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Water Conservation Practices: Landscape Irrigation

Part 2 of 5 in the series "Water Conservation in Connecticut Landscapes"

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Changing weather patterns and increasingly dry conditions have made water conservation in Connecticut landscapes a priority. The potential for another year of less than adequate rainfall compels the reconsideration of seasonal irrigation practices. Landscape professionals and home gardeners can adopt simple and smart water conservation strategies. **When irrigation is a component in the outdoor landscape, best management practices should be followed to reduce water consumption and maximize plant health.**

I. THE WATER/HYDROLOGIC CYCLE

Understanding the role of water in the environment can help to illustrate the most effective practices for water conservation. When water falls to the earth's surface, it can be evaporated, transpired, runoff, absorbed by plants, entered into groundwater, or merged with springs and streams that lead to rivers and, ultimately, oceans. **The supply of water in the earth's environment will always remain constant.** However, as the human population rises, a corresponding increase in demand for freshwater resources follows.

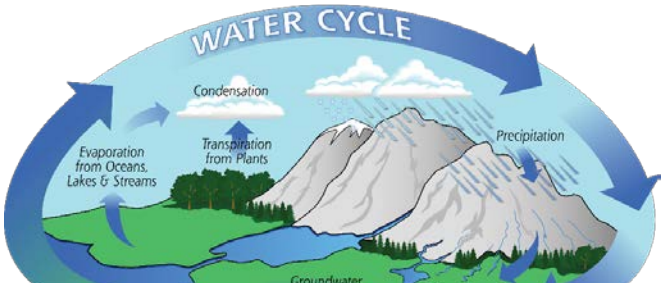

Image from http://pmm.nasa.gov/education/water-cycle

- There is no beginning or end of the hydrologic cycle. It is **the continuous movement of water above, on, and below the surface of the earth in either a solid, liquid, or gaseous state.**
- Ninety percent of the moisture in our atmosphere is provided by evaporation of water from the surface of the ocean, which cools and condenses to form clouds. Moisture returns to the ground as precipitation, where it either evaporates back into the atmosphere or penetrates the surface to become groundwater. Groundwater flows into oceans, lakes, rivers, and streams.
- The remaining moisture (10%) in the atmosphere is released by plants through transpiration (the process of water being taken up by a plant, contributing to its growth, and then being released through respiration).[1]
- Although the water cycle continuously returns water to Earth, it is not always returned to the same place, or in the same quantity and quality.
- **Water that is not taken up by plants or evaporated by the sun will recharge groundwater** as it slowly infiltrates through layers of soil and rock, instead of running off the soil surface or impervious surfaces.

II. MAKE SURE THE IRRIGATION SYSTEM IS WORKING EFFICIENTLY AND CORRECTLY

Efficient sprinkler systems can be an integral component of a water conservation plan. The two types of irrigation systems are:

- Surface irrigation: i.e., sprinklers; best for turfgrass areas.
- Drip irrigation: low volume drip, spray, or bubble emitters; soaker hoses. Most useful for trees, shrubs, flower gardens, and vegetable gardens. On average, drip irrigation systems use 25 to 50 percent less water than hose or sprinkler systems.

Simple systems run on a schedule linked to a timeclock. Complex systems are connected to a climate-based electronic controller and run when weather and evapotranspiration data dictate. Any improperly managed irrigation system may contribute more water than is necessary to maintain a healthy landscape.

An efficient irrigation system design will:

- Meet site-specific irrigation needs.
- Reduce run-off.
- Match application rates to infiltration rates.

[1] http://earthobservatory.nasa.gov/Features/Water/page2.php

Plants, including turfgrass systems, are not inherently wasteful users of water, but poor or improper maintenance and cultural practices can lead to inefficient water use. Research shows that residential irrigation systems with automatic timers use 47% more water than systems without timers.[2]

Evidence of a problematic irrigation head.

Practice good irrigation maintenance. Professional turf and landscape managers use audits to inspect and measure the effectiveness of the sprinkler system. Periodic audits of the irrigation system are an important part of a water conservation plan. At least once a year, confirm that all irrigation systems are distributing water uniformly and inspect, repair and/or adjust in-ground or drip watering systems.

- Flag the locations of all sprinkler heads on the lawn. Turn the system on and make sure sprinkler heads pop up, are level and operating at the correct pressure. All areas of turf should receive thorough, uniform coverage, with no gaps.
- Check automatic sprinkler or drip irrigation systems periodically to ensure plants are receiving the water they need without being overwatered. **If any irrigation heads are not functioning correctly, repair them immediately.** Contact an irrigation specialist if repairs cannot be completed without professional assistance.
- In lawn areas, identify "hot spots" where patches of turf are displaying greater signs of drought stress than other areas. If hot spots are evident, check if irrigation heads are clogged, blocked, or sunken.
- If an irrigation company is completing the water audit, ask for the installation of the most efficient water sensors. Confirm that their service is familiar with and incorporates the most advanced water conservation technology available.

III. MAXIMIZE EFFICIENCY OF IRRIGATION SYSTEMS

Irrigate in the early morning, when temperatures and winds are at their lowest levels, for the most uniform applications and to reduce water lost through evaporation. Watering between 4 am-9 am allows roots to absorb water and leaves to dry. **Avoid watering in mid-day, afternoon, or evening:** in mid-day, much of the water from irrigation is lost through evaporation and transpiration. Leaf stomates (pores that allow gas exchange) open to cool the plant and allow it to conserve its water reserves. Plants cannot efficiently absorb water at that time. Watering in the afternoon or evening prolongs the time the leaf surface remains wet and increases disease susceptibility.

Ensure that irrigation heads are directed at turfgrass, not sidewalks or other impervious surfaces. Photo courtesy of http://www.hrirrigation.com

- **Apply water only as fast as it can be absorbed by the soil.** Water applied in excess of what can be absorbed will be

[2] https://ag.umass.edu/turf/fact-sheets/water-conservation-for-landscape-turf

wasted and potentially contribute to run-off. **Recognize conditions that contribute to poor infiltration**, such as poor soil structure, compacted soil, or excess thatch at the soil and turfgrass interface. The rate of infiltration into the soil will be influenced by the soil type and texture. Soils with a high percentage of clay have poor infiltration rates, below the typical rate of irrigation application (0.3 to 0.6 inches per hour). Frequently, irrigation applied to a heavy clay or compacted soil will lead to puddling, runoff, and leaching. **Maximize the amount of water entering the root zone, which allows uptake and storage of the water, by reducing leaching** (water movement below the root zone):

Pooling of water can occur when soil infiltration rates are slower than water application rates.

- Soils with poor infiltration rates may require applications of several short cycles or multiple irrigation events to wet the root zone, rather than irrigating all at one time. Irrigation systems can be fitted with features to apply irrigation using short, repeated cycles to minimize runoff.
- Alternately, water can be applied using slower application rates or using lower volume irrigation nozzles to allow for greater infiltration.

- **Install sensors** that automatically shut the irrigation system off once enough moisture has reached the root zone to save both water and money. Automatic irrigation systems should have a manual override that allows for adjustments during unusually wet or dry conditions. Automatic rain delays can be used to shut off irrigation during rain events.
  - Replacing a standard clock timer with an irrigation controller on a moderate-sized yard can save about 24 gallons of water per day.[3] Irrigation controllers use weather and landscape conditions to tailor watering schedules to actual conditions on the site, rather than a clock and a preset schedule. Irrigation controllers labelled as WaterSense meet current EPA criteria.
- **Use water timers** or flow meters for hose-end watering to ensure proper amounts are applied.
- Determine water requirements within the landscape. Water requirements will vary within each landscape, based on variations in soil texture, microclimates, and plant species. **Designate irrigation zones** that include areas of similar soil types, slopes and climactic conditions. When designing the landscape, group plants with similar watering needs into specific zones to reduce water use and protect the plants from both underwatering and overwatering. Turf areas and landscape areas should always be separated into different zones because of their differing water needs.
- Test for and determine moisture requirements rather than relying on automatically timed intervals. Utilize evapotranspiration rates, soil type, drainage characteristics, species of turfgrass, and use of site (i.e., home lawn, athletic field, dog run, backyard) to determine irrigation cycles.

Rain barrels can be used to collect rainwater for use on turf and landscape plants.

IV. REDUCE OUTDOOR WATER USAGE AND WASTE.[4]

1. Water landscape plants only when necessary, according to the needs of each plant species. Emphasize the use of plants that require **little or no supplemental irrigation** once established.
2. **Catch and use run-off from impervious surfaces**. Use rain barrels and other containers to collect rainwater runoff from the roof, downspouts, driveways, and other surfaces. "Harvest" water from rainfall and snowmelt for landscape irrigation purposes.
3. Cover pools, spas and other water features when not in use to minimize evaporation.

[3] https://www3.epa.gov/watersense/products/controltech.html

[4] Adapted from http://ag.umass.edu/landscape/fact-sheets/indoor-outdoor-residential-water-conservation-checklist

4. Clean sidewalks, driveways and patios of debris by sweeping rather than by spraying with a hose.
5. **Cars are best washed at designated car washes that reuse water.** If done at home, wash car(s) with a bucket of water and rinse as needed rather than using a running hose.
6. Restrict or eliminate use of hose-end water toys. If possible, combine use of water for play with landscape needs.
7. Use recycled or non-potable water to the greatest extent possible, as limited by supply and/or regulation.
8. Immediately shut off irrigation systems(s) and adjust whenever irrigation water runs or falls onto hard surfaces such as sidewalks, streets or driveways. **Don't allow water to run down a driveway or street.**
9. Adjust controllers for in-ground or drip watering systems according to seasonal needs of plants.
10. Avoid planting lawns or landscape beds in spring. More water is needed to establish and maintain areas before the arrival of and during the summer months. Fall is the best time to establish new plantings.
11. If possible, avoid planting turf or landscape beds on narrow strips that either will dry out more quickly and will require additional irrigation or are difficult to irrigate without wetting non-grassy areas.

A narrow strip of turf is a struggle to maintain and leads to significant quantities of water runoff (above). Replacing turf with drought tolerant plants in these narrow strips creates a landscape bed that requires reduced labor and no supplemental irrigation once established (right). Photos courtesy of https://centraltexasgardening.wordpress.com

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