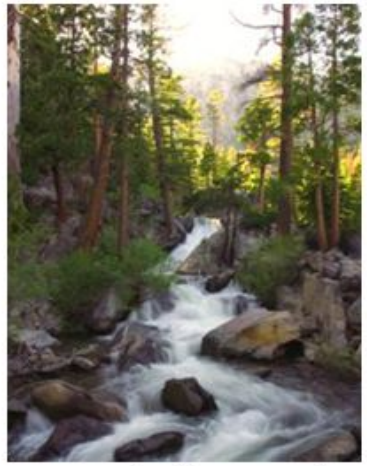
The UC ANR "Spotlight" Webinar series

https://ucanr.edu/sites/StrategicInitiatives/

Water quality, quantity and security

Endemic and Invasive Pests and Diseases



Sustainable Natural Ecosystems

Sustainable Food Systems

UC ANR Strategic Initiatives

Healthy Families and Communities

University of California Agriculture and Natural Resources

A Celebration of Science and Service

UC ANR

UC ANR: Our Public Value

The difference we make…

- Promoting economic prosperity in California
- Developing a qualified workforce for California
- Safeguarding abundant and healthy food for all Californians
- Protecting California's natural resources
- Building climate-resilient communities and ecosystems
- Promoting healthy people and communities
- Developing an inclusive and equitable society

Goal of the “Spotlight” series

Provide an upbeat, interactive opportunity to see

how the work of UC ANR is making a difference:

- breakthroughs, challenges and needs.

SI Spotlight Webinar

Highlighting Work across the UC ANR Strategic Initiatives

UC ANR

Trees for Tomorrow Start Today

Janet Hartin
Area Environmental Horticulture Advisor
(San Bernardino, Riverside, and Los Angeles Counties)

Introduction

Did you know?

- Landscape trees help reduce impacts of climate change
- California has the lowest tree canopy per capita (108 yd^2) in the USA

(climate-ready tree research plot at UCR)

Properly selected and maintained landscape trees:

- Mitigate climate change by storing carbon dioxide
- Cool urban heat islands
- Provide shade/conserve interior energy
- Improve water quality
- Provide wildlife and pollinator habitat
- Beautify neighborhoods

Problem

Trees often underperform in urban settings due to:

- poor species selection
- poor care

(invasive bluegum eucalyptus)

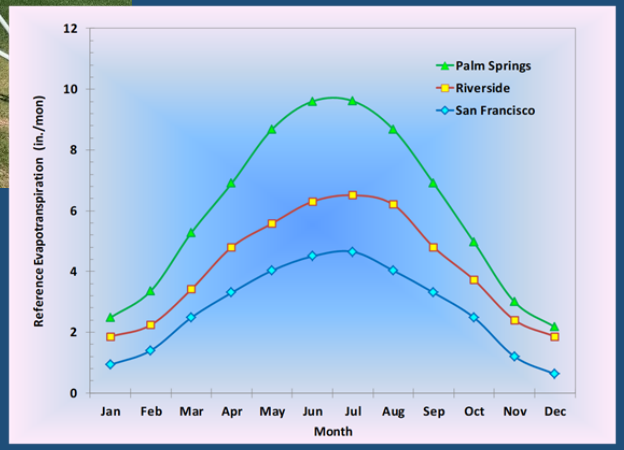
Tree Care 101

Replace The Don’ts

With The Do's

What UC ANR environmental horticulture advisors, specialists, and UC partners have done to promote proper tree selection and care:

- Determined minimum irrigation requirements
- Developed the WUCOLS database (over 3,000 entries)
- Identified tree species expected to perform well in warming climates
- Educated professional horticulturists
- Educated the public via Master Gardeners
- Published results



Water Requirements of Landscape Plants Studies Conducted by the University of California Researchers

Janet S. Hartin[1,7], David W. Fujino[2], Lorence R. Oki[3], S. Karrie Reid[4], Charles A. Ingels[5], and Darren Haver[6]

Additional index words. landscape water use, evapotranspiration, landscape irrigation, CIMIS, plant factor, ETAF, WUCOLS

Summary. University of California (UC) researchers have been involved in research and extension pertaining to measuring evapotranspiration (ET) rates and determining the minimum irrigation requirements of landscape plants for more than 30 years. Early work included the design and implementation of the California Irrigation Management Information System (CIMIS) weather station network and determining crop coefficients for warm and cool season turfgrasses based on historical ET and CIMIS data. Other researchers determined the minimum irrigation requirements for several species of established landscape trees, shrubs, and groundcovers in diverse climate zones throughout the state. In addition, the Water Use Classification of Landscape Species (WUCOLS) system was developed by UC personnel in the early 1990s which, to date, has classified more than 3500 landscape species into very low, low, moderate, and high water-use categories based on observation and personal experience by industry experts and UC personnel. Future work in the area of landscape water use and conservation will include updating WUCOLS as more data from replicated trials become available. New research at UC Riverside aims to improve irrigation efficiency (IE) through precision irrigation using smart controllers, remote sensing, and geospatial analysis under controlled conditions. Irrigation training and certification for public and private landscape managers must remain a priority because, even with advanced smart controller technologies, water savings will not occur with poorly designed and functioning irrigation systems.

Between 40% and 70% of water used in urban settings in the United States is applied to landscape plantings (Cabrera et al., 2013; Haley et al., 2007; Kjelgren et al., 2000; St. Hilaire et al., 2008). Water conservation in urban landscapes in California is especially important because of a limited water supply, cyclical droughts, population increases, and a water distribution problem requiring transporting large volumes of water from Northern to Southern California. The population of California is expected to increase from 39 to 60 million by 2050 (Dieter and Maupin, 2017). Since 2005, nearly half of the population growth in the state has occurred in inland Southern California and the Central Valley because of less expensive and more plentiful land than along the coast (Hanak and Davis, 2006). In addition, because inland landscapes tend to be larger and ET rates higher than those in coastal areas, more water is required for their irrigation.

Climate change poses additional challenges to urban landscapes as rising temperatures coupled with limited water exacerbates the need to increase and diversify the palette of trees and other ornamentals adaptable to harsh urban conditions (Bohn et al., 2018; Hanak and Lund, 2008). Furthermore, Fall 2011 through Fall 2015 was the driest 4-year period in recorded history in California since the beginning of weather tracking in 1895, exacerbated with record high temperatures in 2014 and 2015 (Hanak et al., 2015). Although precipitation in 2016 and 2017 rose to near-average levels in much of northern California, all of central and southern California continue to experience moderate or severe drought as of 10 Mar. 2018 (Fenimore, 2018).

An increase in California's population coupled with a multiyear drought in the 1980s requiring greater landscape water conservation led to the enactment of the California Assembly Bill 325 (Water Conservation in Landscaping Act), which became effective in 1993. The act required the California Department of Water Resources (CDWR) to develop a Model Water Efficient Landscape Ordinance (MWELO), intended to increase water conservation in urban landscapes. This included reducing water waste in landscape plantings and listing landscape plants within WUCOLS water-use categories to supplement the small number of actual plants whose water use had been measured in field studies, a lengthy and resource-intensive process.

The assumed a leadership role in WUCOLS, bringing together 36 experts from the landscape industry who categorized thousands of plants in six climate zones (north central valley, central valley, south coastal, south inland valley, high and intermediate desert, and low desert) as very low, low, moderate, or high water users. Since the inception of WUCOLS, additional species were

This article results from the workshop "Maintaining Healthy Landscapes Under Drought and/or Permanent Water Restrictions" held on 20 Sept. 2017, at the ASHS Annual Conference, Waikoloa, HI and sponsored by the Ornamentals/Landscape and Turf (O/LT) Professional Interest Group.

Appreciation is extended to Workshop fellow presenters Raul Cabrera, Michael Dukes, and Ursula Schuch, session attenders, and the O/LT Professional Interest Group.

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https://doi.org/10.21273/HORTTECH04037-18

Units

To convert U.S. to SI, multiply by	U.S. unit	SI unit	To convert SI to U.S., multiply by
0.0929	ft^2	m^2	10.7639
3.7854	gal	L	0.2642
2.54	inch(es)	cm	0.3937

https://doi.org/10.21273/HORTTECH04037-18

RESEARCH ARTICLE

UC ANR research and education influences landscape water conservation and public policy

For more than 30 years, UC has tackled the obstacles that inhibit widespread landscape water conservation, with new science, trainings and contributions to state policy.

by Janet S. Hartin, Lorence R. Oki, David W. Fujino, Karrie Reid, Charles A. Ingels, Darren L. Haver and William N. Baker

For nearly three decades, California has mandated practices to improve landscape water use efficiency and conservation. The goal of state policies has been to ensure a steady and reliable water source while maintaining healthy sustainable landscapes. Strategies have included the adoption of landscape irrigation standards, water budgets and tiered water rates favoring conservation, and also increased education to the landscape industry and the public.

UC has been influential in developing and providing credible science-backed information to inform legislative actions. It has also reduced the obstacles that were inhibiting widespread landscape water conservation: a lack of credible information regarding landscape water requirements, inadequate training across a large segment of the landscape industry, lagging irrigation system technology, and an inadequate supply of locally available drought-resistant landscape plants.

Abstract

UC has been heavily involved in research and extension efforts impacting landscape water conservation legislation for over 30 years. In 1981, UC implemented the California Irrigation Management Information System, a network of weather stations that provides data for local estimates of plant water needs. Those estimates led to UC being able to advise the California Legislature on policies for maximum applied water allowances for residential and large landscaping projects. The allowances have been reduced significantly with UC guidance, and UC has helped landscapers to meet the increasingly restrictive requirements. Best practices that reduce water losses have been developed in collaboration with equipment manufacturers and landscaping specialists, and explained to end users. In addition, UC has developed the WUCOLS database, which classifies over 3,500 plants by their water needs. UC's involvement in landscape water conservation continues on many fronts, developing science and contributing to policy.

Online: https://doi.org/10.3733/ucanr.2018a0041

UCCE Advisor Chuck Ingels speaks to the press in Sacramento about water conservation. UC has developed a database that categorizes 3,500 plants by their water needs.

https://escholarship.org/uc/item/5335s6jg

Water savings potential in professionally managed landscapes study

(Hartin, Fujino, Oki, Haver, Reid & Ingels)

- Implementing ‘best practices’ improves plant health and saves between 1.3 million to 2.9 million acre-feet of water annually

1.	Adopt water-conserving rate structures as defined by the task force
2.	Reduce the ETAF (landscape water budget) in MWELO and review it every 10 years for possible further reduction
3.	Enforce and monitor compliance with local ordinances and MWELO
4.	Require dedicated landscape meters
5.	Promote the use of recycled water in urban landscapes
6.	Require that local ordinances be at least as effective as MWELO
7.	Increase the public's awareness of the importance of landscape water use efficiency and inspire them to action
8.	Require smart controllers
9.	Adopt and enforce statewide prohibitions on overspray and runoff
10.	Provide training and certification opportunities to landscape and irrigation professionals
11.	Support upgrading CIMIS
12.	Adopt performance standards

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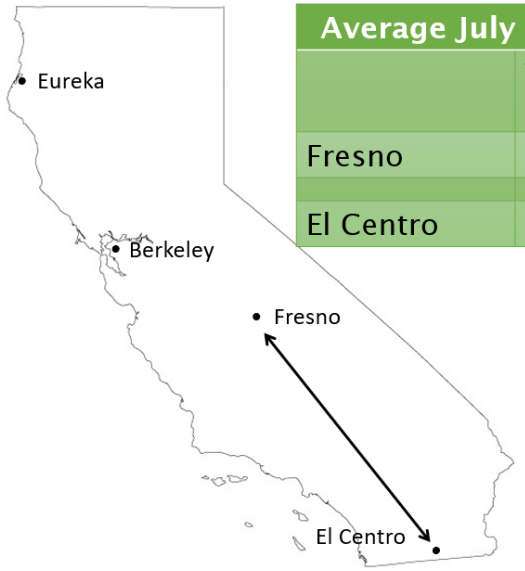
Results were shared with over 4,000 professional landscapers and researchers

‘Space for Time’ substitution study

(Igor Lacan and Joe McBride)

- Paired 16 cities to cities in warmer climate zones (CalAdapt)
- ½ of current tree species may be unsuitable
- 7 inland cities may suffer substantial species losses if substitutions do not occur

Example: Fresno will be as warm in 2099 as El Centro is today



Average July Maximum Temperature ºF		
	Today (2019)	Predicted in 2099
Fresno	95 ºF	108 ºF
El Centro	106 ºF	

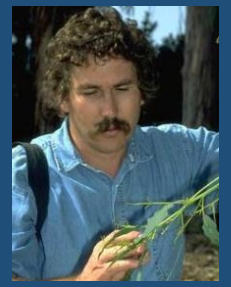
If trees commonly found in Fresno are ABSENT from El Centro, Fresno’s urban forest will suffer under climate change

Space-for-time substitution results

Zone	City	Common species	% Absent in warm cities
1	Eureka	29	0
2	Ukiah	23	39
3	Berkeley	20	10
4	King City	25	8
5	Santa Maria	17	0
6	Santa Monica	14	7
7	San Diego	25	0
8	Santa Ana	12	0
9	Burbank	23	35
10	Riverside	16	63
11	Yuba City	15	100
12	Stockton	13	46
13	Fresno	32	59
14	Barstow	15	60
15	El Centro	10	70
16	Susanville	34	100

Climate-ready landscape trees study

(Berry, Hartin, Downer, Haver, & USDA Forest Service)

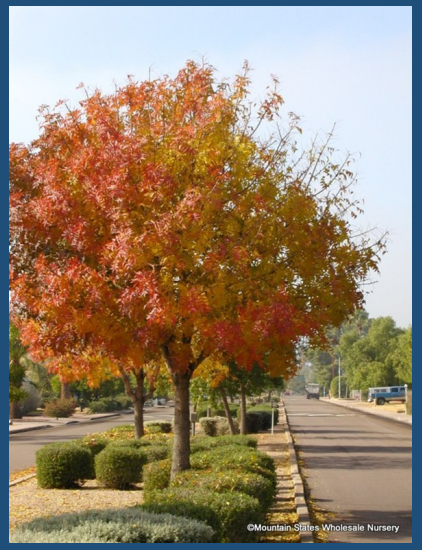


- Measuring performance of select landscape tree species based on drought resistance, maintenance, CO_2 sequestration, soil tolerance, pest resistance, shade, biodiversity, rareness, longevity, etc.
- UCR, SCREC, UC Davis, area parks

Climate ready tree study (con'd)

- Measuring performance of 4 of the same species in a mulch/no mulch study

'Maverick' Mesquite



'Red Push' Pistache

'Bubba' Desert Willow

'Desert Museum' Palo Verde

‘Trees for Tomorrow’ workshops (Hartin)

- Goal: to increase urban tree canopies to ≥ 25% within 20 years through an interactive process with stakeholders
- 3-4 locations

Trees for Tomorrow

INCREASE TREE CANOPIES
TO COOL URBAN HEAT ISLANDS

when: **April 14, 2020**

where: **UCR Palm Desert**
75080 Frank Sinatra Drive, 92211

cost: **$25**

ceu credit: **5.5 Western Chapter ISA CEUs**
8 CAI-CV Chapter CEUs

Sponsored by:

UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources

Register at the link: http://ucanr.edu/survey/survey.cfm?surveynumber=29593

Agenda

8:15 **Welcome and Workshop Overview**
Tamara Hedges, Executive Director, UCR Palm Desert
Cal Lockett, Executive Director, Coachella Valley Associations Institute – CV Chapter
Rose Epperson, Executive Director, Western Chapter Intern. Soc. of Arboriculture
[illegible], Division of Agriculture and Natural Resources

8:30 **Benefits of Landscape Trees and Best Practices for Their Selection and Care**
[illegible]

9:10 **Coachella Valley Water Use and Future Availability**
Angela Johnson, Water Management Specialist, Coachella Valley Water District)

9:45 **Current Shade Tree Canopies and Implications for CV Cities**
(Miranda Sutten, Regional UCF Prog Mgr, US Forest Service)

Coffee break provided by Coachella Valley Water District

Insect Pests Impacting Desert Trees: South American Palm Weevil
(Ivan Milosavljevic, postdoctoral researcher, Dept. of Entomology, UC Riverside)

11:00 **Case Study: Increasing Tree Canopies in Palm Desert**
(Ryan Stendell, Director of Community Development, City of Palm Desert)

11:45 **Morning Wrap-Up** (Janet Hartin)

Noon *Lunch provided by Coachella Valley Resource Conservation District*

1:00 **Panel Discussion** (Morning Speakers)

1:30 **Roundtable discussions: ‘Challenges and Opportunities to increase Tree Canopies in Coachella Valley Cities’**
(cross-discipline small group discussions that include planners, community development managers, arborists, landscapers, landscape architects, nursery personnel, HOA managers, Master Gardeners, and others)

2:30 **Reports from Roundtable Discussions**

2:50 **Next Steps**

3:00 **End of Workshop**

Sample

POSTPONED

UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources

CHINO BASIN Water Conservation District | Waterwise Community Center

‘Trees for Tomorrow’ Workshop

Goal: To reduce impacts of urban heat islands by planting and caring for trees today to ensure a greener tomorrow

Tuesday, May 19, 2020

Chino Basin Water Conservation District
4594 San Bernardino Street, Montclair, CA 91763

8:15: Welcome and Workshop Overview: Rose Epperson (Executive Director, Western Chapter ISA), Elizabeth Skrzat (Executive Director, Chino Basin WCD); Mandy Parkes (District Manager, Inland Empire Resource Conservation District); and, Janet Hartin (Environmental Horticulturist, University of California Cooperative Extension)

8:30: [illegible] Landscape Trees and ‘Best Practices’ for Their Selection and Care (Janet Hartin)

9:00: [illegible] Get Started [illegible] Urban Forest Management Plans (Elizabeth [illegible])

9:30: [illegible] Matching Plant Design Tree with [illegible] for Creative Planting for Water Conservation, Sustainability, and Beauty (Scott Kleinrock, CBWCD)

10:00: Coffee Break (provided by Chino Basin Water Conservation District)

10:15: Working Together Across Professions: Success Stories (Hector Ramirez, Cal State San Bernardino; Dave Roger (retired, City of Claremont), and Cris Falco (West Coast Arborists)

11:50: Morning Wrap-Up (Janet Hartin)

12:00: Lunch (provided by Inland Empire Resource Conservation District)

12:45: Panel Discussion/Q and A (Morning Speakers/Attendees)

1:15: Roundtable discussions: Challenges and Opportunities to Increase Tree Canopies and Tree Health in Inland Valley Cities (cross-discipline small group discussions that include city planners, city managers, community service directors, arborists, landscape architects, landscapers, water district managers, HOA managers, nursery growers, master gardeners, etc.)

2:00: Reports from Roundtable Discussions

2:45: ‘Next Steps’

3:00: End of Workshop

$25 per person

Register here (cut and paste link to secure server):
https://ucanr.edu/survey/survey.cfm?surveynumber=29678
5.5 Western Chapter ISA CEUs Approved

INLAND EMPIRE RESOURCE CONSERVATION DISTRICT

SAN BERNARDINO COUNTY

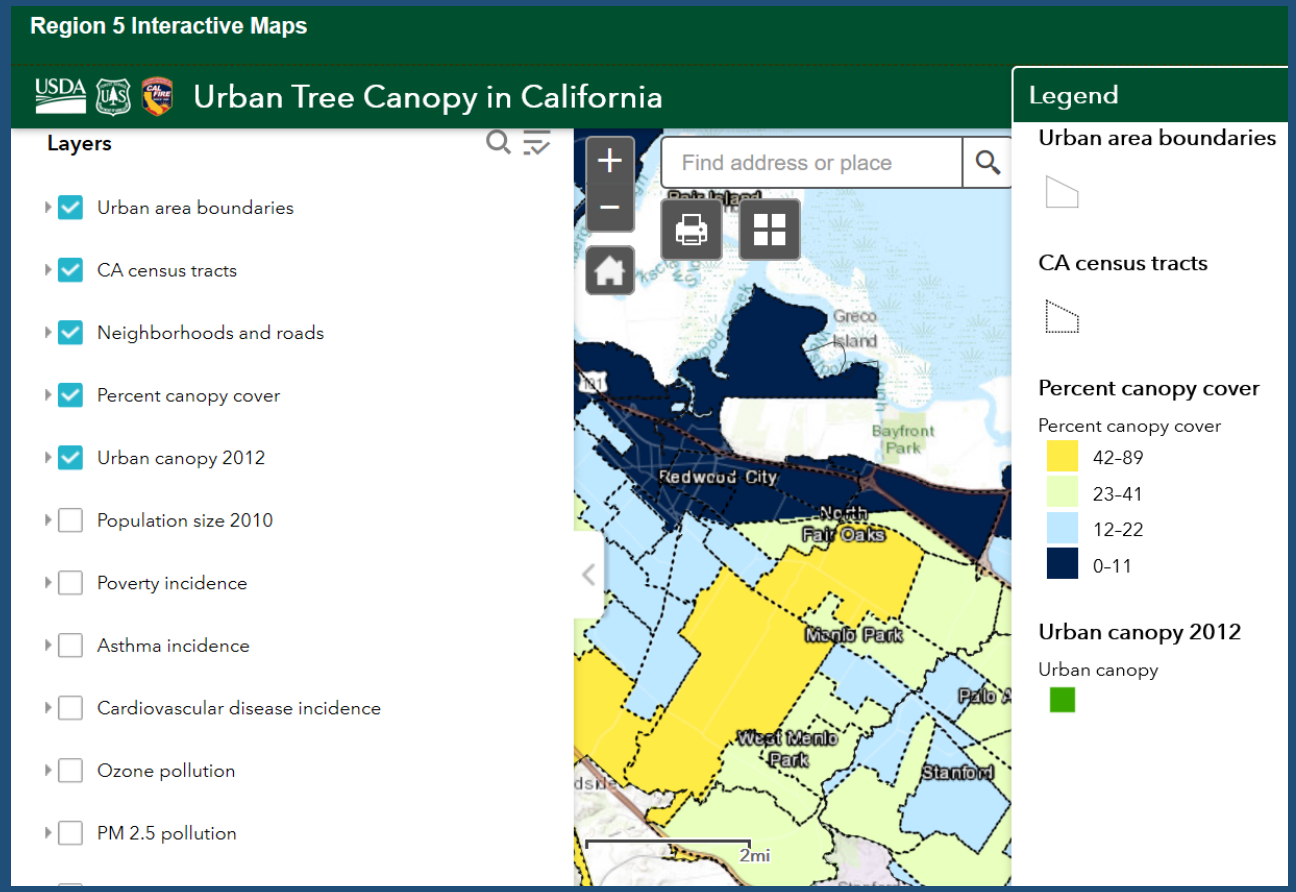
POSTPONED UNTIL FALL

Sample

Higher Tree Canopies in Wealthier Neighborhoods

(https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd645759.html)

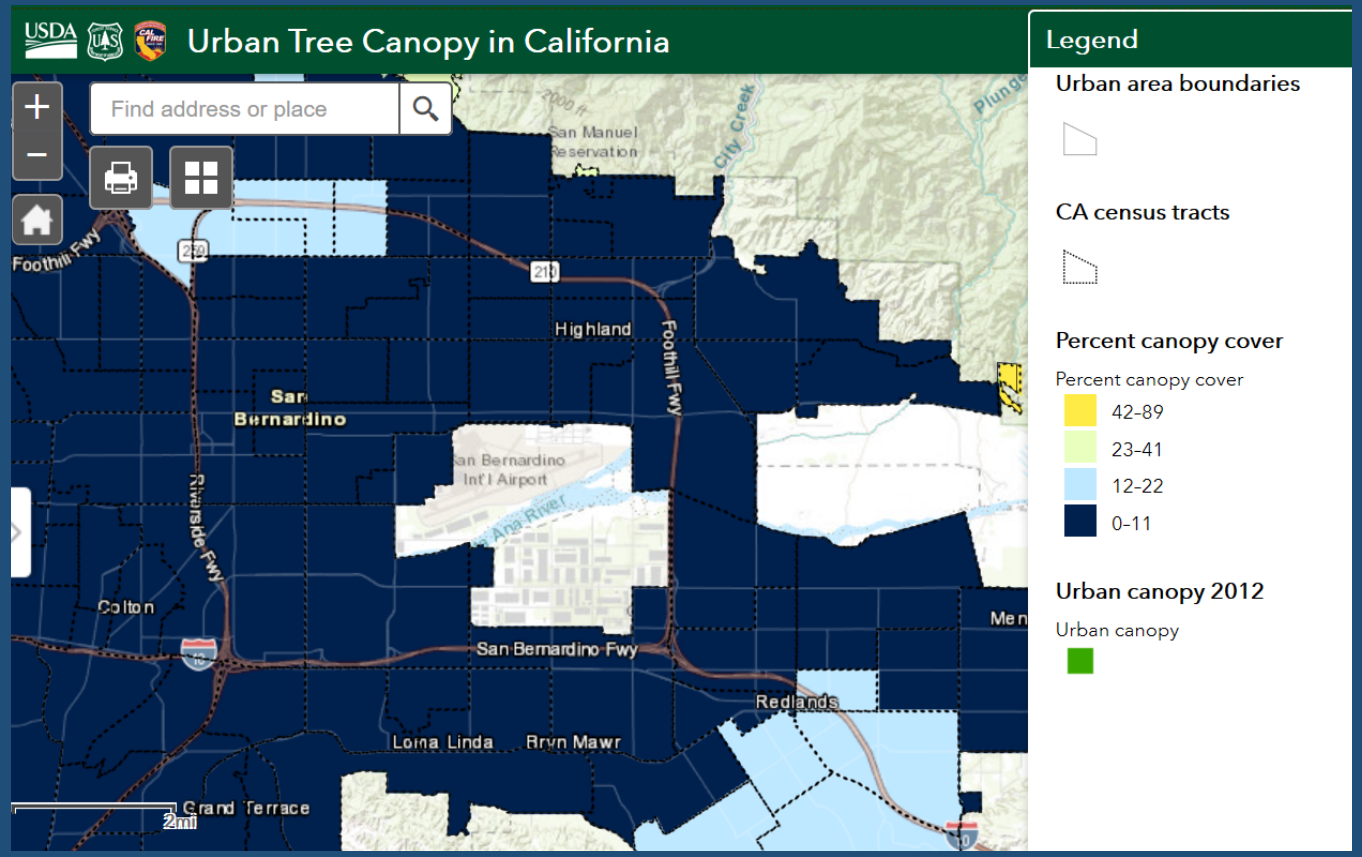
Tract number	6081611400
County	San Mateo
Zip code	94027
City	Atherton
Population 2010	4,237
Percentile poverty incidence	2
Percentile asthma incidence	4
Percentile cardiovascular disease incidence	1
Percentile ozone pollution	11
Percentile PM 2.5 pollution	41
Percentile water body impairment	0



Lower Tree Canopies in Impoverished Neighborhoods

(https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd645759.html)

Tract number	6071006401
County	San Bernardino
Zip code	92410
City	San Bernardino
Population 2010	3,343
Percentile poverty incidence	99
Percentile asthma incidence	84
Percentile cardiovascular disease incidence	74
Percentile ozone pollution	98
Percentile PM 2.5 pollution	82
Percentile water body impairment	0



Master Gardener involvement:

MGs in San Bernardino and Riverside Counties are:

- taking quarterly data on the mulch/no mulch 'climate-ready trees' study
- recording tree care data in their neighborhoods for the 'Trees for Tomorrow' workshops and facilitating breakout sessions

(Master Gardeners take data for the climate-ready mulch/no mulch study)

If you remember one thing, remember this….

- Proper tree selection and care helps ensure a healthier tomorrow…..one tree at a time!

UC ANR

Searchable Tree Selection Websites:

- Urban Forest Ecosystem Institute/Cal Poly: https://selectree.calpoly.edu
- California Native Plant Society: http://www.calscape.org
- WUCOLS IV (Water Use Classification of Landscape Species): http://ucanr.edu/sites/WUCOLS

Questions?

Thank you

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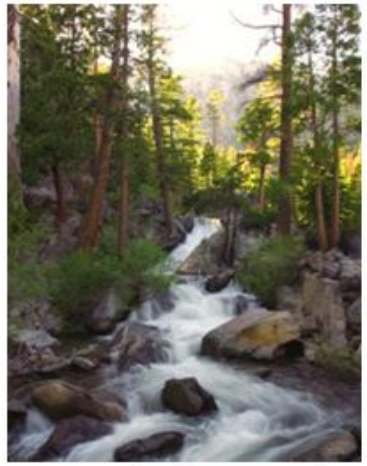

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