HOW OUR FUTURE CLIMATE AFFECTS SOUTHERN CALIFORNIA WATER: WHAT THE EXPERTS SAID

Southern California's water future will be profoundly impacted by our changing climate. Science can't provide a precise answer, given how future decisions will impact future levels of greenhouse gas emissions. But experts studying climate change can provide a range of potential futures to assist Metropolitan in updating the district's long-term water strategy, our Integrated Water Resources Plan (IRP).

Future changes in temperature and precipitation will significantly impact both water supplies and demand. By carefully examining four different scenarios of various possible levels of supplies and demands due in part to different climate circumstances, Metropolitan intends to develop an updated IRP that can help Southern California adapt to the future as it unfolds.

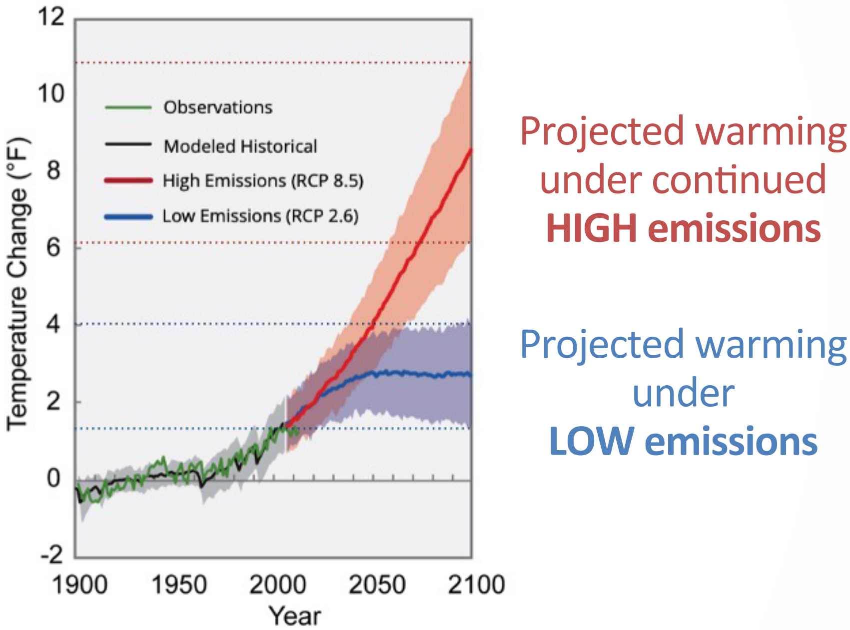
On May 25, the Metropolitan Board of Directors held a three-hour workshop to listen to four climate change experts provide insights into their research and their thoughts on prudent planning. Along with a separate panel of experts with various specialties relating to demand management, Metropolitan intends to incorporate this feedback, along with that of our Member Agencies, Board and the Public, to develop the District's first IRP that utilizes scenario planning. The following are summaries of the experts' initial remarks. Listen here to the full workshop.

Global Climate Change

Dr. Heidi Roop

- Assistant Professor, University of Minnesota Department of Soil, Water and Climate
- Ph.D in Geology from Victoria University of Wellington, M.S. in Geology from Northern Arizona University, B.A. in Geology from Mount Holyoke College

Human Choices: the principal driver of long-term warming is total emissions of CO2



RCP = Representative Concentration Pathway.

Modified from 3rd National Climate Assessment, 2014

"We don't have crystal balls as climate scientists. But we have tools in our toolbox that help us navigate these scenarios."

Key Points

- Global averages do not provide information that is locally useful and actionable
- The greatest source of uncertainty is connected to human behavior
- Climate models are projections, not predictions, and can provide a range of potential outcomes
- Models are rapidly progressing to provide local information and decision-relevant information

Going from Global to Local

Dr. Julie Vano

- Research Director at Aspen Global Change Institute
- Ph.D. in Civil and Environmental Engineering from University of Washington, M.S. in Land Resources from University of Wisconsin and B.A. in Biology, minors in Mathematics and Chemistry from Luther College

No Model is Perfect

> *"The accuracy of streamflow simulations in natural catchments will always be limited by simplified model representations of the real world as well as the availability and quality of hydrologic measurements." (Clark et al., WRR, 2008)*

Do not expect perfect results,

Not prediction, but a tool to test how system responds (what if scenarios)

BUT we can make better choices…

Seek simple yet defensible (do not need a Cadillac)
Be aware of models' shortcomings
Use a range, not a single model outcome

> *"In using these models, they can be really helpful tools. But it is important to be a savvy consumer. No model is perfect."*

Key Points

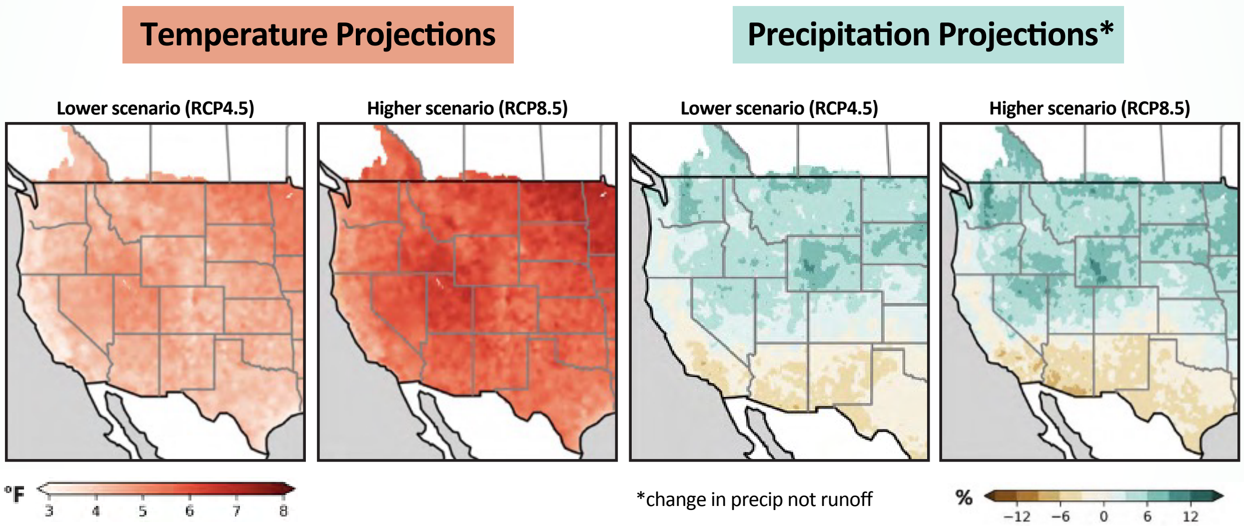
- A model with a fine spatial scale may provide a false sense of precision
- Use a range of potential outcomes from a climate change model rather than a single output
- Different models should be used to best inform different decisions

Regional Hydrologic Changes

Brad Udall

- Senior Water and Climate Research Scientist at Colorado Water Institute, Colorado State University
- M.B.A. from Colorado State University and B.S. in Environmental Engineering from Stanford University

Regional Hydrologic Changes



Maps show average change in temperature and precipitation across a two emissions scenarios for the period 2040 - 2069 relative to 1970 - 1999 using the LOcalized Constructed Analogs (LOCA) downscaling approach.

These maps convey an average across 32 global climate models.

Source: Reclamation's 2021 SECURE Water Act

> *"If you add heat to the planet like we're doing and not add it uniformly....you are going to end up with profound changes in the water cycle."*

Key Points

- In the Sierra, the drought year of 2015 was the first time in 132 years that the average winter temperature was above freezing
- Future peak flows in the Sacramento-San Joaquin Delta will shift from March and April to December through March
- The Central Valley and Colorado River basins will have in common earlier runoff, more rain and less snow, lower late season flow and declining water quality

Climate Change & Water Demand

Heather Cooley

- Director of Research at the Pacific Institute
- M.S. in Energy and Resources and B.S. in Molecular Environmental Biology from the University of California, Berkeley

Landscape Irrigation

Estimated water use = (ET0 x Plant Factor x Landscape Area x 0.62) / Irrigation Efficiency

Plant Factors

0 to 0.1 = very low water use plants

0.1 to 0.3 = low water use plants

0.4 to 0.6 = moderate water use plants

0.7 to 1.0 = high water use plants

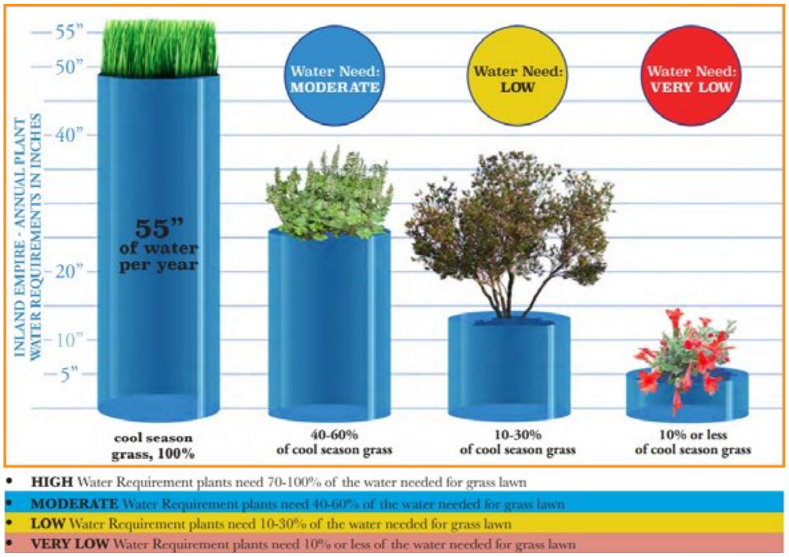


Image from the Inland Empire Landscape Guide

“The impact of climate change on landscape irrigation can be moderated by changing these plant factors and the plant palettes that we have, looking at differences in landscape area...as we move toward densification.”

Key Points

- Temperature and precipitation are major drivers on future water demand, temperature being more significant
- For single-family residential homes, climate change’s greatest impacts are on landscape irrigation
- Some grasses require 55 inches of water per year, with native plants using up to 90 percent less