.2 e

Note: Due to rounding, rows do not add up to 100.

¹Least squares means with the same letter do not differ significantly.

type or traditional) and time spent in the Southwest depends on property value group ($p = 0.004$). The survey data yielded decreasing percentages of respondents reporting Southwest landscaping in their front yard with increasing time spent in the Southwest. However, the lowest property value group did not show the same trend. For backyards, the logistic regression indicates a significant negative association, with all four property groups reporting a lower percentage of Southwest landscaping in a backyard as time spent in the Southwest increased.

Well-Planned, Neat or Beautiful Qualities as Determinants of Landscape Appeal

A majority of respondents agreed that the qualities of “well-planned,” “neat” and “beautiful” are more important than vegetation type used to create the landscape (table 10). The percentage of respondents (41%) who agreed with the statement “I like yards that provide a contrast to the surrounding desert” (table 10) corresponds well with the 62.2% agreement among those who feel “Desert plants provide the landscape I desire” (table 9).

Factors Influencing Reduced Water Use

Respondents indicated water shortages are the most important factor in reducing landscape water use (table 11). Environmental concerns, high water bills, water rate increases and city regulations followed as the next most likely factors to reduce landscape water use (table 11). However, when results are tabulated using percentage of agreement (strongly agree and agree), then city regulations are the second most likely factor to reduce water use.

A significant positive association existed between property value and agreement that water shortages would cause reduced water use ($p = 0.007$). Ninety-six percent of respondents in the low/middle, middle/high and high property value groups strongly agreed or agreed they would use less water if there were water shortages compared with 74% in the lowest property value group (table 12). A significant positive association ($p = 0.02$) existed between property value and responses to “Do you water your landscape?” Seven percent of the low and low/middle property groups reported they do not water their landscape, while all respondents (100%) in

Table 7. Using desert plants to landscape (percent response to yes or no), n = 192.

Item	Yes	No
1. I would use desert plants to landscape my front yard.	80.3	19.7
2. I would use desert plants to landscape my backyard.	56.3	43.8

Note: Due to rounding, rows may not add up to 100.

Table 8. Actual landscape type reported for front yards and backyards (percent response for each type), n = 195.

Item	Percent Response	
	Front yard	Backyard
1. Southwest desert type landscaping	50.5	23.0
2. Traditional landscaping (turf grass, nonnative trees)	45.4	69.4
3. Other	4.1	7.6

Table 9. Characteristics of desert plants (least squares means rating and percent response to strongly agree (SA), agree (A), undecided/neutral (U), disagree (D) or strongly disagree (SD)), n = 185.

Item	Percent Response					Least Squares
	SA	A	U	D	SD	Means ¹
1. They look attractive.	18.6	58.5	13.3	6.9	2.7	2.2 a
2. They provide the landscape I desire.	24.5	37.8	15.4	18.1	4.3	2.4 b
3. They provide the variety I desire.	12.6	44.3	24.0	14.2	4.9	2.6 b c
4. They provide enough green.	10.8	42.2	17.3	24.9	4.9	2.7 c
5. They are not my favorite plants.	10.1	28.6	21.7	29.1	10.6	3.0 d
6. They look too much like the desert.	8.7	25.1	22.4	32.2	11.5	3.1 d
7. They are too expensive.	2.7	14.1	37.3	33.5	12.4	3.3 e
8. They are not available or can't find.	0	5.5	30.1	40.4	24.0	3.8 f

Note: Due to rounding, rows may not add up to 100.

¹Least squares means with the same letter do not differ significantly.

the middle/high and high property value groups said they do water their landscape.

Responses to “How much do you feel you know about plants?” indicated that respondents who feel they “know a lot” were significantly ($p = 0.04$) less likely than those who “know some” or those who “don’t know much” to use Southwestern landscaping in a backyard. Only 15% of those who responded that they know a lot about plants described their backyard landscaping as Southwestern. Sixty-one percent of those who responded that they “know some” about plants and 24% of those who responded that they “don’t know much about plants” described their backyard landscaping as Southwestern.

DISCUSSION

Many respondents (56%) reported wanting to change their landscape, but cited a lack of money as the reason they had not made the desired changes. Indeed, money may be needed to replace an existing landscape. For example, a majority of respondents said they would use desert plants to landscape their backyard or front yard (56-80%), but a much lower number actually created a landscape that uses desert plants (23-50%). Furthermore, fewer respondents in the higher property value groups stated that they would like to change their landscape.

Although our study found that many respondents report having a desert landscape, 97% reported that they water their landscape regardless of landscape type. Research has shown homeowners frequently overwater their landscape (Cotter and Croft, 1974; Hla et al., 1998). One reason homeowners overwater is due to a lack of awareness about landscape plants’ water needs. Whether homeowners with desert landscaping actually apply less water to their landscapes warrants further research.

Some (7.6%) respondents rated their backyard as “other,” and there was a significant difference among property value groups for those reporting their backyard as “other.” Write-in comments indicated “other” frequently meant the backyard was not landscaped. One area for future research would be to investigate the reasons homeowners do not landscape their property.

Respondents rated grass as the most preferred ground cover (31.3%); 27% of respondents report having “much” grass (table 2). Respondents in the lowest property value group reported the highest percentage of “much” lawn area (40%) compared with low/middle (26%), middle/high (25%) and high (23%) property values. The lowest property value group also reported the highest percentage of “many trees” (46%) compared with low/middle (24%), middle/high (18%) and high (27%) property value groups. Perhaps, lower value homes are located in the city’s older, central areas where more traditional landscapes exist.

Our survey showed that respondents value trees because trees increase property values. Furthermore, respondents indicated that trees make an area more beautiful, provide shade and are part of the landscapes they desire. In a study of preferred vegetation density for front yards, Palmer (1988) found residents of Syracuse, N.Y., preferred a front yard landscape with well-placed shrubs or a landscape with a single ornamental tree and well-placed shrubs. Similar studies are needed to determine preferred vegetation type and density of drought-adapted plants for home landscapes in arid and semiarid areas.

Respondents strongly agreed (88%) with the statement: “I like any type of landscape that looks neat and well cared for.” This finding is consistent with that of Herzog (1989) who found that neatly cared for vegetation was rated as the most preferred and that of Nassauer (1988) who noted neatness is strongly related to attractiveness. Lockett et al. (2002) and Thayer (1982) found drought-tolerant plants, even when grown under reduced irrigation regimes, could be used to create desirable plantings. Thus, demonstration gardens might help develop an appreciation for desert plants in respondents

who feel there is not enough variety or among those who do not feel desert plants create a desirable landscape.

We found that people who reported that they knew a lot about plants were significantly ($p=0.041$) less likely to use desert landscaping. Our research did not test whether knowing a lot about plants equates with knowing about native vegetation. However, people who are familiar with or who have more of an interest in native vegetation have a greater appreciation for landscapes containing those elements (Schulhof, 1989). Whether there is a difference between people who learn about or use native plants and people who learn about or use traditional landscape plants still is an open question.

Previous studies have noted an association between increased length of time spent in desert environments with an increased acceptance of desert landscaping (Kennedy and Zube, 1991). In contrast, we found respondents were less likely to use desert plants in their backyards the longer they had resided in the Southwest. One possible explanation for our results is that some study respondents are residents who have spent much, if not all, of their residency in Las Cruces’ central area, where more traditional landscapes exist. Some central

Table 10. Factors influencing satisfaction with landscapes (least squares means rating and percent responses to strongly agree (SA), agree (A), undecided/neutral (U), disagree (D) or strongly disagree(SD)), n = 192.

Item	Percent Response					Least Squares Means ¹
	SA	A	U	D	SD	
1. I like any type of landscape that has beautiful, healthy plants.	36.5	55.2	3.7	4.7	0	1.8 a
2. I like any type of landscape that looks well planned, with interesting features.	35.2	56.5	4.2	4.2	0	1.8a
3. I like any type of landscape that looks neat and well cared for.	37.1	51.0	5.7	6.2	0	1.8 ab
4. My attitudes about desert plants have become more positive over time.	32.3	52.8	7.7	6.2	1.0	1.9 b
5. I like yards that provide a contrast to the surrounding desert.	11.6	29.6	31.2	23.3	4.2	2.7 c

Note: Due to rounding, rows may not add up to 100.

¹Least squares means with the same letter do not differ significantly.

Table 11. Factors influencing reduced water use for landscapes (least squares means rating and percent response to strongly agree (SA), agree (A), undecided/neutral (U), disagree (D) or strongly disagree (SD)), n = 185.

Item	Percent Response					Least Squares Means ¹
	SA	A	U	D	SD	
1. Water shortages	39.5	53.0	6.0	0.5	1.1	1.74 a
2. Environmental concerns	22.6	48.9	21.0	6.5	1.1	2.17 b
3. High water bills	25.3	46.2	13.4	14.5	0.5	2.19 b
4. Water rate increases	24.6	47.1	13.9	13.4	1.1	2.20 b
5. City regulations	16.1	57.0	16.1	8.6	2.2	2.26 b
6. Information on water conservation	15.4	51.1	24.5	8.0	1.1	2.30 b

Note: Due to rounding, rows may not add up to 100.

¹Least squares means with the same letter do not differ significantly.

Table 12. Respondents' predicted landscape water use in a water shortage, compared by property value (percent response to strongly agree (SA), agree (A), undecided/neutral (U), disagree (D) or strongly disagree (SD) to use less water), n = 184.

Property Value	Percent Response				
	SA	A	U	D	SD
Low	19.4	54.8	22.6	3.2	0
Low/middle	38.5	57.7	3.9	0	0
Middle/high	47.4	49.1	1.8	0	1.8
High	44.4	51.1	2.2	0	2.2

Note: Due to rounding, rows may not add up to 100.

areas of Las Cruces near the Rio Grande have water rights that allow access to large amounts of water. Indeed, seven respondents wrote that they lived in an area with water rights and that desert landscaping did not fit in their neighborhood.

Respondents stated that a water shortage was the most important factor that would cause them to use less water on their landscape. In a study conducted in Rio Rancho, N.M., Brown et al. (2000) also found that water shortage is one of several factors that can influence reduced water use. Currently, some municipalities have strategies, such as increased regulation on water use and water rate increases, to reduce water use in the urban landscape. However, for Las Cruces, a possible effective strategy for reducing water use in landscapes would be to send a clear message to residents that water shortages are inevitable if current water resources are not conserved.

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APPENDIX A

The following survey is part of a research study being conducted at New Mexico State University. This survey is designed to find out what factors influence landscape choices. For this survey, **landscape** means the trees, shrubs and other features that create the design and the plant cover for the front yard and back yard of a home. Your answers will be used to help researchers determine if homeowners in the Southwest feel the plants and landscapes they most desire are available to them. I appreciate your help and thank you very much for taking the time to complete this survey.

Instructions: Answers to the questions in this survey will be used to study landscape preferences. For

each question there are a number of responses. Please indicate how much you agree or disagree with each response by circling the letter that most closely matches your opinion.

Example: The first question is asking about the most important reasons to landscape. The first response statement is “to make my house more attractive”. If you agree with that statement circle either SA for strong agreement or A for agreement. Circle the letter U if you feel undecided or neutral. Circle D if you disagree, or SD if you strongly disagree.

Example question:	Strongly Agree	Agree	Undecided/ Neutral	Disagree	Strongly Disagree
I like trees in my yard:	SA	(A)	U	D	SD

In this case the circled response indicates Agreement with the statement.

A. The most important reasons for landscaping are:

For each item, please circle the letter that best describes your opinion

	Strongly Agree		Undecided/ Neutral		Strongly Disagree
1. To make my house more attractive	SA	A	U	D	SD
2. To make my yard more attractive	SA	A	U	D	SD
3. To create an area that contrasts with the desert	SA	A	U	D	SD
4. To increase the property value	SA	A	U	D	SD
5. To provide shade	SA	A	U	D	SD
6. To provide a place to play or relax	SA	A	U	D	SD
7. To express my landscape preferences	SA	A	U	D	SD
8. Other? (Please write in)					

B. In my **FRONT** yard I **would**/ ____ **would not** ____ use desert plants to landscape. (Please check one.)

C. In my **BACK** yard I **would**/ ____ **would not** ____ use desert plants to landscape. (Please check one.)

D. Please indicate your feelings about landscaping with desert plants (desert plants are plants that have adapted to dry areas and are able to survive with little supplemental irrigation. For this survey, a plant does not need to be native to New Mexico to qualify as a “desert plant”). Please indicate why you would or would not use desert plants in your landscape:

For each item, please circle the letter that best describes your opinion

	Strongly Agree 		Undecided/ Neutral		Strongly Disagree
1. They provide the landscape I desire	SA	A	U	D	SD
2. They provide enough green	SA	A	U	D	SD
3. They look attractive	SA	A	U	D	SD
4. They provide the variety I desire	SA	A	U	D	SD
5. They are not available or can't find	SA	A	U	D	SD
6. There is not enough variety	SA	A	U	D	SD
7. They are too expensive	SA	A	U	D	SD
9. They are not my favorite plants	SA	A	U	D	SD
10. They look too much like the desert	SA	A	U	D	SD
11. Other (please specify) _____					

E. Please indicate your feelings about grass lawns in a yard:

For each item, please circle the letter that best describes your opinion

	Strongly Agree 		Undecided/ Neutral		Strongly Disagree
1. A grass lawn is cooler	SA	A	U	D	SD
2. Grass is familiar	SA	A	U	D	SD
3. Grass provides a place to lay outside	SA	A	U	D	SD
4. Grass provides a play area for children	SA	A	U	D	SD
5. Grass is desirable for landscaping	SA	A	U	D	SD
6. Grass provides a contrast to the desert	SA	A	U	D	SD
7. Grass often looks unattractive	SA	A	U	D	SD
8. Grass requires a lot of maintenance	SA	A	U	D	SD
9. Other (please specify) _____					

F. Please indicate your feelings about trees in a yard:

For each item, please circle the letter that best describes your opinion

	Strongly Agree 		Undecided/ Neutral		Strongly Disagree
1. Trees make an area more beautiful	SA	A	U	D	SD
2. Trees increase the value of a home	SA	A	U	D	SD
3. Trees create too much litter	SA	A	U	D	SD
4. I value the shade provided by trees	SA	A	U	D	SD
5. Trees produce too much pollen	SA	A	U	D	SD
6. Trees are part of the landscape I desire	SA	A	U	D	SD
7. Other (please specify) _____					

G. Please indicate whether you agree or disagree with the following statements related to landscaping:

For each item, please circle the letter that best describes your opinion

	Strongly Agree 		Undecided/ Neutral		Strongly Disagree
1. My attitudes about desert plants have become more positive over time	SA	A	U	D	SD
2. I like any type of landscape that looks neat and well cared for	SA	A	U	D	SD
3. I like any type of landscape that looks well planned, with interesting features	SA	A	U	D	SD
4. I like any type of landscape that has beautiful, healthy plants	SA	A	U	D	SD
5. I like yards that provide a contrast from the surrounding desert	SA	A	U	D	SD
6. Other (please write in) _____					

H. Do you water your landscape? Yes _____ No _____

I. If you do water your landscape—please indicate which of the following would cause you to use less water on your landscape?

	Strongly Agree SA	A	Undecided/ Neutral U	D	Strongly Disagree SD
1. high water bills	SA	A	U	D	SD
2. water rate increases	SA	A	U	D	SD
3. environmental concerns	SA	A	U	D	SD
4. city regulations	SA	A	U	D	SD
5. information on water conservation	SA	A	U	D	SD
6. water shortages	SA	A	U	D	SD
7. other (please specify) _____					

J. The ground cover I prefer most is: (please check one)

- natural ground cover including soil, sand, or rocks
- landscaping stone or gravel
- brick, paving stones or concrete
- turf grass (buffalo grass, Bermuda grass etc.)
- native ornamental grass, native ground cover, or native turf grass,
- other (please specify) _____

K. How would you describe the landscaping in your front yard?

- Southwest desert type landscaping
- Traditional landscaping (turfgrass, non-native trees)
- Other(please specify) _____

L. How would you describe the landscaping in your back yard?

- Southwest desert type landscaping
- Traditional landscaping (turfgrass, non-native trees)
- Other (please specify) _____

M. I would like to change the landscaping in my yard (Please check one) _____ Yes _____ No

If you would like to change your landscaping: How would you change it?

From: _____

To: _____

What prevents you from changing your home landscaping? (Please list all reasons)

N. How much of the following vegetation do YOU HAVE in your yard?

trees (circle one answer) none some many

shrubs (circle one answer) none some many

lawn area (circle one answer) none some many

O. If you could have any amount, how much of the following vegetation would you LIKE TO HAVE in your yard?

trees (circle one answer) less the same more

shrubs (circle one answer) less the same more

lawn area (circle one answer) less the same more

P. Would you please answer some questions about you?

1. How long have you been in your current home? _____ years
2. How long have you been in the Southwest? _____ years
3. If you are not from the southwest; what state (or country) did you live in previously?
(please write in) _____
4. The area I live in now is: ___ center of the city ___ outskirts of city ___ rural
5. While growing up, how much time did you spend in rural areas, or areas with undeveloped landscapes?
_____ Years
6. Do desert plants and desert landscaping fit well with the style of your home? ___ Yes ___ No
7. Do you ___ own your home? ___ rent your home? (Please check one)
8. Do you spend much time thinking about your landscape? ___ yes ___ no
9. How much do you feel you know about plants?
 ___ I know a lot
 ___ I know some
 ___ I don't know much about plants

Additional comments: Please feel free to provide additional comments if you would like. If you would like someone to contact you, please give a phone or email address. Thank you.

Thank you for completing this survey.

To find more resources for your home, family, or business, visit the College of Agriculture and Home Economics on the World Wide Web at www.cahe.nmsu.edu.

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