Producing Scientific and Strategic Guidance for California's Department of Water Resources
Poster for American Geophysical Union Annual Meeting (2015)
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Collaboration Overview

The California Department of Water Resources (DWR) uses the Multi-Value Impact (MVI) model, which provides drinking water for more than 25 million people, water for nearly all irrigation requirements, and serves as a key component of water generation, reclamation, flood, and wildlife protection, and water quality improvements. Hydrologic impacts under a changing climate include reduced snowpack, increased rates of snowmelt, earlier snowmelt, higher temperatures, and rising seas, all of which impact the state’s water resources. The DWR and regional climate change stakeholders (Figure 1) below). To improve the scientific basis for decisions and enhance the consistency of climate change approaches, DWR implemented a Climate Change Technical Advisory Group (CCTAG) for guidance on the scientific aspects of climate change, its impacts on water resources, the use and creation of planning approaches and analytical tools for both DWR and for local water management supported by DWR, and the planning and design of projects. Diverse areas of expertise are needed to describe and assess the changing climate. Members were selected from multiple-disciplines, including atmospheric, soil, hydrology, civil engineering/infrastructure, environmental science, climate data and statistics, local science, resource economics, land use planning, and land use modeling. DWR selected professionals from these disciplines (September 2019) by assessing applicant knowledge and skills. Members were announced in February, 2020.

Meetings were held quarterly, with additional conference calls as needed, to discuss incorporating climate change into planning for DWR, as well as how DWR can best support the local water management community with climate change planning.

Lessons Learned
- Climate change must be incorporated into planning and projects in a dynamic manner that is communicative with updates to scientific and technical data.
- Drafting DWR-specific recommendations for incorporating science was challenging due to time constraints and understanding DWR's business needs.
- Technical capacity to ingest climate data varies greatly among water managers and across DWR's regions. The climate model selection process was developed more important in some ways than the technical quality itself. However, as the science is changing so rapidly, the process will likely have to be repeated every few years or so.
- Seeking the impact of assumptions made (e.g., climate data), through some type of appropriate integrative software or case studies and pilot projects on various scales, where such impacts have been studied or demonstrated might achieve more useful and realistic guidance.
- Large-scale water distribution projects influence effective approaches to climate change adaptation, and decision making on the local characteristics (including institutional issues), demands and conditions, and who on the large-scale climate forcing.
- More time should be invested early in the process to develop a plan for incorporating the final products and identify critical path items.
- Statewide adaptation can be hindered by a lack of integrated policy guidance from DWR to influence planning at the local level. Providing incentives or technical assistance to increase water agencies' capacity to apply climate models for water resource planning would benefit both climate state-wide adaptation.
- The CCTAG should provide implementation of the guidance and perspectives both scientifically and operationally to support local water management.

Positive Outcomes
- The diverse professional team of scientists and practitioners tackled complex water management issues regarding climate change impacts on California's water supply in Perspectives and Guidance for Climate Change Analysis, http://www.water.ca.gov/climatechange/doc/2015/Perspective_Guidance_Climat Change_Analysis.pdf. The Technical Information Report summarizes the preliminary findings of the Advisory Group, on global climate model selection appropriate for California climate water resources, planning for extreme conditions, downscaling, and recommendations for future work.
- A Dynamic Team with Diversity of Expertise
- The diversity of topics and perspectives from technical, policy, and practitioners from various local regions, states, and international organizations was noted as a very positive aspect of this effort.
- External perspective was helpful as a counterbalance to DWR's internal perspective.
- The team effectively worked through climate-change technical issues by holding frequent discussions, drafting DWR's analyses and extensions, and incorporating the best science available.
- The effort showed that a practical planning guide for using climate information can be achieved for complex multidisciplinary issues such as those tackled (see "Choosing Global Climate Models") above.
- The group conducted effective collaboration without many large-scale, face-to-face, inclusive, and transparent discussions.
- A dynamic team brought expertise, energy, and passion to the table, but had different communication styles, which could also be a challenge.
- Climate planning engagement with the science community was enhanced by the CCTAG process.
- The CCTAG offered improved collaboration and guidance and support to local water management.

Model Selection
- CCAUGE provides guidance on a methodology to choose global climate models (GCMs), developing thresholds arguments for extreme events, and further work needed to apply decision tools. Specific unique work resulting from the CCTAG effort was enhanced.
- A 3-step evaluation approach was used to identify a tractable set of GCMs for California water resources planning.
- The identified GCMs will provide consistency for DWR planning projects.
- This methodology will inform the State’s 4th Assessment Report, anticipated in 2023.

In Conclusion
- California Department of Water Resources planning because that important components of historical climate in regional, and statewide scales
- The multi-disciplinary CCTAG members met regularly over the course of 3 years, engaged as needed, to discuss their climate variability and adaptation and real-time needs. The wide variety of perspectives was allowed for the transfer of information and understanding between the science community and practitioners.

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