CHALKBOARD

TIPS FROM THE PROS

MAKING IRRIGATION SYSTEMS WEATHER CONSCIOUS

Recently Hurricane Hugo drenched the Atlantic Coast... seven inches of rain fell in two days in Atlanta... New Jersey experienced its wettest summer in decades. Who could have predicted such a huge swing in rainfall after three consecutive years of drought?

Just a few months ago, many golf course superintendents shut down irrigation to their roughs and fairways so they would have enough water for their greens and tees. Groundskeepers calculated their turf losses from last year's drought and purchased seed in record volumes to renovate parched fields. Sports turf managers across the country watched helplessly as their wells and reservoirs dropped lower than they ever had in memory.

The futility of maintaining safe, durable turf without an irrigation system finally sank in. The idea that irrigation and conservation go hand in hand is gaining acceptance.

The very nature of institutional irrigation systems installed at golf courses, parks, stadiums, and schools reduces the potential for water waste. As Keith Shepersky, product manager in the Turf Division of Rain Bird, in Glendora, CA, explains, the precipitation rate of small residential or commercial pop-up sprinkler heads is up to four times greater than that of institutional impact or rotary heads. Many small heads with a throw of 15 feet or less apply four inches of water per hour. The heads typically used by sports complexes that reach 50 feet or further apply from 1/3 inch to 3/4 inch per hour. That difference alone decreases the potential for water waste.

The greatest savings are possible by adjusting irrigation cycles according to the needs of your particular turfgrass. Those needs obviously vary according to the weather in your area. They are greatest during the summer, when high temperature, low humidity, wind, and decreasing cloud cover combine to raise the water requirement of plants.

In the past, good groundskeepers discovered that by changing cycle times and watching the condition of the turf they could determine what seasonal adjustments were necessary. Shepersky recommends that such adjustments be made at least four times a year.

Even the most basic irrigation systems can conserve water automatically if they include rain switches and/or moisture sensors, explains Wade Terry, director of marketing for Toro Irrigation, Riverside, CA. A rain switch is like a rain gauge. It collects precipitation in either a cup or absorbent disks. When the amount of rainfall reaches a certain point, a microswitch interrupts the flow of electricity in the common wire, causing the valves to close. The program in the controller continues to run normally.

Power is not restored to the valves until the rain switch is reset or the water collected evaporates. The turf manager can adjust the amount of rainfall required to activate the switch. This prevents a brief shower from stopping irrigation.

Moisture sensors detect the amount of moisture in the soil where they are located. Buried in the root zone, a sensor uses electrical, chemical, or physical means to determine when soil moisture reaches a predetermined level. At this point, the sensor signals a control module which can interrupt the power to valves. When moisture drops below this level, normal operation is restored.

"Moisture sensors allow the irrigation to run only when needed," states Terry. "They also take into account the field capacity of the soil." Field capacity is the maximum amount of moisture soil particles will hold. Beyond this point, water rather than air begins to occupy the pore spaces in the soil. The result is poor aeration and loss of water through the soil profile by gravity.

Moisture sensors can be installed to shut down all the valves on a controller or individual valves. By using sensors on slopes, low spots, shaded sites, and sandy

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Modified Average Midsummer Daily E.T. Rates

Data gathered by the Soil Conservation Service and Modified by Rain Bird Sales

State/City	*ET*
Alabama	
Montgomery	.21
Mobile	.20
Alaska	
Anchorage	.16
Fairbanks	.20
Arizona	
Flagstaff	.23
Phoenix	.30
Tucson	.27
Arkansas	
Little Rock	.20
California	
Bakersfield	.25
Fresno	.25
Los Angeles	.20
Palm Springs	.37
Sacramento	.20
San Francisco	.15
Colorado	
Denver	.18
Pueblo	.20
Connecticut	
Hartford	.20
New Haven	.20
Delaware	
Wilmington	.20
Florida	
Fort Myers	.24
Jacksonville	.25
Tampa	.26
Georgia	
Atlanta	.23
Augusta	.24
Savannah	.24
Hawaii	
Hilo	.17
Honolulu	.20
Idaho	
Boise	.24
Pocatello	.22
Illinois	
Chicago	.19
Springfield	.21
Indiana	
Evansville	.21
Indianapolis	.21
Iowa	
Des Moines	.21
Sioux City	.20
Kansas	
Topeka	.25
Wichita	.26
Kentucky	
Louisville	.20
Louisiana	
Baton Rouge	.20
New Orleans	.20
Maine	
Portland	.16
Maryland	
Baltimore	.16
Massachusetts	
Boston	.20
Pittsfield	.19
Michigan	
Detroit	.20
Muskegon	.17
Minnesota	
Duluth	.15
Minneapolis	.20
Mississippi	
Biloxi	.19
Vicksburg	.21
Missouri	
Kansas City	.21
St. Louis	.20
Montana	
Billings	.24
Helena	.20
Nebraska	
Norfolk	.20
Omaha	.23
Valentine	.25
Nevada	
Las Vegas	.30
Reno	.23
New Hampshire	
Concord	.13
New Jersey	
Atlantic City	.19
Newark	.17
Trenton	.19
New Mexico	
Albuquerque	.30
Las Cruces	.33
New York	
Albany	.16
Buffalo	.15
New York	.19
Syracuse	.15
North Carolina	
Charlotte	.19
Raleigh	.19
North Dakota	
Bismark	.20
Ohio	
Cleveland	.21
Columbus	.23
Oklahoma	
Oklahoma City	.30
Tulsa	.28
Oregon	
Portland	.18
Pennsylvania	
Harrisburg	.17
Philadelphia	.20
Pittsburgh	.18
Rhode Island	
Providence	.19
South Carolina	
Charleston	.19
Columbia	.20
South Dakota	
Sioux Falls	.24
Tennessee	
Nashville	.19
Memphis	.17
Texas	
El Paso	.29
Fort Worth	.28
Houston	.27
Utah	
Salt Lake City	.21
Moab	.33
Vermont	
Burlington	.17
Virginia	
Norfolk	.19
Richmond	.19
Washington	
Seattle	.15
Spokane	.19
West Virginia	
Charleston	.16
Wisconsin	
Madison	.20
Milwaukee	.18
Wyoming	
Cheyenne	.19
Jackson	.20
New Castle	.22

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soils, you won't have to overapply water to one area to meet the needs of another.

A third device which can lead to water savings is the flow meter. By installing flow meters at the pump station or water source, you know how much water you use on a daily basis. Any change in use alerts you to leaks and malfunctions in system operation. Flow meters installed on key mains can help you pinpoint localized irregularities. Useful information can also be derived from pressure gauges.

Shepersky calls the above devices "water-saving hardware." He makes this distinction because computers are playing a larger role in the sports turf industry. Computers, ranging from small solid-state controllers or satellites to sophisticated central controllers, have a flexibility not available from mechanical clocks. By adding software to these microprocessors, irrigation manufacturers have expanded the range of water-saving features.

One of the first advances in software was water budgeting. This allows the irrigation manager to reduce or increase all cycle times on a controller by a percentage. Instead of changing all the times for each station and program, you simply enter the percentage that you want all the times to change. This feature is available on most satellites and central controllers.

Water-budgeting software has been refined further to include a more precise adjustment for weather conditions, called evapotranspiration (ET). This is an estimation of the amount of water used by turf or lost to the atmosphere during a given period of time, usually one day. To arrive at this number, state or local water agencies use a formula which includes temperature, humidity, solar radiation, wind speed, and rainfall. The result is the amount of water in inches that needs to be replaced by irrigation.

The Soil Conservation Service (SCS) has published a list of average midsummer daily ET rates for many cities across the country. Shepersky points out that the SCS rates were geared to pasture and forage-type grasses, but they are close enough to turfgrasses to be valuable.

For example, on an average summer day in Illinois or Indiana, a turf manager would need to replace about two-tenths (0.2) inch of water through irrigation. In most cities in Florida, the daily ET would average one-quarter (0.25) inch, while in Seattle, WA, the rate would be 0.15 inch. The highest ETs listed are 0.37 inch for Palm Springs, CA, 0.33 inch for Moab, UT, and .30 for Laredo, TX, and Phoenix, AZ. On a weekly basis, turf managers in these areas should be applying anywhere from one to two-and-one-half inches of water during the summer.

When you compare ET to the precipitation rate of your sprinkler heads, you get an approximate idea of the cycle time you should be using during the summer. Let's say a golf course superintendent in Seattle and one in Phoenix both have sprinkler heads that apply one-half inch of water per hour. The Seattle superintendent would be running his stations for 18 minutes, while the one in Phoenix would be running his twice that long.

Although many newspapers and some state water agencies publish ET rates for cities, variations within an area are likely. For example, in Phoenix ET differs depending upon the elevation. Large water users, such as golf courses and parks, can conserve by installing a weather station on site.

Weather stations provide localized data which many central irrigation computers can convert to ET. Superintendents can use this information to adjust their irrigation schedules with water-budgeting programs, or the computer can change the run times automatically.

Sports turf managers today have the ability to make their irrigation systems "weather conscious." By adding hardware and software, they can conserve water more effectively than other turf managers. You can predict weather within certain limitations, or you can react precisely to rain, heat, wind and sun by making your irrigation system weather conscious.