Assessing and Influencing Attitudes toward Water-conserving Landscapes

Virginia I. Lohr and
Lenore H. Bummer

Additional index words. environmental education, perceptions, urban horticulture, water conservation, xeriscape

Summary. Implementing water-conserving landscapes is one action that many individuals can take to help ease the nation's water crisis, but few people seem to be exercising this option. Some horticulturists attribute this to a negative attitude toward such landscapes. Our research was designed to assess these attitudes and to see if they could be improved with information. Questionnaires were administered to people in treatment or control groups. Those in the treatment group viewed a short videotape about water issues and water-conserving landscapes. Initial attitudes in both groups were neutral or positive, not negative as predicted. Viewing the videotape was associated with significantly improved attitudes. People in the treatment group described water-conserving landscapes as less hot, more colorful, and more attractive three weeks after viewing the videotape than they had initially.

Water conservation is a critical issue in areas where demand for water is increasing and supply is limited (El-Ashry and Gibbons, 1987; Funk 1988). The largest single residential use of water is landscape irrigation, accounting for 40% to 70% of domestic water use for typical residences (Cotter and Croft, 1974; Ferguson, 1987). These quantities can be reduced through careful landscape design and management (Thayer and Richman, 1984). The public is often reluctant to implement such water-conserving methods for a number of reasons, including a lack of awareness of the issue.

Some programs, such as Denver's xeriscape program have been successful in encouraging lower water-use landscaping as a long-term measure by using extensive public education (Denver Water Dept., 1982). In the event of severe or temporary shortages, some municipalities have imposed rationing and limitations on landscape irrigation, resulting in unattractive landscapes and injury to plants. When the immediate crisis subsides, water use tends to creep up to preshortage levels (Thayer, 1982).

One reason that water-conserving measures have not been widely used may be a lack of knowledge about the issue. Cotter and Croft (1974) assessed water use at a university campus and found that the maintenance crew was

Department of Horticulture and Landscape Architecture, Washington State University, Pullman, WA 99164-6414.

H/LA Paper no. 89-30, College of Agriculture and Home Economics Research Center, Pullman, WA 99164.

applying excessive water. After the crew was trained, irrigation levels continued to be higher than necessary for optimal plant growth but were significantly reduced from pretraining levels. Another explanation for the lack of landscape water conservation may be that individuals who have seen unattractive or uninviting water-conserving landscapes are reluctant to establish them. This attitude was noted by Cotter and Croft (1974), who found that homeowners established traditional landscapes because they found them more attractive than water-conserving landscapes.

Although we found no studies specifically assessing preconceptions of water-conserving landscapes, several have shown that such landscapes can be aesthetically pleasing. Thayer (1982) reported that respondents rated landscapes with mulch or water-conserving ground covers as pleasing as those with turf, provided the surface was not intended for sitting or lounging. Cotter and Croft (1974) assessed various landscapes and found that several design factors determined to be aesthetically pleasing, such as "concrete areas attractively shaped," also could contribute to conservation of water. Kennedy and Zube (1991) reported that a majority of the residents of Tucson, Ariz., felt that the vegetation in their city should be a continuation of the surrounding desert vegetation, because, for example, some felt that desert landscaping was attractive. These studies suggest that water-sparing landscapes would be more readily accepted by the public if aesthetic alternatives to traditional landscapes were more evident.

This study was designed to document attitudes toward water-conserving landscapes and to determine if educational materials designed to change attitudes could improve these perceptions. We developed a questionnaire to assess attitudes toward water-conserving landscapes and to measure changes in those attitudes, and we developed a short videotape to present information about and images of water-conserving landscapes.

The 12 1/2-min videotape- *Water-Conserving Landscapes: Responsible, Beautiful, Inviting* -encapsulated and standardized the information to be presented in this study. It contained basic information about the status of water problems from a national and global perspective, methods to conserve water in the landscape, and positive images of well-designed, water-conserving landscapes. To induce the viewer to conserve water in the landscape, we incorporated persuasive techniques (Haney and Ulmer, 1975).

The attitude questionnaire was developed using various testing procedures, including preliminary interview sessions, review by experts, and pretests with four different test groups. The final form of the attitude questionnaire consisted of 29 paired opposite adjective phrases, using a Semantic Differential Scale (Anderson, 1987). Respondents were asked to place an "X" along a graphic scale at the location that most closely approximated their view of water-conserving landscapes. A typical question looked like this:

Wet :__ :__ :__ :__ :__ : Dry

On a preliminary questionnaire with similar adjective pairs, graduate students and faculty in ornamental horticulture and landscape architecture were asked to mark the statements reflecting their attitudes toward well-designed landscapes in general and not specifically toward water-conserving ones. These answers were used to determine which adjective in each pair should be given a high value and

which should receive a low score. We assumed that if attitudes toward water-conserving and well-designed landscapes were similar, people would be more likely to install the water-conserving landscapes than if attitudes about the two landscapes were very different.

Attitudes toward water-conserving landscapes were computed by scoring responses to individual adjective pairs on a scale where the most positive response to a given pair received a 5 and the least positive a 1. Total attitude scores were calculated by averaging the responses for all 29 pairs. An overall score above 3.5 was defined as a positive attitude, a score between 3.5 and 2.5 was considered neutral, and a score below 2.5 represented a negative attitude.

The questionnaire was given to 100 students, faculty, and staff from various disciplines at Washington State Univ. in Pullman, a dry region of the state. The participants represented diverse backgrounds, including individuals from local, national, and international locations. Fifty-nine percent of the participants reported that they had had to limit their use of water at some time, and 58% of that group reported that the experience had not been positive. Thirty-nine percent said they were currently trying to limit their use of water, and 90% would consider living in a home with a water-conserving landscape.

Participants were randomly assigned to a control group or a treatment group. All participants completed an initial questionnaire, which was used to determine their attitudes toward water-conserving landscapes. Participants in the treatment group then watched the videotape. Participants in both groups were asked to complete a repeat questionnaire $\approx$ 3 weeks later [3 weeks has been shown to be adequate time to eliminate short-term outcomes and accurately express long-term attitude changes (Triandis, 1971)].

Changes in scores between the initial and repeat questionnaires were compared within groups with a paired t test. Total attitude scores of the treatment group were compared with those of the control group using analysis of variance. Thirty-six people in the control group and 46 people in the treatment group completed both questionnaires and were included in the analysis.

The first objective of this study was to determine the actual attitude of participants toward water-conserving landscapes. Those in the control group scored 3.5 and those in the treatment group scored 3.6, indicating that their attitudes were neutral or slightly positive toward water-conserving landscapes. There was no significant difference in initial total attitude score between the groups. These results disproved the hypothesis that people do not implement water-conserving landscapes because they have negative preconceptions about them. In fact, both groups initially associated water-conserving landscapes with such statements as "comfortable," "interesting," and "beautiful" (see Table 1), indicating that their preconceptions were more positive than we had anticipated. In areas of the country where examples of poorly designed water-conserving landscapes are more evident, results might have been different. Participants in this group seemed to have some awareness of issues related to water conservation, because they also described water-conserving landscapes as ecologically sound, needed, and valuable.

The second objective of the study was to determine if attitudes toward water-conserving landscapes could be improved by explaining why they are important and by show-

Table 1. *Initial scores and difference from final scores (Final – Initial)^a (tested 3 weeks later) for participants in the control group and treatment group (viewing a videotape about water-conserving landscapes immediately after completing the initial questionnaire).*

Adjective pair		Control		Treatment	
Positive pole	Negative pole	Score	Difference (F – I)	Score	Difference (F – I)
Areas without plants	All planted	2.5	–0.1	2.5	0.5*
Beautiful	Unattractive	3.8	0.1	4.0	0.6**
Calming	Hectic	3.9	0.1	4.0	0.3
Colorful	Gray and dull	3.5	0.5**	3.7	0.7**
Comfortable	Uncomfortable	4.1	–0.1	4.1	0.3*
Conserving	Consuming	4.3	0.1	4.3	0.4**
Cool	Hot	2.8	0.3	2.9	0.3*
Ecologically sound	Environmentally damaging	4.3	0.3*	4.6	0.3*
Interesting	Monotonous	4.3	–0.2	4.4	0.3**
Inviting	Uninviting	3.8	0.1	4.1	0.2
Low maintenance	High maintenance	3.1	0.4	3.8	0.5*
Natural	Manicured	3.8	0.0	3.8	0.1
Needed	Unneeded	4.3	–0.1	4.5	0.0
No special irrigation	Complex irrigation	2.7	0.5	3.3	0.5*
No turf	All turf	2.9	0.2	3.2	0.3
Organized	Disorganized	4.2	0.0	4.1	0.1
Original	Routine	3.8	0.1	3.7	0.5**
Regional identity	Could be anywhere	2.9	0.1	3.3	–0.9**
Rewarding	Unrewarding	4.0	0.2	4.4	0.3
Rugged	Delicate	3.0	0.1	3.2	–0.3*
Satisfying	Not satisfying	4.0	0.0	4.1	0.3
Simple	Complex	2.7	0.1	2.8	0.4
Slow growing	Fast growing	2.8	0.3	2.9	–0.2
Spacious	Constricted	3.5	–0.1	3.5	0.3
Tall	Low	2.6	0.1	2.7	0.2
Unusual plants	Common plants	3.2	0.3	3.0	0.2
Usable by people	Passive landscape	3.4	0.0	3.8	0.5*
Valuable	Worthless	4.3	0.1	4.4	0.2
Wet	Dry	2.9	0.4	2.9	–0.3

^aScore based on a scale from 1 to 5, with 5 being the most positive score. Scores between 2.5 and 3.5 were considered neutral.

*,**Significant at $P = 0.05$ or 0.01 , respectively, based on a paired t test.

ing positive examples. After viewing the videotape, the treatment group's total attitude score increased to 3.9 (significantly different from initial at $P = 0.01$). The control group's total attitude score of 3.6 was significantly lower than that of the treatment group.

Significant changes were noted on 15 of the 30 individual statements for those in the treatment group but on only two of the statements from the control group (Table 1). Respondents in the treatment group found that water-conserving landscapes contained more areas without plants than they had previously thought. They also found that these landscapes were more attractive, colorful, comfortable, conserving, cool, interesting, and usable than they had initially thought. They reported that these landscapes were more ecologically sound, required lower maintenance, used less specialized irrigation, and were less rugged than they had initially noted. They found these landscapes to have less regional identity after viewing the videotape than before. These responses could indicate that the videotape effectively

communicated the message that water-conserving landscapes do not have to look dramatically different from traditional landscapes.

The particular statements with the greatest score changes tended to be related to visual or philosophical aspects of the issues presented in the videotape. The visual responses, such as "attractive" or "colorful," related directly to the visual nature of the videotape. The philosophical statements, such as "ecologically sound" or "original," indicated a change in the way the respondents thought about these landscapes and may indicate an increasing willingness or readiness to implement water-conserving landscapes.

Ultimately, positive attitudes toward water-conserving landscapes are crucial in enhancing their long-term use. Psychological literature speaks of an attitude as the tendency of the individual to act in a certain manner when faced with a situation (Oppenheim, 1966). Studies show that some attitudes can be changed more readily if the original attitude is not central or extremely important to the belief system of

the individual (Fishbein, 1967). Our results indicate that people's attitudes toward water-conserving landscapes are not deeply held, because we were able to readily change those attitudes by showing a brief videotape.

In the face of water shortages, positive attitudes toward water-conserving landscapes could influence people to change the design, management, or plants used in a landscape; or, contrarily, people could wait out the crisis and return to their original landscape practices. Actual behavior ultimately will be the yardstick by which the effectiveness of attitude change and successful educational programs will be measured. We have shown that people's attitudes toward water-conserving landscapes, or their tendency to implement such landscapes, can be enhanced. To turn these improved tendencies into action may require additional information on how their desires can be met.

Literature Cited

- Anderson, J.E. 1987. Assessing affective characteristics in the schools. Reston Publishers, Reston, Va.
- Cotter, D.J and D.R. Croft. 1974. Water application practices and landscape attributes associated with residential water consumption. New Mexico Water Resources Res. Inst., Technical Completion Rpt., Project no. C-4060 NMEX, Las Cruces.
- Denver Water Department. 1982. Water conservation through creative landscaping: Xeriscape garden. Office of Water Conservation, Denver Water Dept., Denver.
- El-Ashy, M. T. and D. C. Gibbons. 1987. Managing the West's water. J. Soil & Water Conservation 43(1):8-13.
- Ferguson, B.K. 1987. Water conservation methods in urban landscape irrigation: An exploratory overview. Water Resources Bul. 23(1):147-152.
- Fishbein, M. 1967. A behavior theory approach to the relations between beliefs about an object and the attitude toward the object. In: M. Fishbein (ed.). Attitude theory and measurement. Wiley, New York.
- Funk, W.H. 1987. Water quantity and quality: The growing crisis in the United States. Washington's Land and People 1(1):5-7.
- Haney, J.B. and E. J. Ulmer. 1975. Educational communications and technology. 2nd ed. William C. Brown Co., Dubuque, Iowa.
- Kennedy, C.B. and E.H. Zube. 1991. Attitudes towards vegetation in a desert urban forest: Creating a sense of place. J. Arboricult. 17(6):159-166.
- Oppenheim, A.N. 1966. Questionnaire design and attitude measurement. Basic Books, New York.
- Thayer, R.L., Jr. 1982. Public response to water-conserving landscapes. HortScience 17(4):562-565.
- Thayer, R.L., Jr. and T. Richman. 1984. Water-conserving landscape design, p. 185-213. In: E.G. McPherson (ed.). Energy conserving site design. Amer. Soc. Landscape Architects, Washington, D.C.
- Triandis, H.C. 1971. Attitude and attitude change. Wiley, New York.