Urban Forestry Solutions: Water

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Cooperative Extension

A common sight in 2013, 2014, 2015, 2016…

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Elements of the problem and responses

Aspect	Problem	Response
Knowledge	"The trees will be fine"	Maybe – but they need a little help right now
Values, perspective	"We need to save water" *or* "there's no water for trees"	Trees are water-thrifty, their benefits are huge and irreplaceable
Technical	Don't know how to apply water, or how often, or how much	Young tree:10s gal/wk; Mature tree: 100s gal/month (in summer)
Attitude	"The city is not watering their trees…"	I will do the little bit that's needed to save **our city trees**

Overview

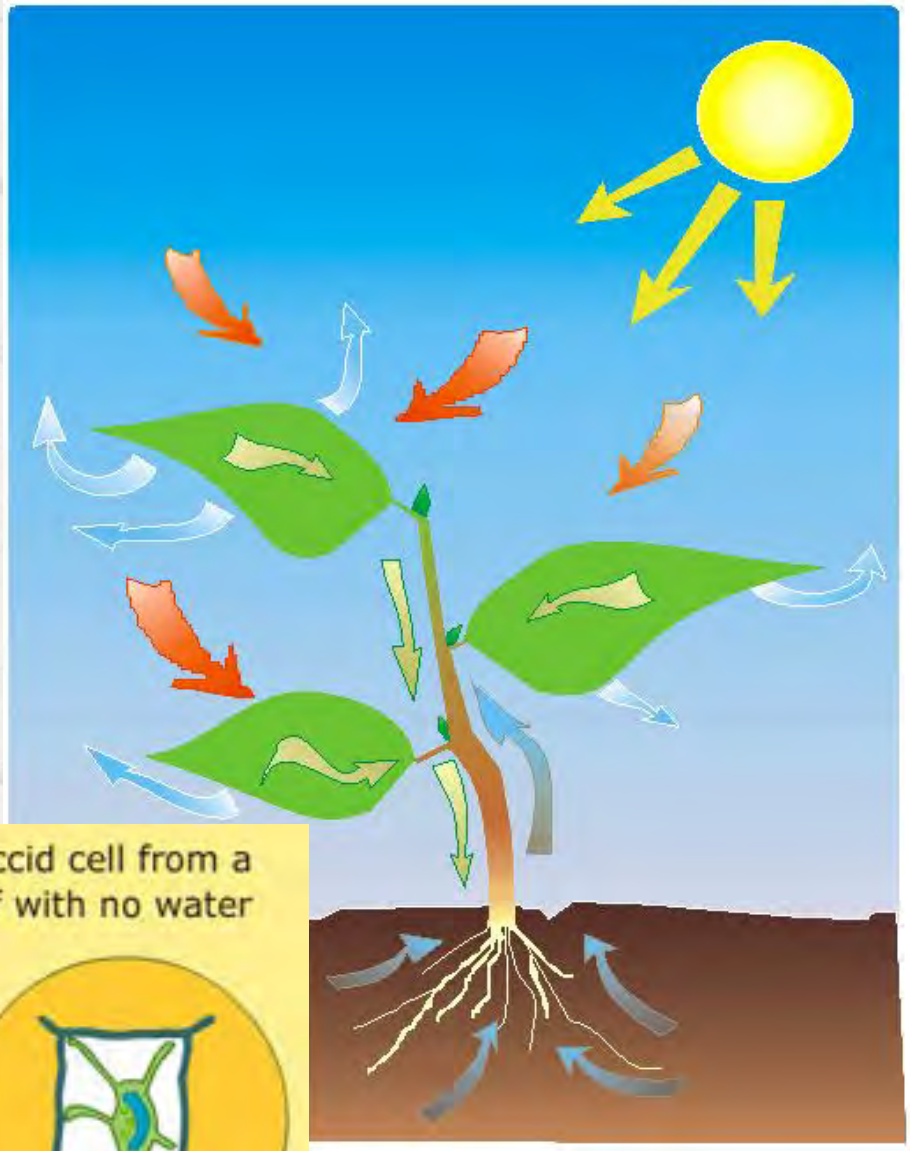
Trees' water use and needs ('the why')

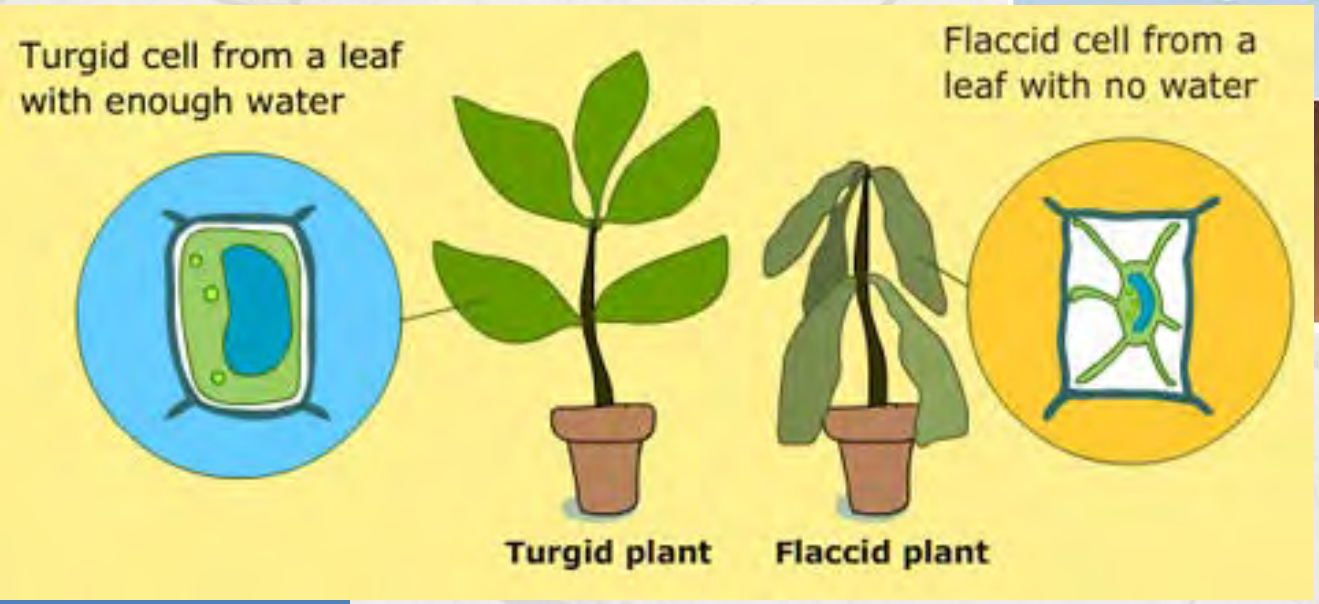
Water sources, delivery:
- The how
- The who

Changing our thinking on water supply for trees

Plants need water…

1) Turgor
2) Transport of solutes
3) Photosynthesis





Trees and drought: problematic in several ways…

~ Trees need water to "feed themselves" (photosynthesis)

~ Drought = reduction in growth (which may persist)

~ Drought = less stored energy = lowered defenses

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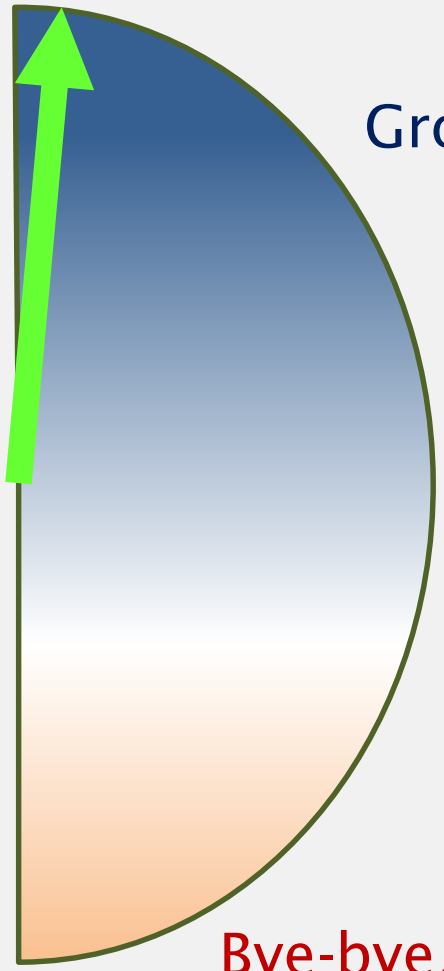
Watering "situation" before the drought

Growth; health?; wasted water



Growth; health

~~Growth;~~ health

Applied water

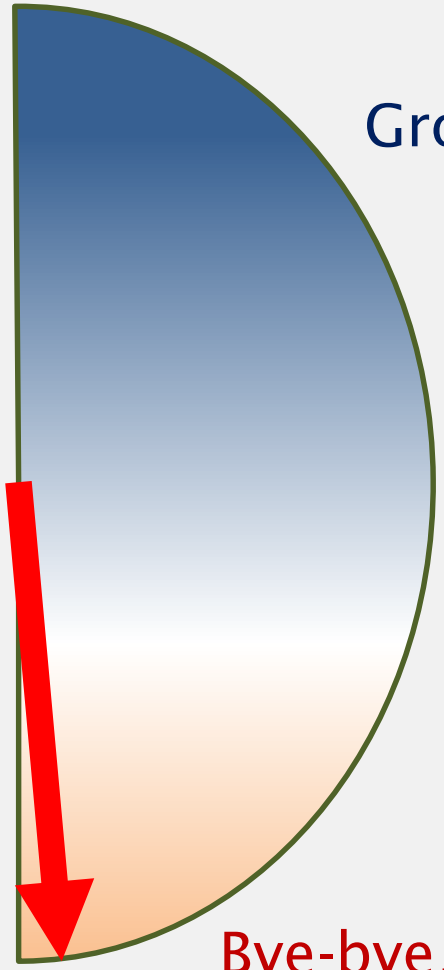
Tree response

Health?

Bye-bye…

Watering "situation" now…

Growth; health?; wasted water



Growth; health

~~Growth;~~ health

Applied water

Tree response

Health?

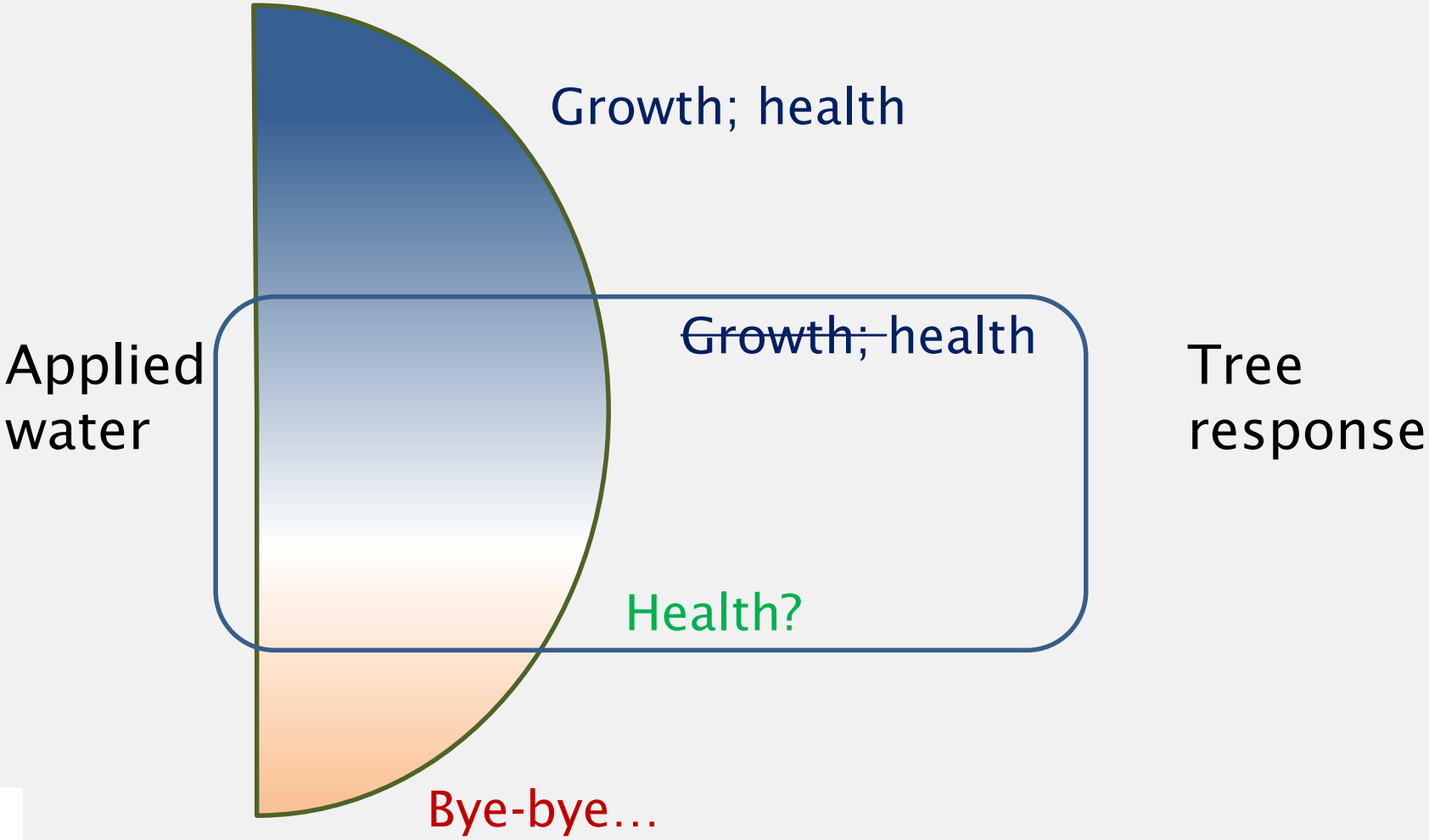
Bye-bye…

Conceptual view of urban trees in drought

$→ / Situation	Costs now	Costs later	Benefits	Benefit-Cost Ratio
No drought				+ +
Drought				– –
Drought + optimal water				+
Drought + minimal water				+ +

Watering "situation" now…

Growth; health?; wasted water



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Young trees: Lack of water = quick death

←Problem:
what does
"Deep watering"
mean here?

(how much can
it hold?)

"Crispy
critters" →
(Larry
Costello)

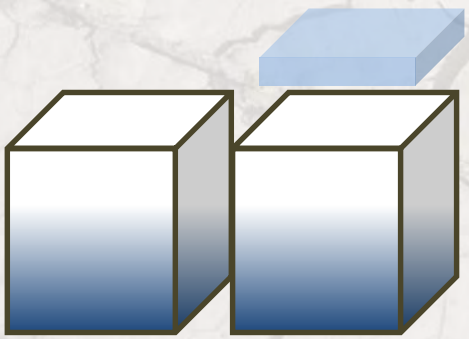
Young tree solutions

How much?
Amazingly little: 5-10 gal

How often?
Frequently! (X times/WEEK)

Who?
Residents
NGOs
Partners (schools, churches, business)

Mature trees: Functional irrigation approach, or refilling the the "water reservoir"
(Nelda Matheny and Larry Costello)



1 in on 1 ft^2
= 0.62 gal.

Soil water reservoir capacity: 2 elements

Volume → area*depth, or inches water/foot depth

Texture → available water → loam > clay > sand

Mature tree solutions

How much?
Substantial: 100 to 100s of gal.

How often?
Seldom! (X times/SUMMER)

Who?
Residents
Municipalities
Partners (schools, churches, business)

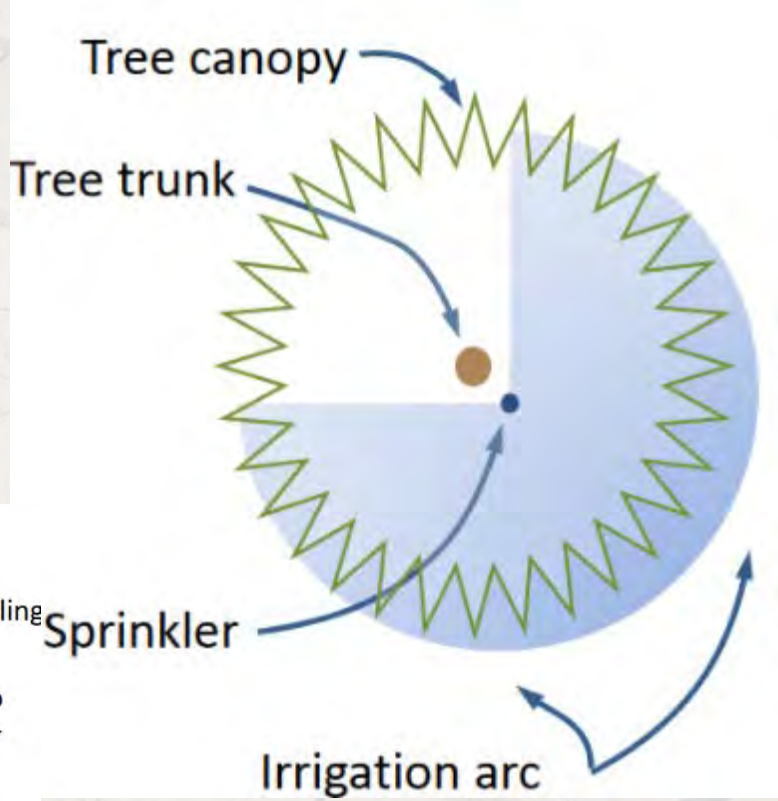
Oki/Fujino RSIC→

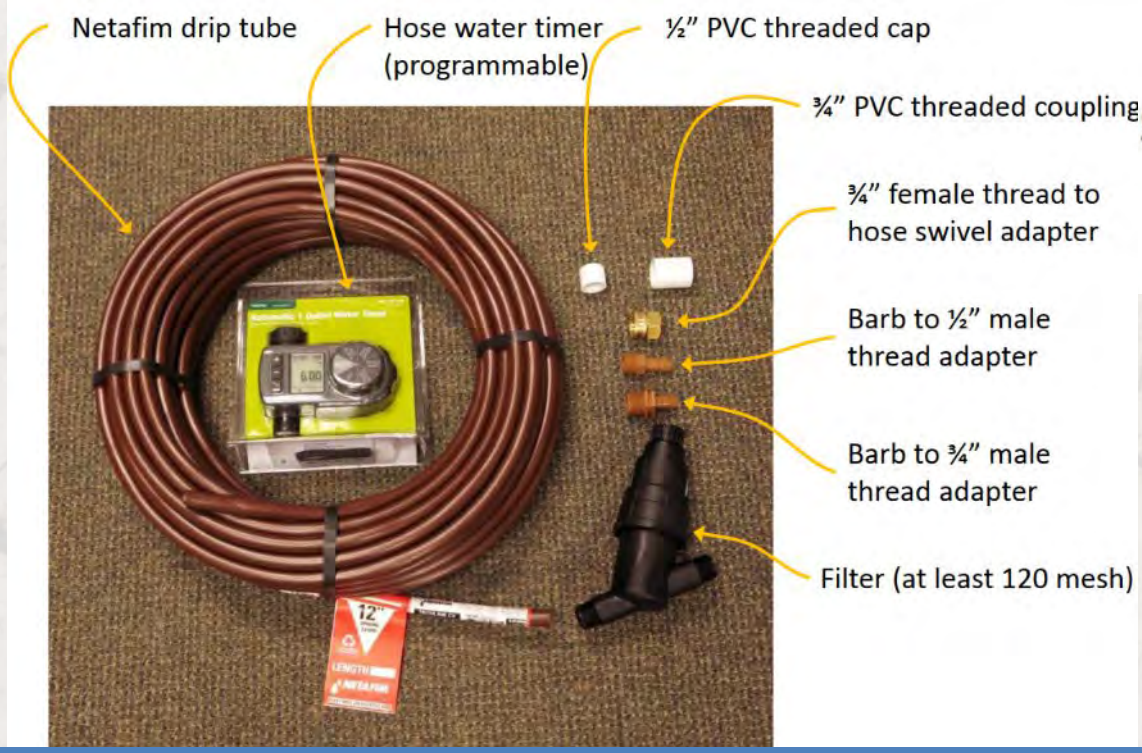
and

TRIC ↓

Mature tree solutions: **ccuh.ucdavis.edu**

The challenge:
How to apply water
~~too much, too little~~
without runoff





↑RSIC

and

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Solutions: New sources of water 1 - Grey

Local:

Greywater

How much?

Some…

Pros/Cons

+ Reliable, cheap

- Wrong place

Use for other plants; saves potable water for trees

Solutions: New sources of water2 - recycled

Local/regional:

Recycled

How much?

Lots… maybe!

Pros/Cons

+ Volume!

- Distribution, salts

Keep track, test soils; but USE IT if you have it!

Solutions: New sources of water & funding – stormwater

Local-statewide:

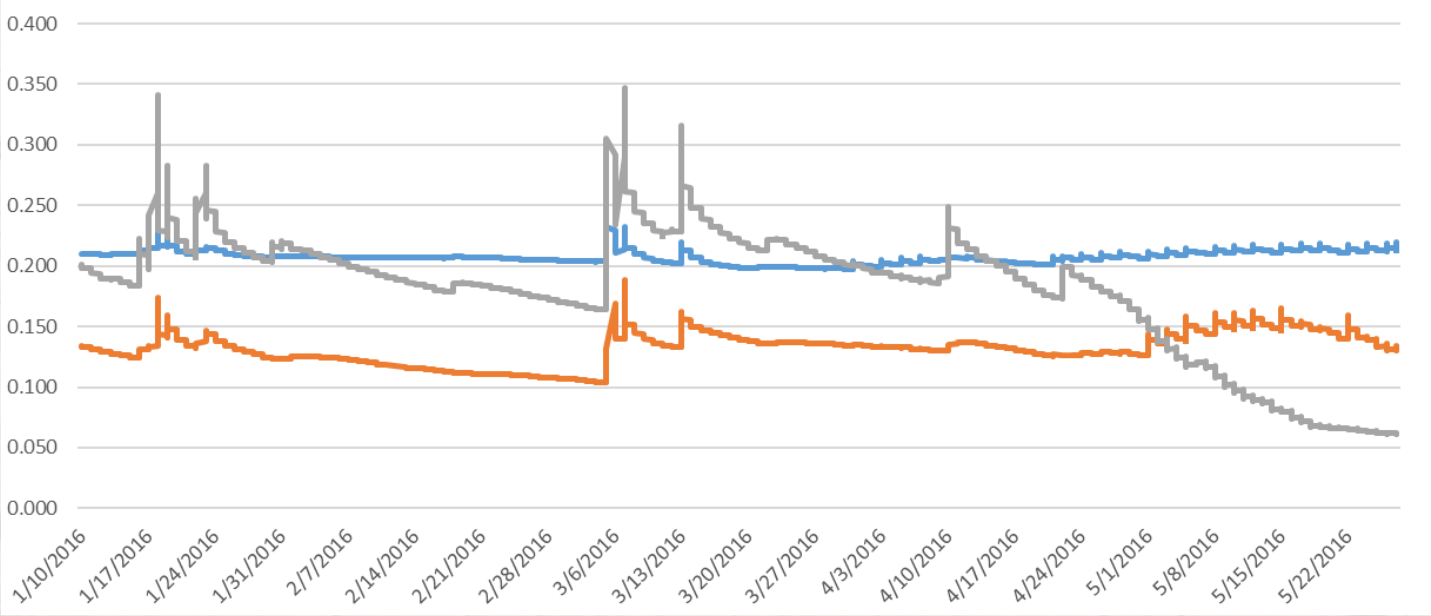
"Stormwater trees"

How much?

H2O: some, can be stored underground
$: potentially lots…

Solutions: New sources of water & funding – stormwater

Pros/Cons
+ multiple objectives, added funding
- initial costs, limited experience



We are at an early stage – let's try it out

Long term solutions: reconsider trees + water

Element	Characteristics or Function
Water	***Grey*** → ubiquitous; for landscape trees or plants ***Recycl.*** → available to residents and city crews; distribution lines not crucial ***Potab.*** → "backup" or last resort for mature trees ***Storm*** → provides all of trees' winter needs; remains stored in soils/accessible
Plant palette & setup	**Landscapes** → water-conserving, tree-compatible **Trees** → drought- and recycled water-tolerant **Irrigation** → separated: trees vs. other plants
Steward-ship	**Shared** between residents, NGOs, local groups, and municipal staff

Thank you!

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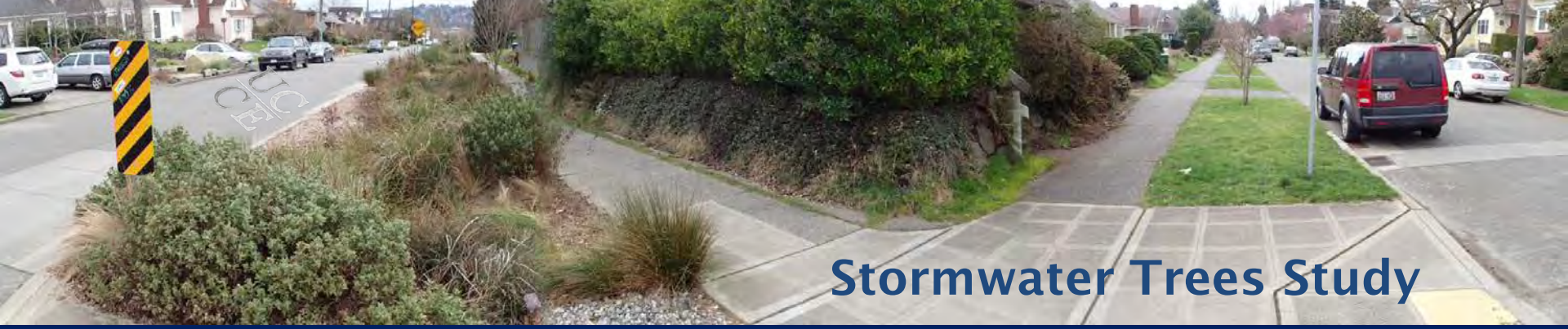

Igor Laćan UC Cooperative Extension San Francisco/San Mateo

Please "enroll" your bioswale trees in my study!

ilacan@ucanr.edu

*Help me evaluate how **trees** perform in bioswales!*

→ No cost to you! (funded by the UC, and USDA-FS)

→ Get soil moisture & tree condition data for 2 yrs.

→ Email ilacan@ucanr.edu or call 510 684 4323