Is Agriculture in Riverside Economically Viable?

A "Virtual Water" value analysis that provides metrics for crop value, water efficiency and farm profitability

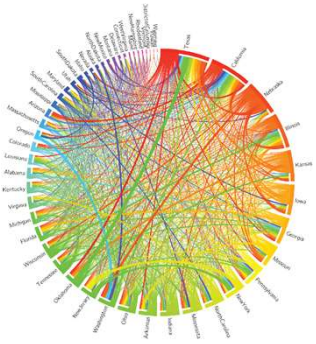
Presented to:

The Riverside Agricultural Water Rate Task Force

E. Seth Wilson

November 14, 2018

Overview



- What is Virtual Water?
- Example: Central Valley
- Is agriculture in Riverside economically viable?
  - Most likely crops evaluated;
  - Three scenarios examined;
- Potential opportunities/impacts to RPU rates and infrastructure;
- Virtual Water and Urban Water Management Planning.
- Key Takeaways

https://ai2-s2-public.s3.amazonaws.com/figures/2017-08-08/ef98ab05d2624a8d8b4d6cfa12160a7b5e75115c/8-Figure3-1.png

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Virtual Water

Virtual water is the volume of water used to produce consumer products. The total volume of water refers to all of the water used in the production of a product. Every product we consume contains virtual water.

For example, the total volume of water used in a food product would include the water used in the agricultural process, but also the water used in packaging and shipping.

https://www.foodandwaterwatch.org/insight/virtual-water

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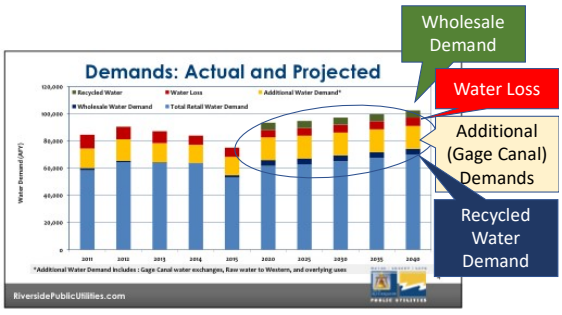
Virtual Water Analysis helps value, signal, and make transparent, hidden costs and benefits of Urban Ag.



URBAN WATER MANAGEMENT PLAN Presentation, AWRTF 08/23/18
https://riversideca.legistar.com/LegislationDetail.aspx?ID=3603807&GUID=B089AA6B-1594-4DC2-8C51-E3B7464F9C76&Options=&Search=

- Measures water use productivity;
- Provides additional economic development metrics/impacts;
- Improves coordinated project development:
  - Potable/Gage/Recycle infrastructure;
  - City General Plan, Prop-R & Msr-C, and RPU service offerings and infrastructure;
- Innovates water contingency strategies:
  - Storm water / rainwater;
  - Recycled/ non-potable / salinity;
  - Conservation & efficiency.

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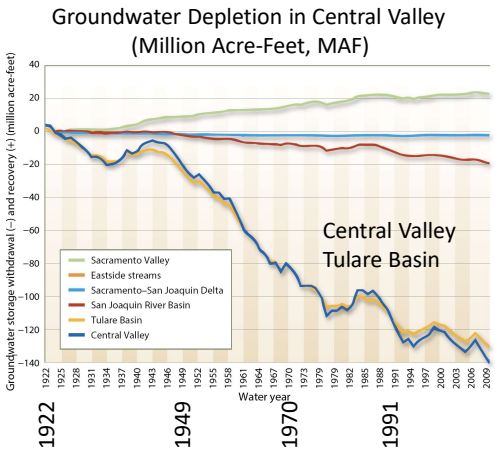
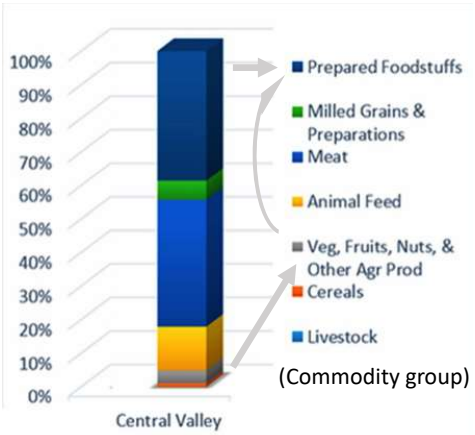
Example: Virtual Groundwater Exports from Central Valley - Food Products





Percentage of Virtual Groundwater Transfers (by Commodity group)

http://calag.ucanr.edu/archive/?image=fig6903p194.jpg

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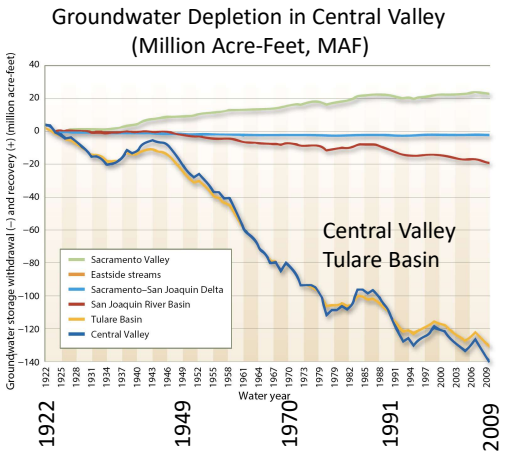
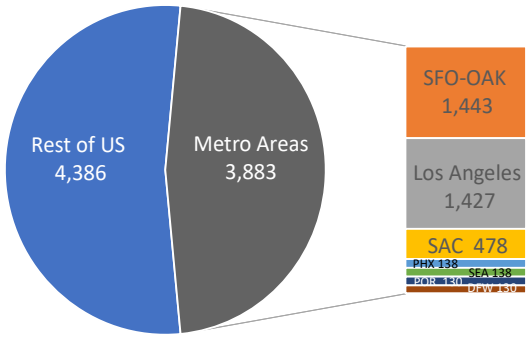
Example: Virtual Groundwater Exports to U.S. & Metropolitan Cities via Food Products



Virtual Groundwater Exports from Central Valley (Thousand Acre-Feet, TAF)



http://www.pnas.org/content/112/28/8561

http://calag.ucanr.edu/archive/?image=fig6903p194.jpg

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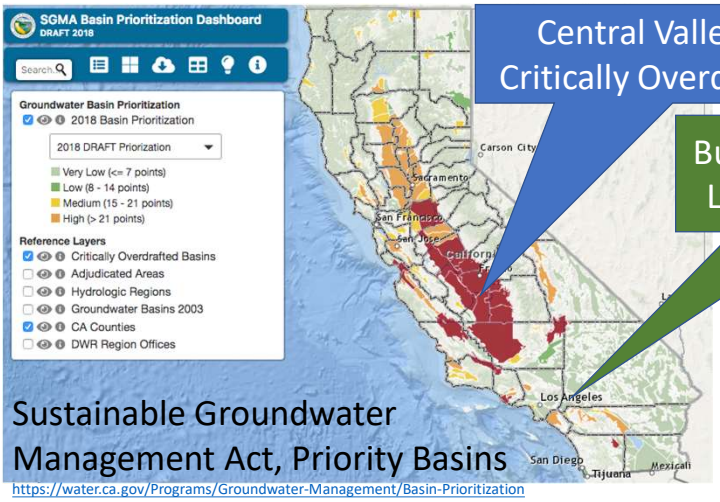
Riverside has Reliable Groundwater Supplies to Support Food Systems Development



Sustainable Groundwater Management Act, Priority Basins

https://water.ca.gov/Programs/Groundwater-Management/Basin-Prioritization

Central Valley Relies on Critically Overdrafted Basins

Bunker Hill is a "Very Low" Priority Basin

"There are sufficient supplies to meet replenishment obligations."
2015 Urban Water Management Plan

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Is Agriculture in Riverside Economically Viable?

- This study uses a "virtual water" analysis to determine the revenue generated per amount of water used to grow crops ($/ccf*);
- Crops evaluated:
  - Citrus, based on UC Agricultural Extension Study;
  - Avocados, based on UC Agricultural Extension Study;
  - Vegetables & horticultural products (3 revenue scenarios):
    1. Sold at wholesale, applied CA statewide metrics (above slide);
    2. Sold at 30% below retail prices, USDA-Economic Research Service (ERS) data;
    3. Sold at retail prices, USDA-Economic Research Service (ERS) data.

*ccf= Hundred cubic feet

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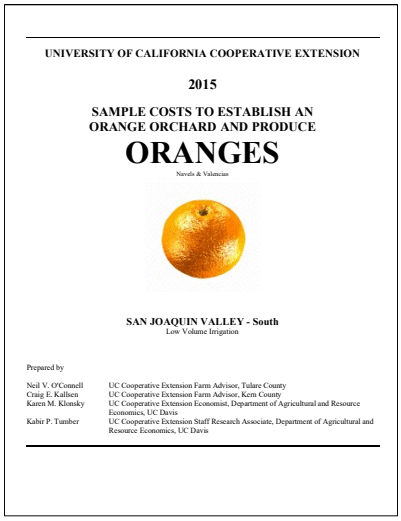
Water Use & Costs for Orange Groves
UC Agricultural Extension Study



UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2015

SAMPLE COSTS TO ESTABLISH AN ORANGE ORCHARD AND PRODUCE

ORANGES

Navels & Valencias

SAN JOAQUIN VALLEY - South
Low Volume Irrigation

Prepared by

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- Thirty acre-inches delivered via canal, at a cost of $114 per acre-foot;
- Water costs in non-drought years are highly variable among water districts:
  - Low: $90 per acre-foot;
  - High: $250 per acre-foot;
- In drought years growers may pay between $1,000 and $1,800 per acre-foot;

https://coststudyfiles.ucdavis.edu/uploads/cs_public/19/d4/19d4f1bb-408a-443e-a759-36fd53a2948f/oranges_vs_2015.pdf

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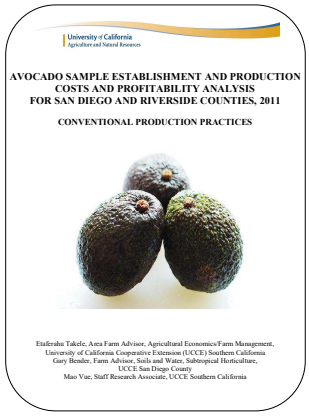
Water Use & Costs for Avocados
UC Agricultural Extension Study



University of California
Agriculture and Natural Resources

AVOCADO SAMPLE ESTABLISHMENT AND PRODUCTION COSTS AND PROFITABILITY ANALYSIS FOR SAN DIEGO AND RIVERSIDE COUNTIES, 2011

CONVENTIONAL PRODUCTION PRACTICES

Etaferahu Takele, Area Farm Advisor, Agricultural Economics/Farm Management, University of California Cooperative Extension (UCCE) Southern California
Gary Bender, Farm Advisor, Soils and Water, Subtropical Horticulture, UCCE San Diego County
Mao Vue, Staff Research Associate, UCCE Southern California

Water cost in San Diego County is estimated at $1,200 per acre-foot and $650 per acre-foot for Riverside County;

"At a water requirement of about four acre feet per acre for avocados in the inland areas of San Diego County, water will cost $4800 - $5200/acre per year. If you are producing 5000 lbs per acre and receive $1/lb for your fruit, you get less than your water costs." https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=7186

https://coststudyfiles.ucdavis.edu/uploads/cs_public/5a/87/5a87bb11-59b3-4056-a2d6-a6e14507dd84/avocadoconventionals2011.pdf

Farm profitability is highly sensitive to RPU water rates

Comparison of Virtual Water Value of Crops to RPU Water Rates ($/ccf)							RPU Rates - Water Costs as % of Virtual Water Value			
							Potable Infrasteucture		Non-Potable Infrasteucture	
Crop (Scenaio)	Yield (lbs/acre)	Unit Revenues ($/lb)	Gross Water Use (AF*/acre)	Gross Water Use (ccf**/acre)	Virtual Water Value ($/AF)	Virtual Water Value ($/ccf)	WA-1A, Tier 3 Summer ($3.26/ccf)	WA-6, Summer ($1.84/ccf)	Gage, Tier 3 ($0.87/ ccf)	Recycled Water ($1.57/ccf)
Citrus	20,625	$ 0.32	2.5	1,089	2,640	$ 6.06	54%	30%	14%	26%
Avocados	9,000	$ 1.07	3.5	1,525	2,751	$ 6.32	52%	29%	14%	25%
Vegetables & Horticulture (CA wholesale, gross water use)	17,569	$ 0.86	1.5	660	14,321	$ 32.88	10%	6%	3%	5%
Vegetables & Horticulture (Urban Ag, Mid - 30% off Retail)	17,569	$ 3.32	2.5	1,089	19,309	$ 44.33	7%	4%	2%	4%
Vegetables & Horticulture (Urban Ag, retail market revenues)	17,569	$ 4.65	2.5	1,089	25,997	$ 59.68	5%	3%	1%	3%

* AF = Acre Feet; **ccf = hundred cubic feet

Key Conclusions:

- Providing interruptible rates and expanding non-potable services improves agricultural profitability;
- Citrus & avocados require Gage Canal water to be marginally profitable;
- Vegetable and horticulture can be profitable at potable water rates.

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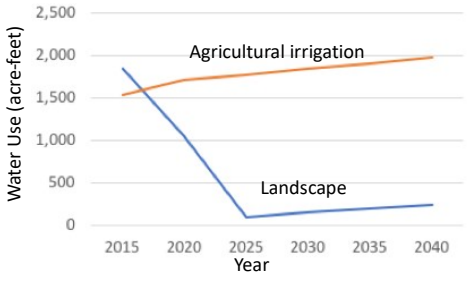
Urban Management Planning
Provide an interruptible agricultural rate for potable access; Expand arable land access to non-potable infrastructure;

RPU Projected Potable Water Use



Source: Table 1-1, 2015 Urban Water Management Plan
https://riversideca.gov/utilities/pdf/2016/RPU_2015_UWMP_June_Draft.pdf

- Aligns strategy with RPU's plans to use more non-potable water for landscapes;
- Lowers long-term infrastructure costs;
- Leverages and enhances Gage Canal infrastructure;
- Improves economic viability for urban farming and groves;
- Supports 4-STAR Community achievement, and California's Transformative Climate Communities (TCC) initiatives.

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RPU can lower costs by shifting agriculture and irrigation to interruptible rates and non-potable infrastructure

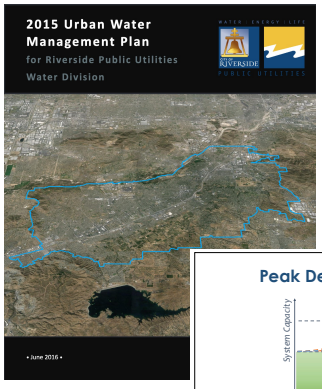
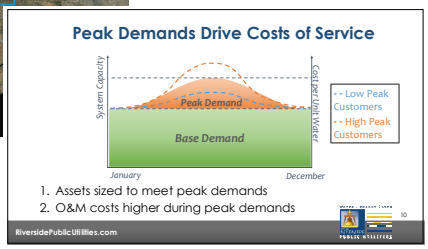


Table 5-7. Estimated Days per Year Exceeding 95 Degrees F

City	Historical	2020	2060	2070
Riverside	43	58	72	82

"Increased temperature levels are expected to increase water demands across the watershed, mainly for agricultural and irrigation purposes."

https://riversideca.gov/utilities/pdf/2016/RPU_2015_UWMP_June_Draft.pdf



See also: COSA Presentation, 6/28/18
https://riversideca.legistar.com/LegislationDetail.aspx?ID=3536801&GUID=D2A6333C-6A6F-49A7-BD98-CED9C3CF9051&Options=&Search=

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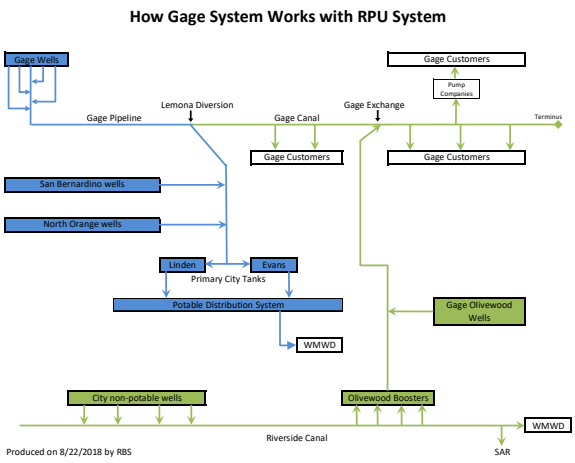
RPU's Non-potable System Improves Reliability & Affordability; Gage CAPEX Improvements Satisfy Proposition 218

"We conclude the trial court erred in holding that Proposition 218 does not allow public water agencies to pass on to their customers the capital costs of improvements to provide additional increments of water..."

CAPISTRANO TAXPAYERS ASSOCIATION INC v. CITY OF SAN JUAN CAPISTRANO

https://caselaw.findlaw.com/ca-court-of-appeal/1698183.html

See also:
Gage Water Exchange Agreement, 03/12/91
Greenbelt Flowage Agreement between City of Riverside and the Gage Canal Company - January 21 1993
https://riversideca.legistar.com/LegislationDetail.aspx?ID=3581157&GUID=43F5BE1C-0295-4E0F-ACC5-14692D456662&Options=&Search=



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Sustainable urban farming water practices can provide "contingency services" to RPU

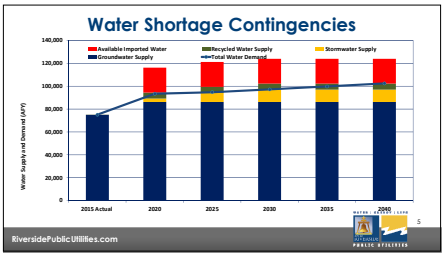
Water Harvesting – "Slow It, Sink It, Spread It"

- Rainwater Harvesting
- Greywater Harvesting

Water Retention - High soil organic matter enhances productivity and permeability, resulting in increased water infiltration and retention.

- Sheet Mulching
- Swales and Basins
- Drip Irrigation
- Weather-Based Irrigation
- Soil-Based Irrigation (SOM)

State Water Bond and Cap & Trade Funds Available



2015 Urban Water Management Plan

1. Stormwater Capture – 11,000 AF
2. Recycled Water – 5,200 AF
3. Conservation – 12,000 AF

https://www.pacinst.org/wp-content/uploads/2013/02/sustainable_water_management_for_urban_agriculture.pdf

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Key Takeaways

- Farm profitability is very sensitive to RPU water rates and service access;
- Citrus & avocados require Gage Canal water rates to be marginally profitable;
- Providing interruptible service on RPU's potable system and expanding non-potable services improves agricultural profitability;
- Sustainable urban farming water practices can provide "contingency services" to meet RPU's ancillary supply needs: storm water, recycled water, and conservation;
- Gage system Improvements can satisfy Proposition 218 requirements without general fund transfer (GFT) appropriations;

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