Components of Landscape Water Use Efficiency

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Components of Landscape Water Use Efficiency

- What is being watered
  - Plant material

- How it is being watered
  - Irrigation equipment

- When and how often it is being watered
  - Management and water application technology

- Where is the water going
  - Infiltration vs. runoff prevention

- Where is the water from
  - Water source

- Functional use
What is being watered

Plant material
Considerations of landscape conversion
How to Remove Turfgrass

1. Water the grass thoroughly.
2. Use a turf removal tool to lift the turf.
3. Carefully remove the turf from the ground.
4. Dispose of the turf as desired.
Erosion Control
Runoff Control

Photo credit: www.gsd.harvard.edu

Photo credit: City of La Habra
Hardscape Area

Permeable pavers are not advisable in the following cases:

- Slopes greater than 5%
- Areas with high wind erosion rates
- Soils that have a rising water table or saline conditions
- Dispersive clay or low hydraulic conductivity soils
Fire Control

- Proximity to structures
- Plants with high oil content
- Plants that act as latter fuels

Graphic credit: Kirah Van Sickle
Turf Alternatives

- Synthetic
- Turf-like grasses
Watering habits and perceptions relating to Plant-water needs

Low Water Requirement ≠ Low Water Use
Drought Tolerant ≠ No Irrigation Need
Socio-Behavioral Influence

Attitudes that result in behavior change in relating to landscape conversion include:

1. Intensifying the regularity of newly acquired practices to reduce water consumption
2. Expanding water saving behavior to include other water conservation practices
3. Showing greater concern for environmental protection by reduced outdoor chemical and water use
4. Promoting the benefits of the non-turfgrass intensive landscape to others
Economic Influence

Maintenance Costs

- Post conversion the maintenance costs will decrease
- Overtime they will increase
Without changes to the irrigation system water savings will likely **NOT** be realized!
Key to Management

• Setting up a budget
  • How much water is needed
  • How much water is applied
Why is drip irrigation recommended?

• Drip Irrigation works in concert with Landscape Conversion projects.
Irrigated Area
How Drip/Micro-Irrigation Works

• Lower application rate
• Applies water directly to the root zone
• Slowly over a long time
Wetted Soil

Clay

Loam

Sand

Photo credit: Netafim
System Components: Points of Connection

From Valve

From Hose Bib

From Spray Body

From Rain Barrel

Photo credit: Sprinkler.com
Emitter Placement

• Emitter placement will determine whether salts are pushed away from the root zone or concentrated within it.

• Salts will tend to be concentrated at the perimeter of the wetted zone.

• Place the emitter near the center of the root zone, rather than between root zones of multiple plants, and upslope when applicable.
The high efficiency results from four primary factors:

• The water is slowly applied directly to the root zone

• Only the root zone or the partial root zone is irrigated
  • As opposed to sprinkler irrigation where the entire field area is wetted

• Soil and plant surface evaporative losses (including water lost to wind) are minimized or eliminated

• Water lost to surface runoff and deep percolation is minimized or eliminated

• Adaptable to changing landscapes
Benefit:

Runoff Reduction
Benefit:
Reduced Application Rate
Benefit:
Conforms to Irrigated Area
Benefit:
Extreme Soil Types & Terrain
Benefit:
Operating Costs & Energy Conservation
Benefit: Chemical Application

vs.

Chemicals Application vs.
Benefit:

Improved Tolerance to Salinity

Frequent applications of water at the root zone push the salts to the perimeter of the wetted area. Using drip irrigation as a process to prevent the combination of harmful soil salinity levels and maintain soil moisture is referred to as *micro-leaching*.
Benefit:

Plant Quality and Growth
Disadvantages

• Root and pest damage
• Vandalism
• UV concerns
• Dust build up
• Salt Build up
“Smart” irrigation controllers such as soil moisture sensor (SMS) controllers offer the opportunity to optimize irrigation based on measured plant demand in the irrigated system.

“Smart” irrigation controllers such as weather-based irrigation controllers (WBIC) controllers offer the opportunity to optimize irrigation based on changing weather needs.
SMS System Components
Sensor Technology

Granular Matrix Sensors (GMS)

Time Domain Transmissometry (TDT)

Frequency Domain Reflectometry (FDR)
Single vs. Multiple Sensors

• For Small Residential Sites
  • One is usually enough

• For Large Residential and Commercial Sites
  • Multiple sensors recommended
SMS as Irrigation Governors

- Effectively bypasses unnecessary as well as superfluous irrigation events
  - This is a benefit that other devices do not offer.
Considerations

• There are three fundamental behavioral barriers to irrigation conservation potential when considering the use of “smart” technologies.

• The first two are behavioral and the second is non-behavioral:
  • How to use the equipment
  • When and how long to water
  • System efficiency
High Efficiency Nozzles

- Relatively new technology
- Increased uniformity compared to spray heads
What is an MSMT Rotating Nozzle

Multi-stream, multi-trajectory (MSMT) rotating nozzle

A variation is the oscillating design
Benefit: Increased Uniformity

Dry Spot

Root Zone
Benefit: Overspray Reduction
Benefit: Reduction of Wind Effects
Considerations: Design & Installation

- In many cases, the benefit potential, by the proxy of an increase in uniformity, is enhanced by the system maintenance that occurs at the same time as the sprinkler retrofit.
- A truncated throw makes a difference.
Considerations: **Scheduling**

- Increased uniformity yields a lower run time multiplier (RTM)
- Lower application rate
  - Influence of schedule change
  - Influence of **no** schedule change
Considerations: Labor & Cost
Water Source

• What is available?
  • Municipal water
  • Well water
  • Surface water
  • Recycled water
  • Rain water
Water Savings Potential

- When looking at the water savings potential, the intended use of the landscape is key
- Submeters for monitoring
What could you implement?

- Plant material
- Irrigation equipment
- Management and water application technology
- Runoff prevention
- Alternative water source