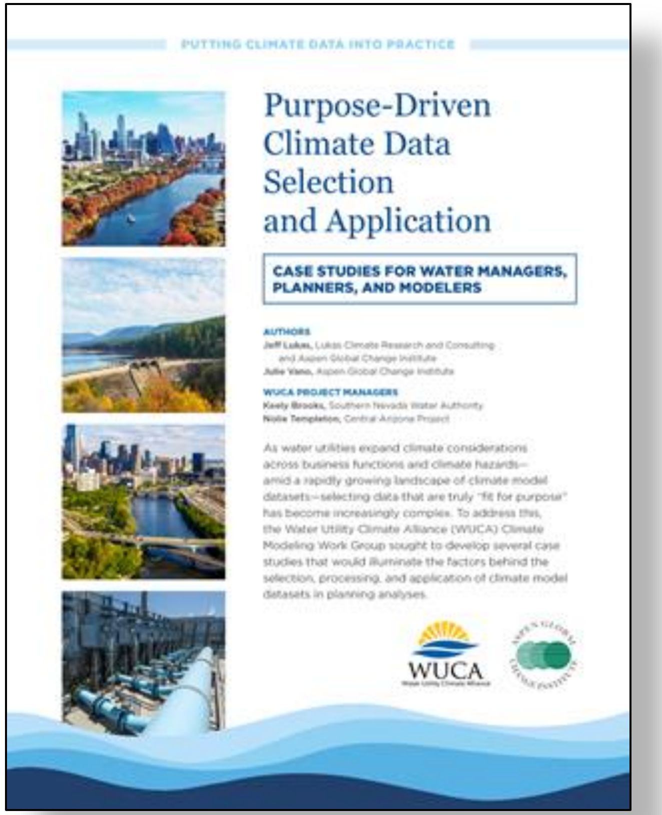
AGENDA

- Introduction
- **WUCA Climate Data Selection and Application Case Studies**
    - Project motivation
    - Case study summaries
    - Lessons learned
    - What now – utility updates
    - Cross-cutting insights
- AGCI-WUCA Advancing Case Studies project
- Conclusion



Water Utility Climate Alliance

Mission: Collaboratively advancing water utility climate change adaptation

Vision: Climate-resilient water utilities supporting thriving communities

Climate-resilient water utilities are an essential part of strong communities.

WUCA strives to advance water utility climate adaptation so that communities can thrive in a changing world.

Water Utility Climate Alliance

WUCA
Water Utility Climate Alliance

Examples of Key Accomplishments & Products

- **CMIP6 FAQ**
- Leading Practices in Climate Adaptation
- Piloting Utility Modeling Applications
- Embracing Uncertainty
- Engineering Case Studies
- Sea Level Rise Guide
- **Climate Resilience Trainings and Workshops**

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Water Utility Climate Alliance

Putting Climate Data into Practice:

Real-World Case Studies from Water Utilities

Case Study Authors:
Jeff Lukas Aspen Global Change Institute & Lukas Climate Research and Consulting
Julie Vano Aspen Global Change Institute

WUCA Project Managers:
Keely Brooks Southern Nevada Water Authority
Nolie Templeton Central Arizona Project

WUCA Learning From Each Other (LFEO)
August 25, 2026

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Aspen Global Change Institute

Lukas Climate
Research and consulting for a changing climate

WUCA Climate Modeling Working Group

Southern Nevada Water Authority – **Keely Brooks, Co-PM**
Central Arizona Project – **Nolie Templeton, Co-PM**

Austin Water - **Young-Hoon Jin, Marisa Flores Gonzalez, Heather Dalrymple**

Denver Water - **Taylor Winchell**

NYC Dept. of Environmental Protection - **Jerry Mead, Rakesh Gelda, Rajith Mukundan, Alan Cohn**

Philadelphia Water Department - **Tsega Anbessi, Julia Rockwell, Ashley Ebrahimi**

Portland Water Bureau - **Ben Beal, Kavita Heyn, Kristin Anderson, Dave Evonuk**

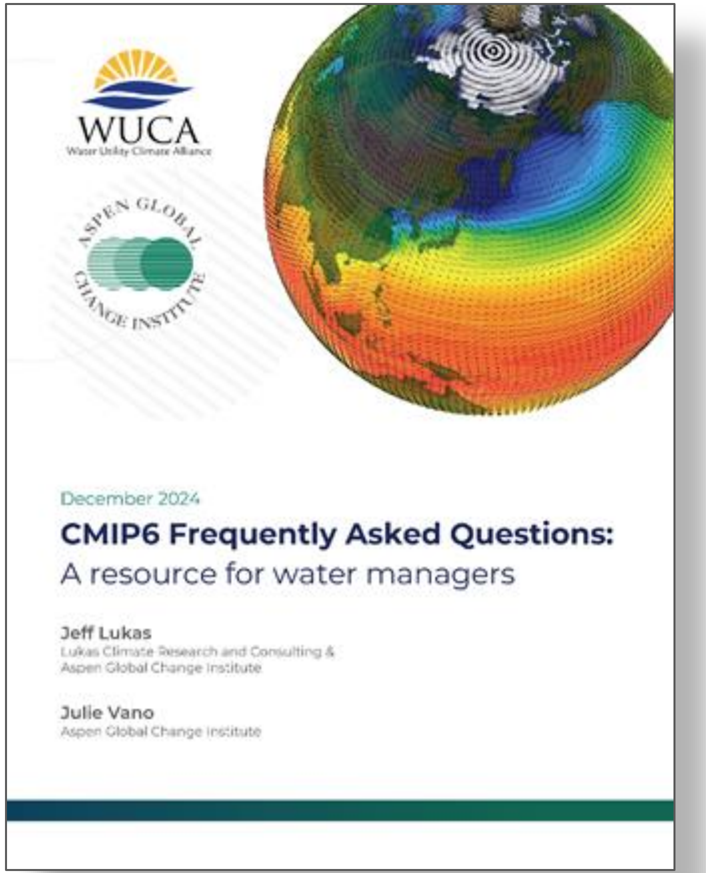
San Diego County Water Authority – **Seevani Bista, Anjuli Corcovelos, Jeremy Crutchfield**

San Francisco Public Utilities Commission - **Amod Dhakal**

Southern Nevada Water Authority –**Eunice Ledres, Brooke Stemple, Deena Hanoun**

Seattle Public Utilities - **Miles Mayhew, Tai Ovbiebo**

Tampa Bay Water - **Hui Wang**



www.wucaonline.org

Motivation & Desired Outcomes

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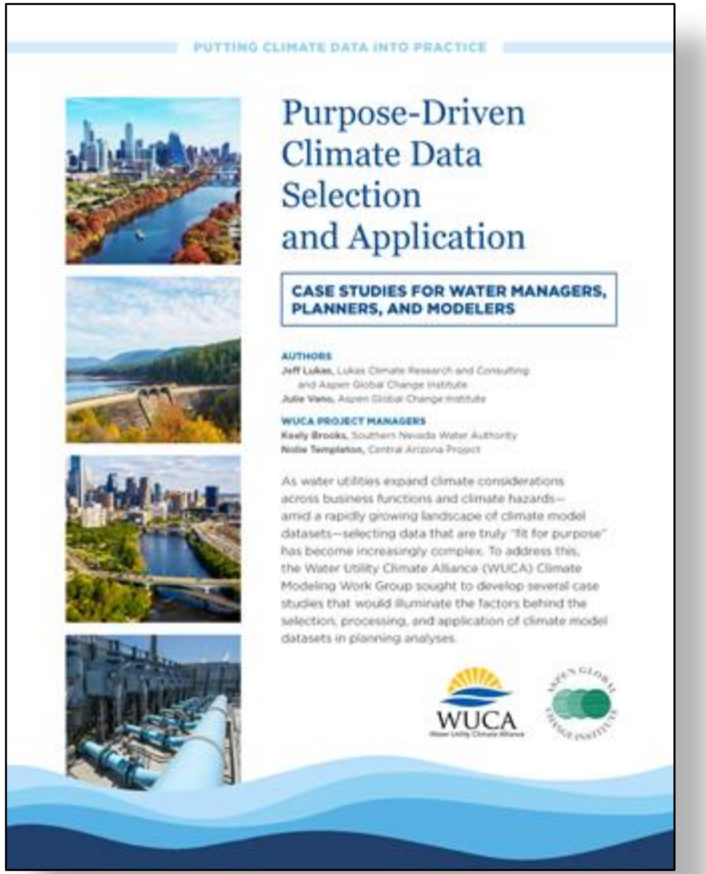
Water Utility Climate Alliance

- Climate projections are critical for long-term water resource, infrastructure, and budget planning.
- Builds on CMIP6 FAQ by using case studies to showcase how utilities selected and used climate data for specific decisions, and what considerations were prioritized.
- Provides transferable lessons and peer contacts for addressing similar challenges.
- Supports WUCA strategic goals:
  - Innovate and Lead
  - Knowledge Generation
  - Knowledge Transfer
  - Mainstream and Operationalize


PUTTING CLIMATE DATA INTO PRACTICE

Purpose-Driven Climate Data Selection and Application

CASE STUDIES FOR WATER MANAGERS, PLANNERS, AND MODELERS

AUTHORS
Jeff Lukas, Lukas Climate Research and Consulting and Aspen Global Change Institute
Julie Vano, Aspen Global Change Institute

WUCA PROJECT MANAGERS
Keely Brooks, Southern Nevada Water Authority
Nolie Templeton, Central Arizona Project

As water utilities expand climate considerations across business functions and climate hazards—amid a rapidly growing landscape of climate model datasets—selecting data that are truly "fit for purpose" has become increasingly complex. To address this, the Water Utility Climate Alliance (WUCA) Climate Modeling Work Group sought to develop several case studies that would illuminate the factors behind the selection, processing, and application of climate model datasets in planning analyses.

WUCA

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How the Case Studies were developed

- WUCA-wide pre-survey to identify utilities who had a recent or ongoing climate analysis, and were willing to participate:
    - **Austin Water**
    - **Philadelphia Water Department**
    - **Portland Water Bureau**
    - **San Diego County Water Authority**
- Semi-structured interviews with utility staff and consultants; review of utility documents and other resources.
- Multiple iterations with the interviewees to review and clarify details and lessons learned.

Where to find the Case Studies

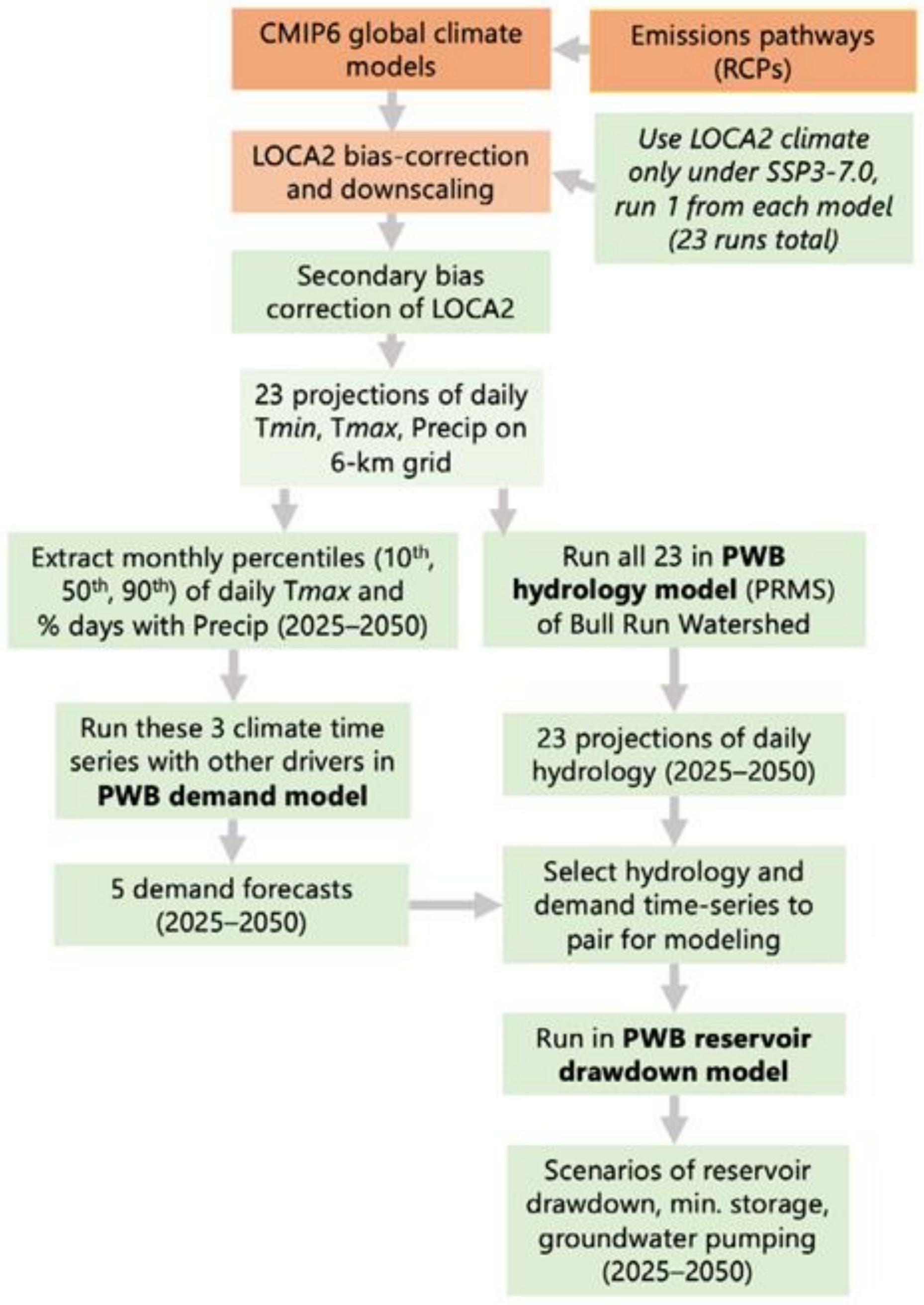
WUCA
Water Utility Climate Alliance

- WUCA Homepage > Case Studies > *Climate Data Application Case Studies*

www.wucaonline.org

What's in each Case Study

- Intro to the utility and the context for the project
- Project methods, data selection and processing
- Results of the analyses
- Use of results in decision support so far (or intended)
- Lessons learned
- Links to additional resources for that Case Study



Overview of the Case Studies

	AUSTIN WATER	PHILADELPHIA WATER DEPARTMENT	PORTLAND WATER BUREAU	SAN DIEGO COUNTY WATER AUTHORITY
Planning/ decisions to be informed	Integrated Water Resources Plan; implementing conservation, reuse, and supply strategies	Planning and design of vulnerable infrastructure assets	Prioritizing water supply system projects in the Capital Improvement Plan	System optimization and capital improvement projects to meet future needs
What was modeled under climate change in the project analyses	Water supply	River flood levels	Water supply, water demand	Water demand
Time horizon(s)	2030, 2040... 2080, 2120	2020, 2030...2090	2050	2050
Climate model dataset used	CMIP6, screened, custom bias-corrected and downscaled (5 models)	CMIP5-LOCA (32 models)	CMIP6-LOCA2 (23 models)	CMIP6-LOCA2 Hybrid (15 models)
Emissions scenarios used	SSP1-2.6, SSP2-4.5, SSP5-8.5	RCP8.5	SSP3-7.0	SSP2-4.5, SSP3-7.0, SSP5-8.5
No. model runs/ scenarios used in system impact modeling	15, plus 48 add'l drought scenarios based on those runs	1 - ensemble mean	23 (supply); 3 (demand)	5
System impact models used	Statistical streamflow models; basin water availability model	Model to interpolate peak flows, elevations, and return intervals from FEMA data	System hydrologic model; water demand model; reservoir drawdown model	Water demand model

Austin Water

Marisa Flores Gonzalez, Young-Hoon Jin, Heather Dalrymple; Richard Hoffpauir (HC)

	AUSTIN WATER
Planning/ decisions to be informed	Integrated Water Resources Plan; implementing conservation, reuse, and supply strategies
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Overview

- First five-year update (2024) of the *Water Forward* plan ("WF24")—IWRP that looks 100 years out
- The WF24 climate and hydrology analyses built on those in WF18, but with revised data and methods
- One of the first applications of CMIP6 at a water utility
- Intensive development and curation of severe drought scenarios, beyond the direct climate model output

Austin Water

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Factors that drove climate data selection and use

- CMIP6 was the ”latest and greatest”; had used CMIP5 in the WF18 plan
- Collaborators at UT-Austin had the capacity to do the custom bias-correction and downscaling
- The 5 models that were chosen had high performance in simulating historical climate *and* came from different modeling centers
- Broad range of emissions scenarios accounted for the deep uncertainty in that trajectory

Austin Water

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Lessons learned

- Doing the work in-house improves the learning feedback loop.
- Look at streamlining the approach.
- Match the level of detail to stakeholder needs.
- Planning for uncertainty and drought resilience can enlarge the window for others.
- Build—and improve—on what you and others have done previously

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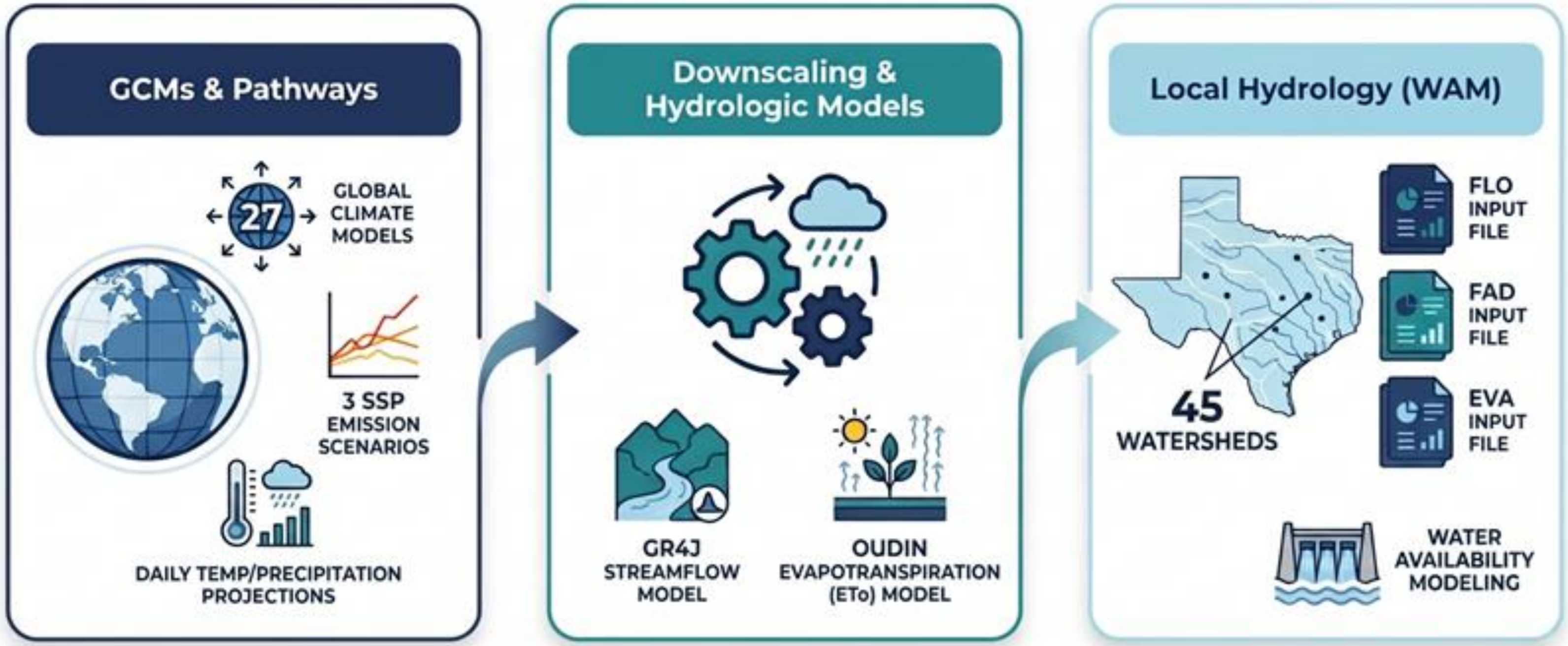
What now?

- Moving ahead with the Water Forward 2029 analyses

AW Climate and Hydrology Analysis



Lessons learned

- Improved the learning feedback loop
- Build on past work and keep improving it
- Leveraging AI for deeper analysis (consultant)

Data foundation	→	Model calibration	→	Streamflow projections	→	Scenario assessment	→	Post-processing + WAM files
COMPLETE		COMPLETE		CURRENT		TAG INPUT		FUTURE

Philadelphia Water Department

Allison Lau; Mark Maimone (CDM Smith)

	PHILADELPHIA WATER DEPARTMENT
Planning/ decisions to be informed	Planning and design of vulnerable infrastructure assets
What was modeled under climate change in the project analyses	River flood levels
Time horizon(s)	2020, 2030...2090
Climate model dataset used	CMIP5-LOCA (32 models)
Emissions scenarios used	RCP8.5
No. model runs/ scenarios used in system impact modeling	1 - ensemble mean
System impact models used	Model to interpolate peak flows, elevations, and return intervals from FEMA data

Overview

- Post-Hurricane Ida flooding of Schuylkill River in 2021 damaged or threatened PWD facilities—a "wake-up call."
- PWD quickly conducted analysis to (1) assess future flooding risk under climate change, and (2) understand the Ida flooding in that context.
- The analysis leveraged an existing methodology and processed climate data, and localized FEMA datasets
- Used a simple regression model to generate site-specific numbers in lieu of a complex impact model

Philadelphia Water Department

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Factors that drove climate data selection and use

- CMIP5 LOCA was the only available downscaled dataset for which there were matching hydrologic projections for the entire CONUS (including Schuylkill basin)
- Only one hydrologic future was output, based on the CMIP5 LOCA ensemble mean under RCP8.5—this satisfied the internal stakeholders' desire to have "just one number"

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Lessons learned

- The results of the analyses (warming -> bigger floods) reinforced the wisdom of PWD's adaptive management
- There are multiple approaches for doing climate-informed flood analysis; your results will vary with the approach
- Handling of uncertainty can be tailored to institutional risk tolerance

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What now?

- Consider updating the analysis with the latest climate science
- Continue applying climate risk information to infrastructure planning and design decisions
- Advance adaptive planning within PWD

Portland Water Bureau

Kavita Heyn, Ben Beal, Kristin Anderson, Dave Evonuk

	PORTLAND WATER BUREAU
Planning/ decisions to be informed	Prioritizing water supply system projects in the Capital Improvement Plan
What was modeled under climate change in the project analyses	Water supply, water demand
Time horizon(s)	2050
Climate model dataset used	CMIP6-LOCA2 (23 models)
Emissions scenarios used	SSP3-7.0
No. model runs/ scenarios used in system impact modeling	23 (supply); 3 (demand)
System impact models used	System hydrologic model; water demand model; reservoir drawdown model

Overview

- Since 2014, PWB has built substantial in-house capacity to conduct climate-change analyses
- In developing the 2021 Supply System Master Plan, PWB committed to 5-year update cycle for supply and demand forecasting
- 2026 update was an opportunity to bring in CMIP6 and other new data and methods

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Factors that drove climate data selection and use

- Initial exploration of CMIP6 (with Portland State U.) confirmed that the models captured the relevant atmospheric patterns
- Developers of LOCA2 downscaled dataset were focused on better capturing short-term extremes
- SSP3-7.0 emissions scenario was intermediate between the RCP4.5 and RCP8.5 scenarios previously used by PWB

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Lessons learned

- Investing in internal capacity has paid off for PWB
- Getting organizational buy-in on new processes takes time and effort
- Speaking in familiar terms aids understanding
- Kick the tires on new climate data first—and expect bumps in the road
- Climate change is not the only source of future uncertainty in water demand

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What now?

- The 2026 update is complete; PWB staff drove the analyses from beginning to end
- The results with CMIP6 were not surprising relative to those with CMIP5
- *Look into:* Could the secondary bias correction of hydrologic model output mask future changes in streamflows?

San Diego County Water Authority

Seevani Bista, Anjuli Corcovelos, Jeremy Crutchfield; Jack Kiefer (Hazen and Sawyer)

	SAN DIEGO COUNTY WATER AUTHORITY
Planning/ decisions to be informed	System optimization and capital improvement projects to meet future needs
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No. model runs/ scenarios used in system impact modeling	5
System impact models used	Water demand model

Overview

- SDCWA has a state-mandated 5-year update cycle for its long-range water demand forecasts.
- The 2025 update used a time-tested approach developed by Hazen and Sawyer, but with new (CMIP6 LOCA2) climate model data.
- The updated demand forecasts also inform the agency’s broader scenario planning approach for its decadal Water Facilities Master Plan.

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Factors that drove climate data selection and use

- Previously used CMIP5 LOCA
- CMIP6 LOCA Hybrid dataset was optimized for California
- The LOCA developers are local (Scripps Institution of Oceanography) and have provided SDCWA with informal guidance on data use
- Reduced the climate data from 45 projections to 5 scenarios (still capturing the uncertainty) to make the demand modeling more tractable

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Lessons learned

- Forecasting demand under climate change involves many confounding factors
- Climate change projections that look 25 years out may prove useful much sooner
- As a water portfolio changes, new climate vulnerabilities may emerge

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What now?

- Continue to evaluate climate vulnerabilities that may emerge as planned projects are developed and the regional water portfolio changes
- Use climate modeling results to inform resiliency planning in consideration of potential water exchanges

Insights from across the case studies

Practical utility-specific considerations carry more weight in data selection and processing than inherent attributes of climate datasets

Insights from across the case studies

System-specific impact models are the key to making climate data usable

Insights from across the case studies

Repeated engagements with climate data can build a utility's internal capacity

Provide insights for future case studies

These case studies were designed with insights from an AGCI-WUCA research effort that asked:

How could case studies be more impactful?

As a next step, we want to hear from YOU!

https://tinyurl.com/value-of-case-studies

Initial funding from NOAA

Learn more about WUCA

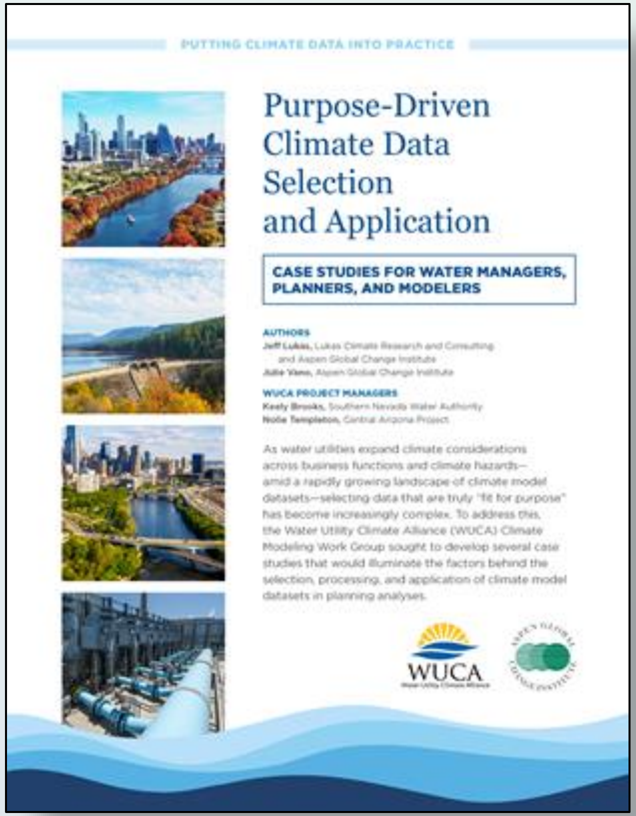
Contact us or sign up for emails

Questions about the Case Studies

Please reach out:

Jeff Lukas –
jeff@lukasclimate.com

Julie Vano –
jvano@agci.org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