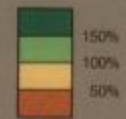


Percent of Average Precipitation and Snowpack

Oct 1, 1975 - Sep 30, 1976

Precipitation in Percent of Average



Percent of Average Precipitation and Snowpack

Oct 1, 1976 - Sep 30, 1977

Precipitation in Percent of Average



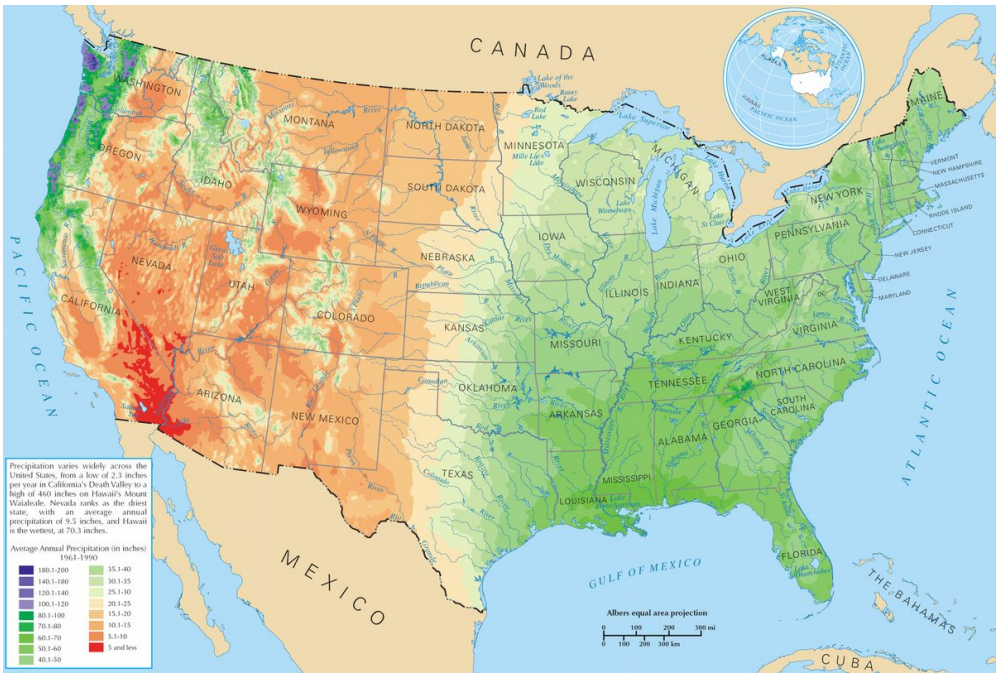
The Future of Water Management

Snowpack In Percent of Average
April 1, 1976 and April 1, 1977

Watershed	1976	1977
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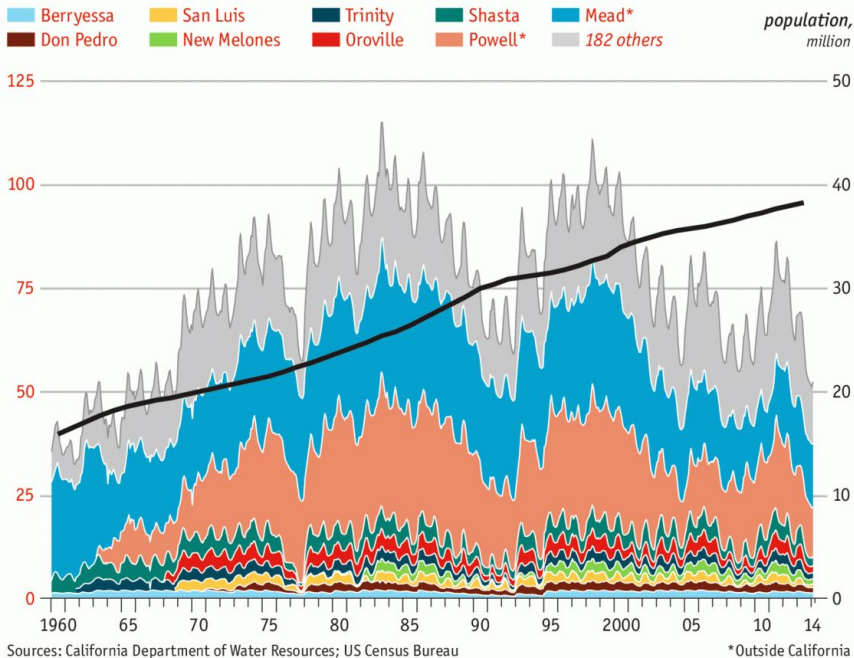
The two maps show deviations from average precipitation and snowpack, illustrating the pattern of drought.

Life beyond the 100th meridian

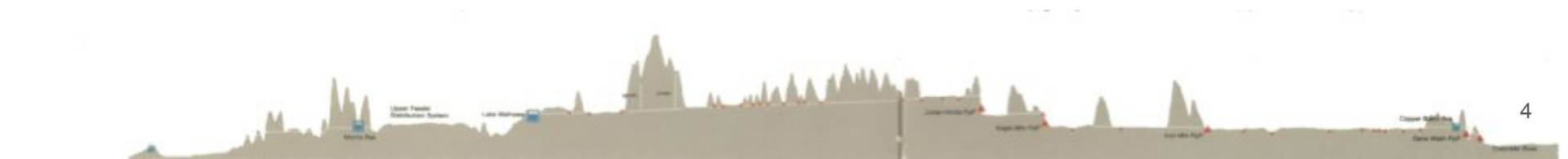


California's:

*water supply by reservoir,
Cubic metres, billion*



Our state's water system was design a generation ago for a state half its current size





“It’s a **different world**...we have to act differently”
-Governor Brown



Water Is Broken. Data Can Fix It.

By CHARLES FISHMAN MARCH 17, 2016



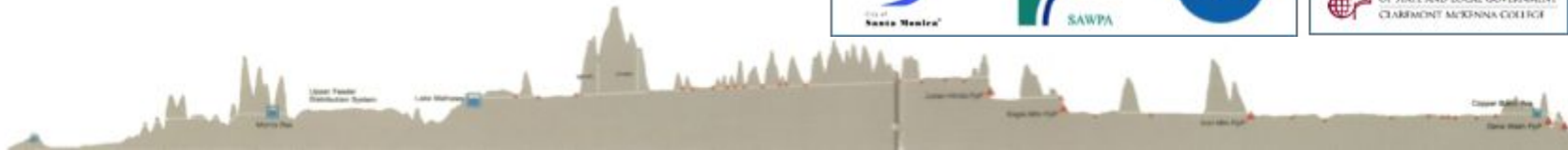
California's
water industry
isn't wired to
adapt to
climate change

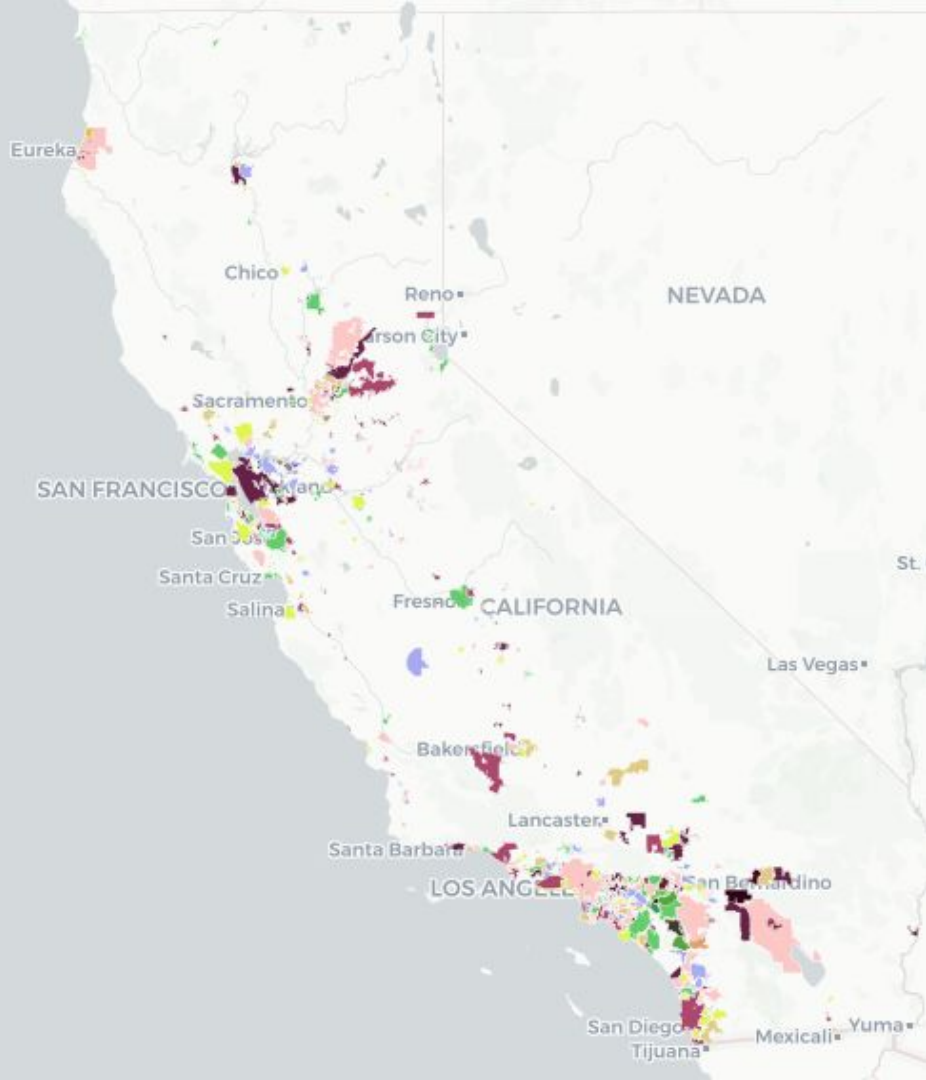


What is the California Data Collaborative?

- Launched Jan 2016 by water agencies for water agencies.
- Goal: Leverage modern data science to ensure water reliability
- Powered by ARGO, a 501(c)3 public data infrastructure non-profit

Founding Members:	Partners:
      	     
      	     





SCUBA

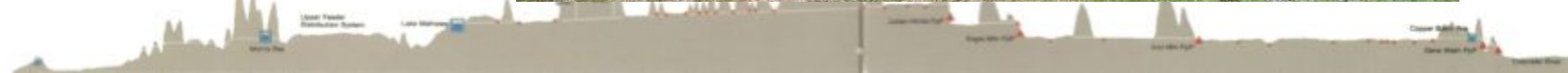
Strategic
California
UrBan water
Analytics

“We not only have the opportunity to collaborate on tools and research we develop together, we have the chance to partner with talented and innovative stakeholders from around the world to assist us in using data to make better water management decisions.”

— Elizabeth Lovsted, Director of Water Supply Planning, EMWD

Digital infrastructure optimizing existing water resources

Physical infrastructure to tap into new water resources



Supporting water managers into an uncertain future

Efficiency Explorer v1.2

About Tool

Powered by ARGO

Scenario Builder

Supplier



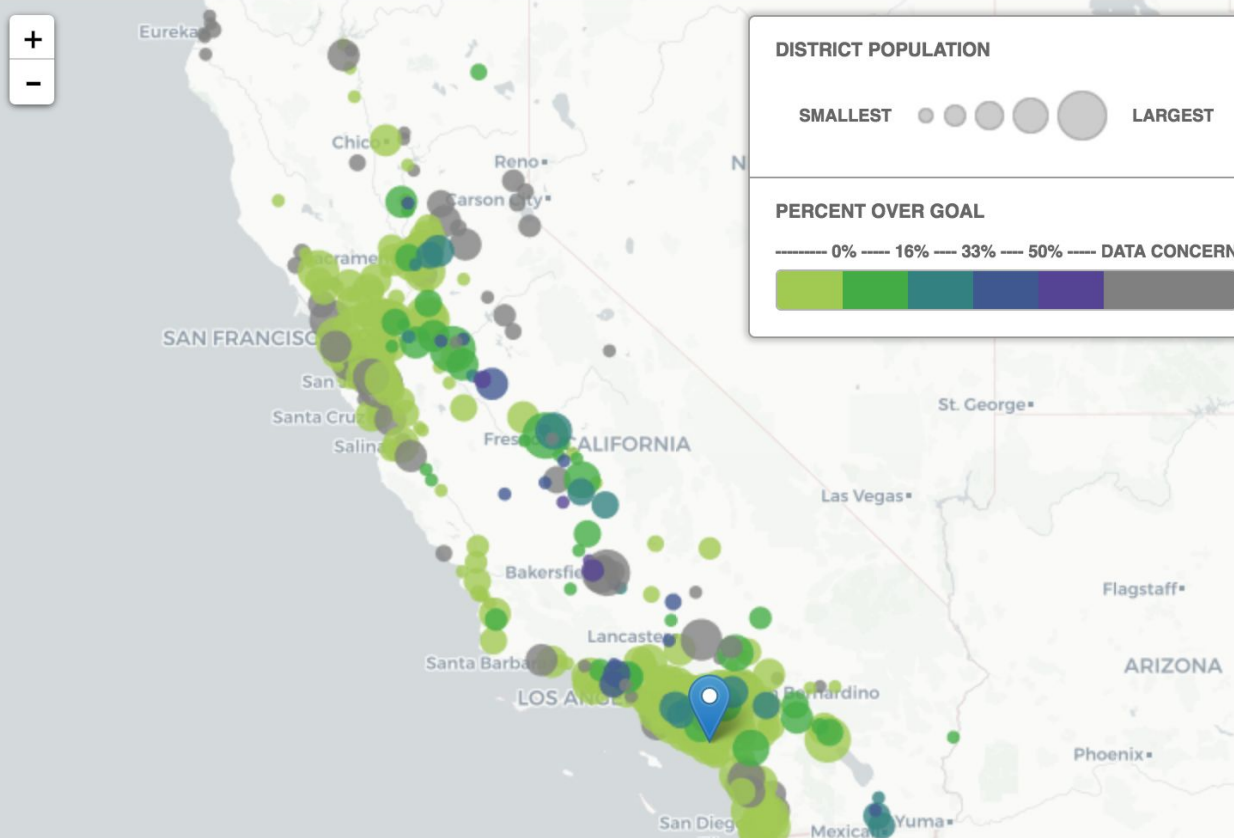
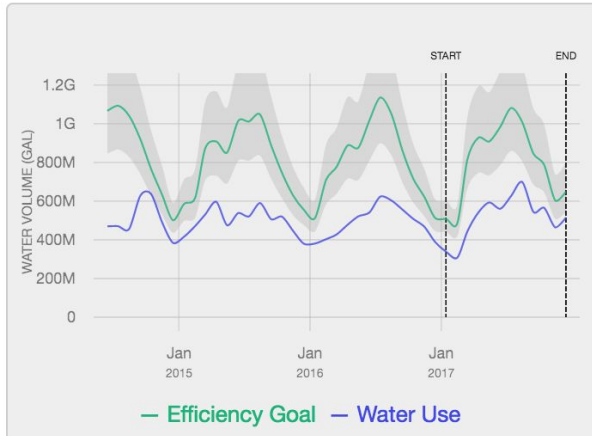
Moulton Niguel Water District

Residential Efficiency Goal: 29453.42 AF

Residential Use: 19005.21 AF

Efficiency: 10448.21 AF *within* goal in this scenario | -35%

Data Quality: [Useful first approximation](#)



Multiple benefits: modeling water rates

CALIFORNIA DATA COLLABORATIVE | Rate Comparison | Scenario Planning

RESIDENTIAL_SINGLE | RESIDENTIAL_MULTI | IRRIGATION | COMMERCIAL | INSTITUTIONAL | INDUSTRIAL | OTHER

Rate Type: Flat | Tiered | Budget (selected) | Display: Revenue (selected) | Usage

Time Range: 2012-01 to 2016-10

Service Charge: (depends on...) | meter_size

Values	Charges (\$)
5/8"	11.39
3/4"	11.39
1"	11.39
1 1/2"	37.98
2"	60.77
3"	132.94
4"	227.88
6"	475.14
8"	683.65
10"	1101.82
2 1/2"	0

GPCD: 60 | Landscape Factor: 7

Rate Code: R1 | R1C | WO1

Revenue (Million \$)

Variable Rev., During Time Period (Mill. \$)

Tier	Baseline	Hypothetical
Tier 1	~25	~25
Tier 2	~25	~25
Tier 3	~15	~15
Tier 4	~5	~5
Tier 5	~5	~5

Percent Fixed Revenue

Scenario	Percent Fixed Revenue
Baseline	~25%
Hypothetical	~25%

Change in total amount paid (\$)



\$20 million

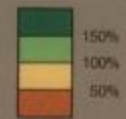
Amount ARGO's platform saved Moulton Niguel Water District by improved water demand forecasting



Percent of Average Precipitation and Snowpack

Oct 1, 1975 - Sep 30, 1976

Precipitation in Percent of Average



Percent of Average Precipitation and Snowpack

Oct 1, 1976 - Sep 30, 1977

Precipitation in Percent of Average



Case Study: Snowpack

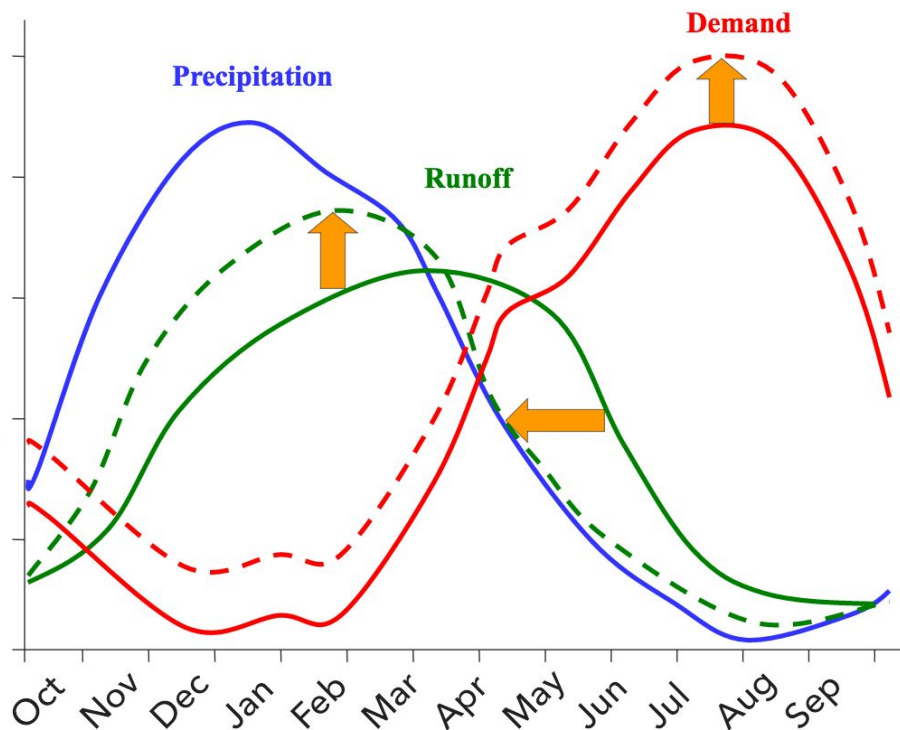
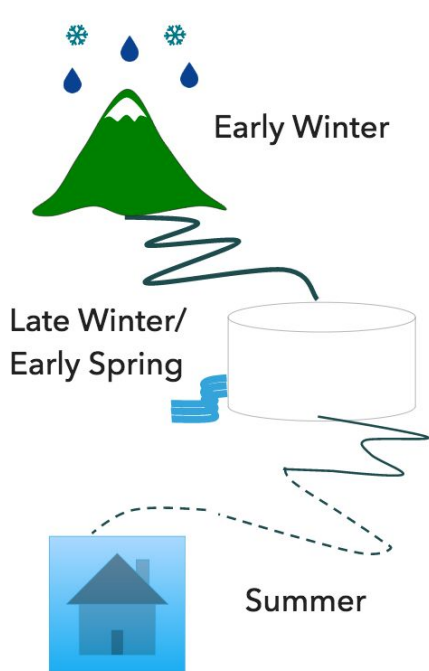
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The two maps show deviations from average precipitation and snowpack, illustrating the pattern of drought.

Climate change

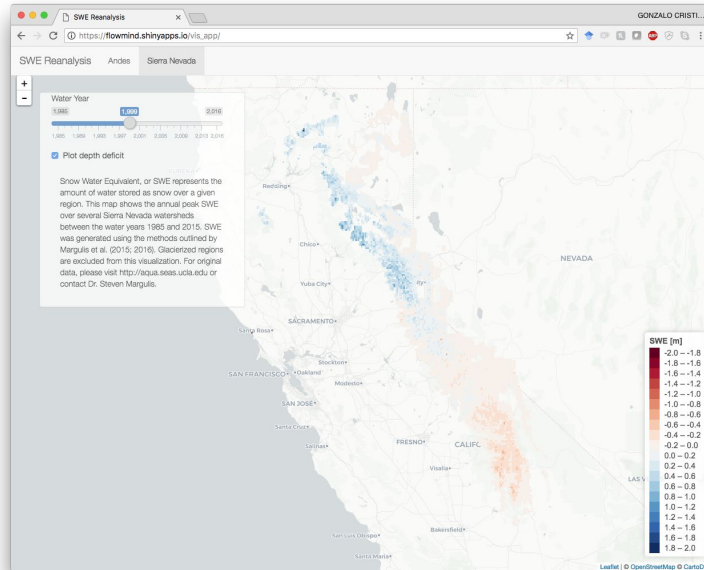
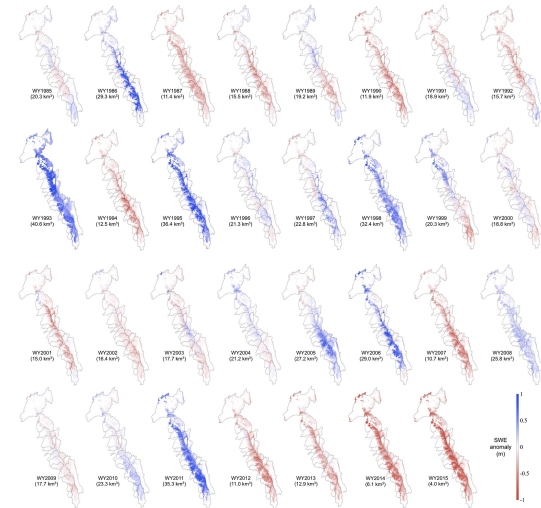
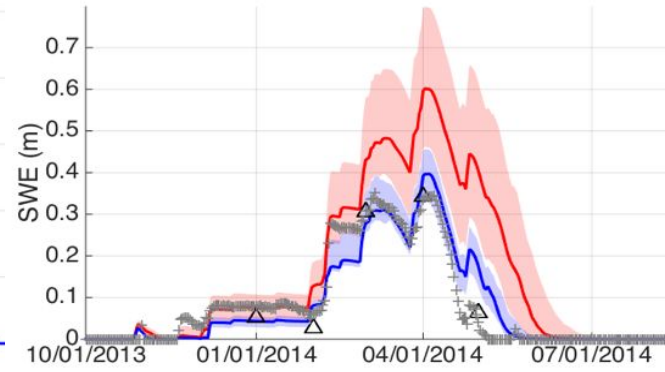
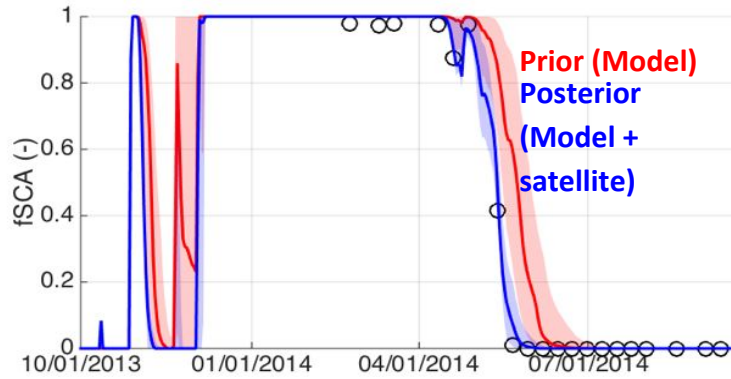
Future



A satellite-style map of the Sierra Nevada mountain range in California, showing snow cover in white and light grey. The map includes the Pacific Ocean to the west, the Sierra Nevada range in the center, and the Central Valley and Great Basin to the east. Several small black markers are placed on the mountain range. The text is overlaid in the bottom-left corner.

**Real time estimation of snow
over the Sierra Nevada**
Gonzalo Cortés - UCLA

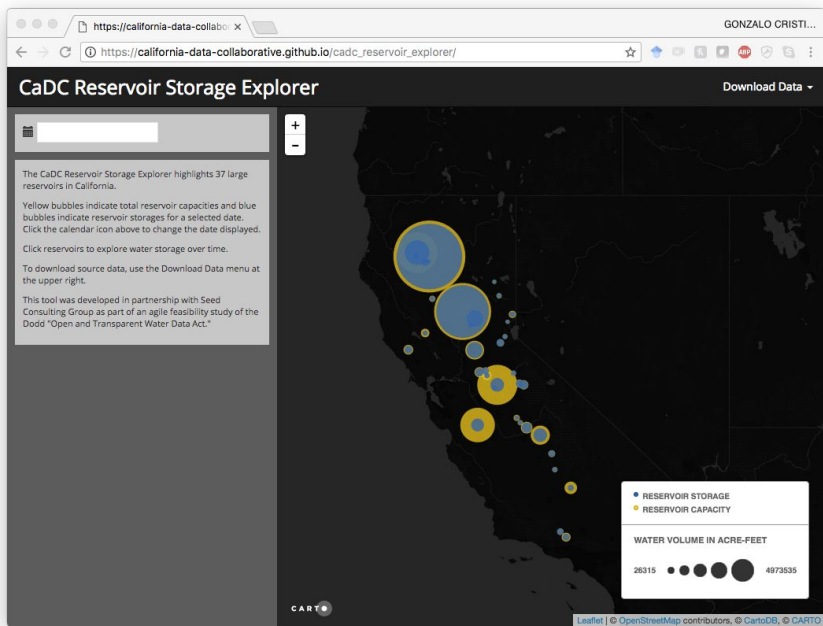
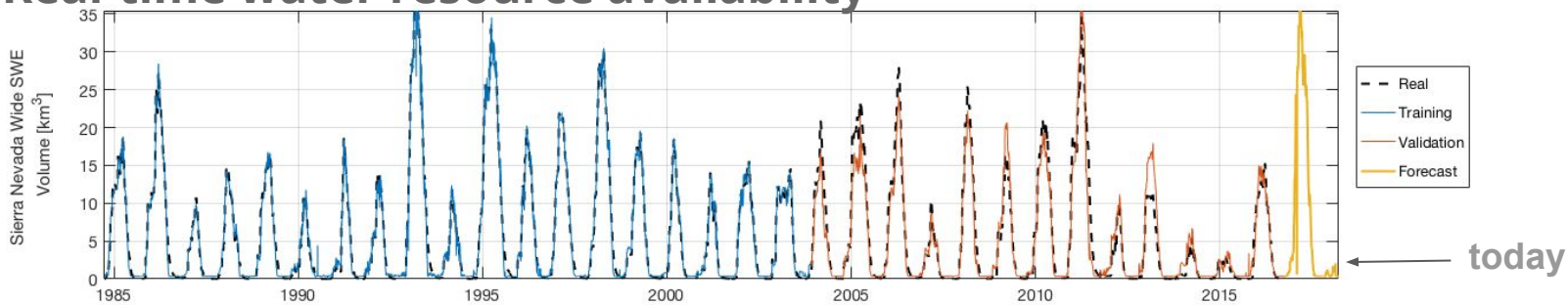
Snow simulations (from model) are conditioned on observed data from satellites



Result are historical spatial estimates of SWE for 1984-2017 (Landsat era), constrained by observed data.

ARGO

Historical Sierra Nevada reanalysis + real-time model implementation: Real-time water resource availability



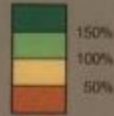
Real time
California-wide
assessment of **all**
different types of
storage.

4
ARGO

Percent of Average Precipitation and Snowpack

Oct 1, 1975 - Sep 30, 1976

Precipitation in Percent of Average



Percent of Average Precipitation and Snowpack

Oct 1, 1976 - Sep 30, 1977

Precipitation in Percent of Average



Case Study: Stormwater

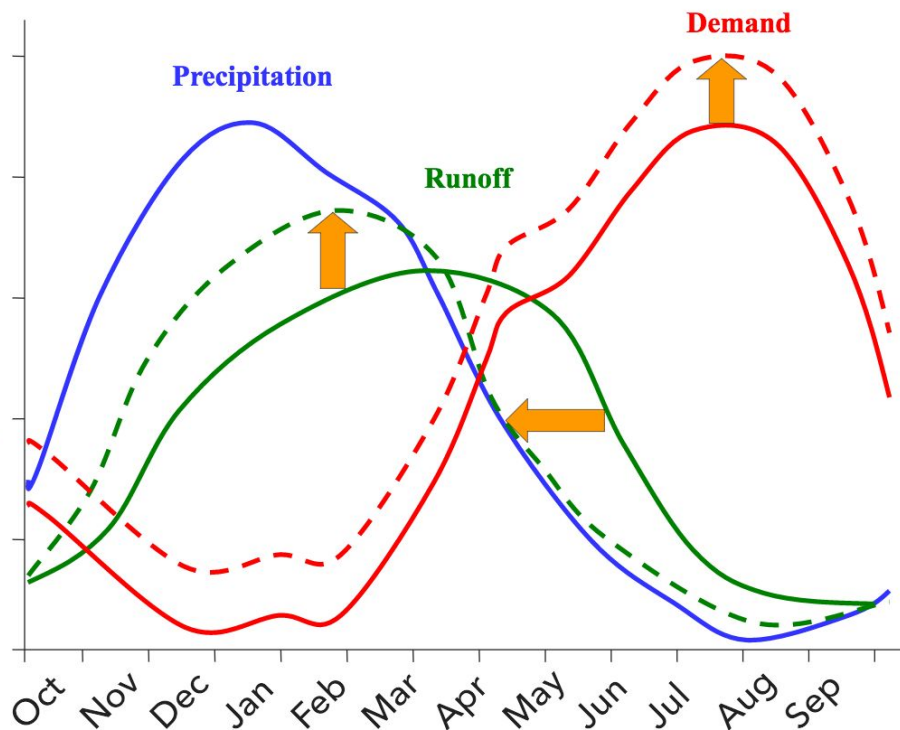
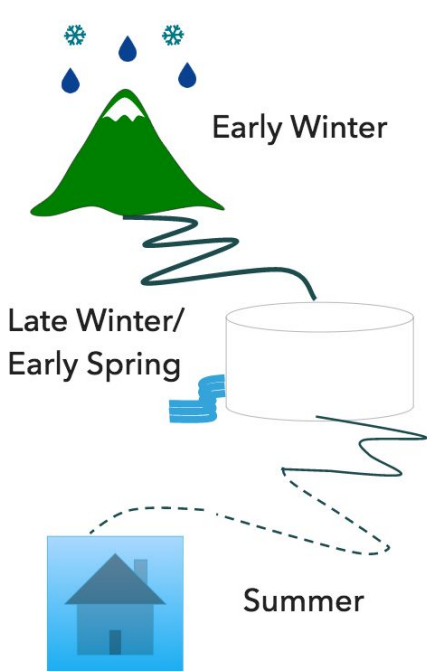
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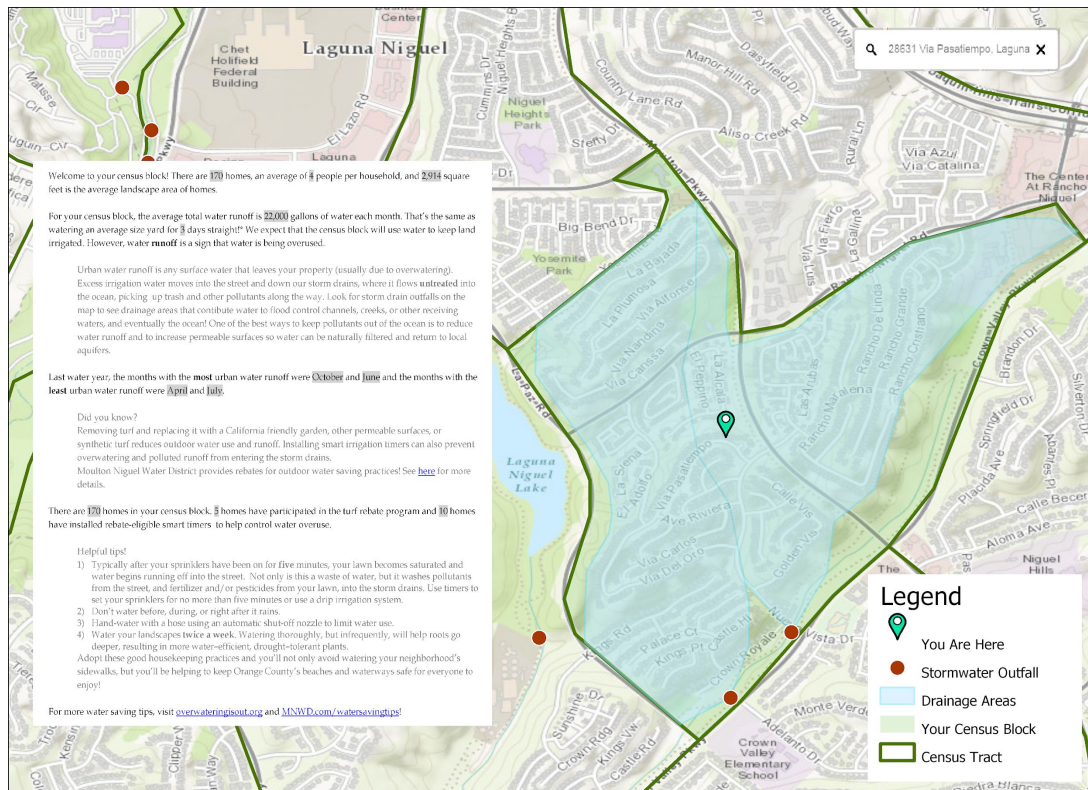
The two maps show deviations from average precipitation and snowpack, illustrating the pattern of drought.

Climate change

Future



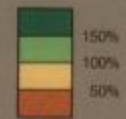
Multiple benefits: mapping urban drool



Percent of Average Precipitation and Snowpack

Oct 1, 1975 - Sep 30, 1976

Precipitation in Percent of Average



Percent of Average Precipitation and Snowpack

Oct 1, 1976 - Sep 30, 1977

Precipitation in Percent of Average



Case Study: Lawns!

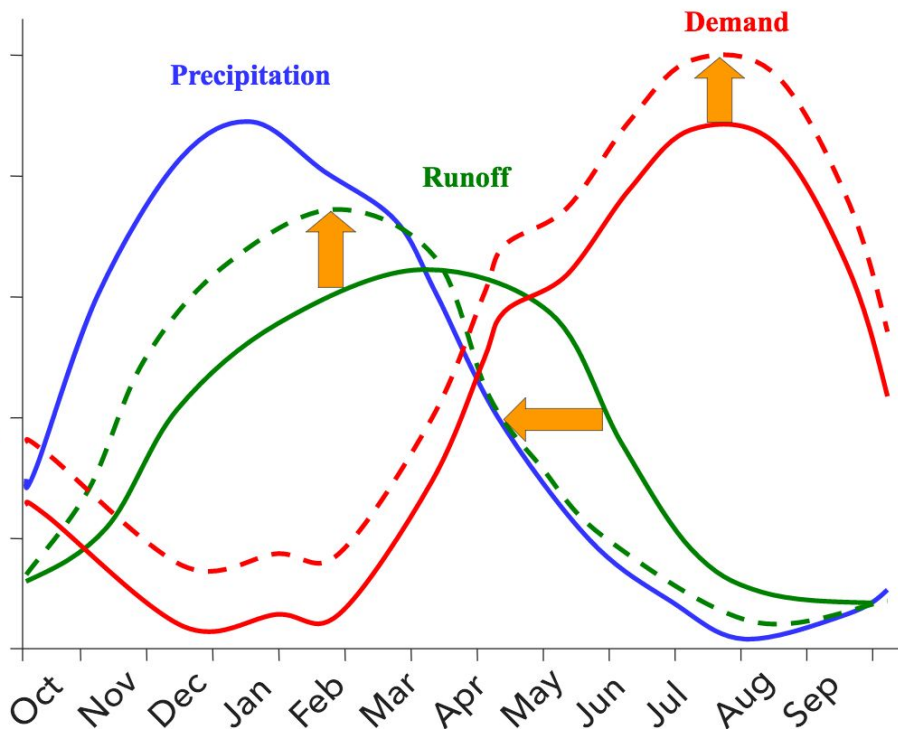
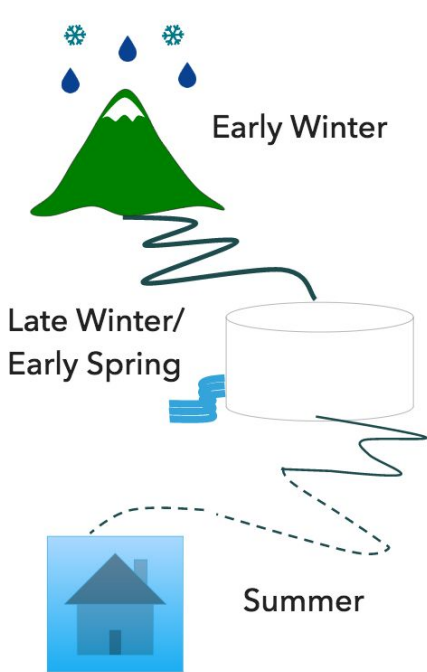
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Climate change

Future



Google Street View Landscape Survey



Survey

- Using Google Street View, virtually walk every street in the study area, creating a record for any front yard where a lawn is not the primary landscape type.
- Also record data for front yards with lawns when the secondary landscape type is drought-tolerant.
- Geocode each record, generating a latitude and longitude for each address.

Parcel level landscape area data across CA



Market transformation is a generational process that requires ongoing measurement

Sample Customer

Multiple Data Sources

- Socio Demographics
- Social Media
- Agency Data
- Purchasing Trends

Program Participation Data

- Smart Controller and Other Device Rebates
- Site Consultations
- Free Device or Materials
- Turf Removal

Customer Profile is Continually Updated and Refined

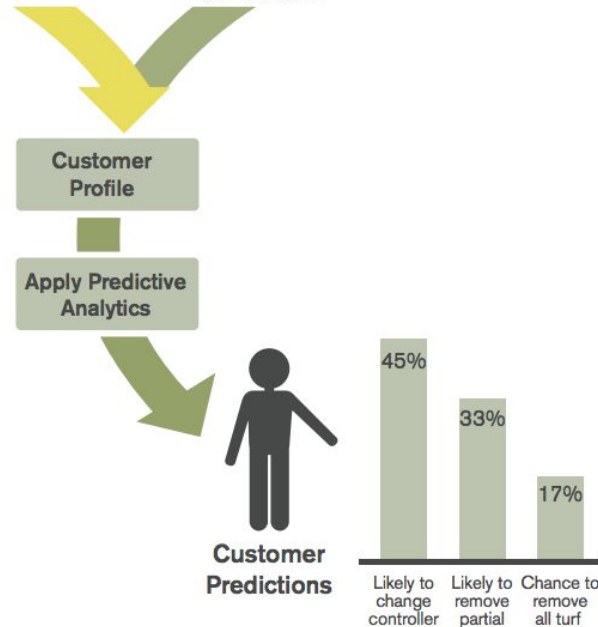
Customer Enrolls in Smart Controller Incentive Program

Recommended Outreach

- E-Bill Promotion
- Facebook Program Link
- NextDoor

Best Messaging

1. Beauty
2. Eliminate Chemicals
3. Desire for New Technology
4. Fresh, New Look



FlipMyLawn.com

Find out how much you could save with California native plants.

Enter your home address

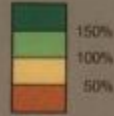
See Estimates



Percent of Average Precipitation and Snowpack

Oct 1, 1975 - Sep 30, 1976

Precipitation in Percent of Average



Percent of Average Precipitation and Snowpack

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Precipitation in Percent of Average



Thanks! Reach out @patwater

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Business model: quasi-governmental nonprofit managing California's water usage data like a utility



GovTech Open Data Smart Cities

WHY WE SHOULD TREAT PUBLIC
DATA LIKE WATER

bit.ly/manage_data_like_water

ARGO