

## A CASE STUDY OF IMPLEMENTING WATER CONSERVATION IN AN INSTITUTIONAL SETTING

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Institutional landscapes, such as public schools, can play an important role in water conservation programs because they have large irrigated areas, are highly visible, and can be good examples of water conservation to the entire community. However, a number of factors such as cost, time, knowledge of turfgrass management, and the irrigation system itself limit irrigation management at many schools. Our study investigated how to best approach irrigation management and water conservation in this type of setting and determine if a conservation program should be pursued in the school district studied here. Our goals were to examine:

- (1) three water conservation approaches and determine which is most effective in achieving water savings in a public institutional setting
- (2) water use at some elementary schools, and quantify the potential water savings.

Water use was monitored at 40 elementary schools in the Granite School District, which includes many suburban communities south of Salt Lake City, Utah. The water use was also compared to historical water use amounts and evapotranspiration (ET) based plant water needs. The conservation programs or treatments were: (1) an educational program where managers—school custodians—were educated on water conservation and given ET based water schedules to use; (2) a prescribed ET based water schedule provided without the education program, and (3) a directive where custodians were told by supervisors to conserve water with no further resources.

Only 10 schools had automatic or clock controlled irrigation systems, so these were randomly assigned to the three conservation programs. Twenty schools with manual irrigation systems were then randomly assigned to the same three programs. Ten schools, all having manual irrigation systems were selected to serve as controls. Before the treatments were implemented, all 30 custodians involved in the three treatments were interviewed separately to obtain background information on the custodian, the irrigation system, the watering routine, factors that influence irrigation, and water conservation. The custodians from the treatment groups were given water diaries to fill out daily in 1996 and 1997. The diary included sections on the watering routine, efforts to conserve water, and what inhibited the custodian from saving water. None of the custodians at the control schools were interviewed throughout the experiment.

In general, the water conservation treatments did not significantly influence water use in the schools studied here. Water use at schools that received the directive and educational treatments decreased, while the schools receiving the prescriptive treatment increased, although not significantly. The educational and directive treatments both were based more on the ingenuity of the custodian, while in the prescriptive treatment the custodians only needed to follow an irrigation schedule (which many didn't). Custodians at schools in the educational treatment could tailor irrigation schedules to their needs while the custodians in the directive approach were left to their own initiative for figuring out how to achieve water savings. Both treatments depended on the custodians' abilities to achieve change on their own. The success of the prescriptive group was simply about the custodians' ability to follow an order. These results were somewhat different than our expectations. Prior to the study, we predicted that the educational treatment would result in the greatest water savings, followed by the prescriptive treatment, with the directive treatment resulting in the least water savings.

During the study period, irrigation amounts compared to historical water use, did not show differences among treatments. As a check, water use for the pre-study years (1991-1995) were found to be statistically equal as expected. An important constraint of this study that may have limited treatment effects was that 75% of the irrigation systems in this study were manual irrigation systems. However, significant differences in water use of the irrigation systems were observed. Automatic systems consistently applied more water to the landscaped areas than the manual systems. The average school with a manual irrigation system applied 3.17 cm/yr over ETo estimates while those with automatic irrigation systems applied 18.27 cm/yr above ETo needs during the project years. Most of the custodians simply did not have enough time in their work day to over-water, leaving little room, or need, for water conservation.

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While not readily observable in the water use data described above, the educational treatment had an impact on custodian behavior based on interviews. Custodians in the educational group that attempted to follow the irrigation schedule reported they watered fewer hours in response to training. The main adjustment made

by the custodians was to change how long an area was watered. Many custodians also reduced run times during and after wet weather. Fewer custodians adjusted the time of day and frequency they irrigated.

Providing a schedule with no training had less impact on custodian watering practices. Only 56% of the custodians in the prescriptive group in 1996 and 67% in 1997 said they followed the water schedule. The reasons cited for not following the schedule included feasibility of the schedule and fear that following the schedule would result in a brown landscape. Few custodians in the prescriptive group (22% in 1996 and 11% in 1997) said the water schedule had an impact on watering.

The effectiveness of the directive treatment was difficult to measure since only 44% of the custodians in 1996 and 60% in 1997 were certain they had received directions from their supervisor stressing the need to conserve water. Several custodians felt they were receiving a conflicting message of being told to keep the grounds green while at the same time being told to save water.

Overall, the custodians felt that they conserved water. In the 1998 post-season interview all the custodians from the three treatment groups were asked if the water conservation treatment they implemented helped to save water. Seventy percent of all the custodians answered yes.

Although our results have shown over-watering in some schools of the Granite School District, the average school, which has a manual irrigation system, does not over-water and therefore a district-wide water conservation program would not make economic sense. The Granite School District, or districts like it, needs to target the type of schools that have historically over-watered, specifically schools with an automated irrigation system. If more drastic water reductions are needed, the only option for these districts may be to reduce the turf area. From the standpoint of water usage, a manual system was more effective in saving water than an automated system, but a public institution must consider more factors than just water usage when choosing an irrigation system. An automated system gives the custodian more time to perform their other duties.

If water conservation programs are instituted in this type of environment, the programs must be flexible and carefully established to have the most participation by the landscape managers. Simply providing information or directives are not adequate.