POLICY FACT SHEET: Evaluation of current irrigation practices and developing water conservation strategies

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PROJECT BACKGROUND AND RESULTS

We devised a first-of-its-kind method for cost-effectively estimating evapotranspiration in urban areas. For more than five years we have studied these processes in Los Angeles. To date, we have made continuous measurements of water use on 108 trees of 14 species in 2007-2009 and 11 lawns in 2008-2011, before the recent drought. The results revealed that before the implementation of mandatory watering restrictions (2007-2011):

- Current watering recommendations, as well as irrigation systems should be reconsidered and updated in light of the new empirical findings.
- Landscapes were greatly over-watered (lawns received at least 40% more water in summer in excess of current recommendations that can be found at ucanr.edu/sites/WUCOLS).
- Intentional shading of lawns (with landscape trees or built structures) is a very effective water-saving measure that may lower landscape water use by up to 50%.

POLICY RECOMMENDATIONS

Revise municipal watering recommendations

- The landscape coefficient method of estimating watering needs should be applied to lawns only.
- Landscape coefficients should be updated to reflect the influence of shade and seasonal changes in water use (Table 1; a technical paper with recommended equations is available on request).
- Water needs of urban trees should be estimated using equations that capture their physiological characteristics (Table 2). Recommended equations are available on request.

Avoid over-irrigation

- Updated irrigation guidelines should be operationalized and disseminated to the public.
- State water conservation funds should support water agencies in replacing timer-triggered irrigation systems with more advanced soil-moisture based drip irrigation, via residential landscape rebate programs and other means.
- Water agencies should promote the use of the soil-moisture based irrigation systems by residents and provide technical expertise for installation, training, and monitoring.

Strategically modify existing landscapes to conserve water

- Plant trees that have been shown to be water conserving.
- Disseminate information on appropriate watering methods and irrigation systems that support deep tree roots (“deep irrigation”).
- Consider municipal tree-planting programs and incentivize residents to plant water-conserving trees to shade existing lawns. While trees may require more intensive irrigation during the first year after planting, when mature they will ultimately lower landscape water use if watered to support deep tree roots.

Table 1 Microclimate coefficients for determining lawn watering requirements: recommended by WUCOLS (ucanr.edu/sites/WUCOLS) and derived from actual water use of irrigated lawns measured in Los Angeles.

Conditions	WUCOLS	Measured	
		Summer	Winter
Shaded	0.5 - 0.9	0.5 – 0.9	0.1 – 0.8
Regular	1.0	1.1	0.9
Dry/windy	1.1 - 1.4	1.6	NA

Table 2 Current watering recommendations (ucanr.edu/sites/WUCOLS) and actual, measured water use by irrigated urban trees in Los Angeles.

Species	WUCOLS	Measured
Chinese elm	M	M
Crape myrtle	M	H
Goldenrain tree	L	H
Honey locust	M	H
Laurel sumac	L	L
Kurrajong	L	L
Lacebark tree	L	L
California sycamore	M	M
London planetree	M	H
Canary Island pine	L	L
Coast redwood	H	L

PROJECT DETAILS

Funding: This research was funded by the National Science Foundation (NSF) IOS 1147057 and EAR 1204442.

Citations: (1) Litvak E., Manago K., Hogue T. S. and Pataki D. E., 2017: Evapotranspiration of urban landscapes in Los Angeles, California at the municipal scale. Water Resources Research, 53, DOI: 10.1002/2016WR020254. (2) Litvak E., McCarthy H. R. and Pataki D. E., 2017: A method for estimating transpiration from irrigated urban trees in California. Landscape and Urban Planning, 158, 48-61. (3) Litvak E. and Pataki D. E., 2016: Evapotranspiration of urban lawns in a semi-arid environment: an in situ evaluation of microclimatic conditions and watering recommendations. Journal of Arid Environments, 134, 87-96. (4) Bijoor, N. S., Pataki D. E., Haver D. and Famiglietti J. S., 2014: A comparative study of the water budgets of lawns under three management scenarios. Urban Ecosystems, 17 (4), 1095–1117.

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