State Adaptation Clearinghouse

Cal-Adapt Energy Sector User Needs Assessment Workshop

Tuesday, September 12th

9:30am – 12:00pm

California Energy Commission, 1516 Ninth Street, Sacramento, 95814

## Focus Groups

**Climate Tools (Temperature, Precipitation, and Relative Humidity)**

About half of the participants had some experience using Cal-Adapt, and in some cases extensive experience. Prior uses of Cal-Adapt include:

* Providing input for a dozen or more city, regional, and tribal climate change plans;
* Providing supporting data for Environmental Impact Reports;
* Creating visualizations related to electricity utility vulnerability;
* Analyses related to how planning decisions (e.g., siting) play out under multiple scenarios;
* Teaching undergraduate classes where students work on projects for local planning;
* As a data source for improving existing tools/analyses.

Regarding what was helpful, and what could be improved on Cal-Adapt:

* Prior users agreed that Cal-Adapt 2.0’s presentation of CalEnviroScreen data in the location selector tool is useful. However, improvements could be made:
	1. Disaggregating the component layers of CalEnviroSceen data would be very helpful, i.e., participants encouraged Cal-Adapt to incorporate CalEnviroScreen indicator layers related to exposure (e.g., ozone, PM2.5, diesel particulate matter), environmental effect (e.g., groundwater threats, impaired water bodies), sensitive populations (e.g., asthma, cardiovascular disease), and socioeconomic factors (e.g., educational attainment, housing burden, poverty).
	2. Another comment questioned the completeness of CalEnviroScreen in the context of assessing climate vulnerability and developing resilience options; but concurred that being able to explore component indicators on Cal-Adapt would address some concerns.
* Several prior users remarked that whereas they are accustomed to working with sea level rise (SLR) data in vector format, Cal-Adapt 2.0 presents SLR data in raster format. This poses some difficulties, and users would like to see the data presented in vector format in Cal-Adapt 2.0.
* A feature that would be very helpful to integrate into Cal-Adapt would be ability to add an additional layer provided by the user (e.g., for siting new infrastructure projects).
* Additional information regarding best practices for using climate change data and projections is needed to foster appropriate use of Cal-Adapt, e.g., when should uses look at models separately?, when are ensemble averages appropriate?, when is a 30-year average desirable?
* Additional information to clarify in very simple terms how the projections on Cal-Adapt 2.0 differ from those presented in the original (2011) release would be helpful, especially for those who have already trained staff to use the 2011 release.

Additional visualizations and/or data that participants felt would be useful:

* Additional streamflow data, in particular at points of interest re: utilities’ hydropower resources;
* Developing “hot spot” visualizations that aggregate climate-related impacts. Facilitator noted that this would involve substantial further research regarding how to assess, aggregate, and appropriately represent implications of multiple climate impacts;
* Development of probability distribution functions for all projected climate parameters, similarly to how long-term regional SLR is being expressed probabilistically in several California-specific efforts;
* Local Hazard Mitigation Planning—it would be helpful to identify and map critical facilities to support Local Hazard Mitigation Planning (e.g., transmission corridors);
* Sliders for selecting threshold values
* “Blue Sky days”: In addition to portraying the inundation associated with various increments of SLR and extreme storm events, data portraying SLR on “blue sky days” is desirable for energy sector planning;
* Marine layer dissipation: Projections of how marine layer cloud dissipation might change would be very useful for demand forecast planning and other issues;
* Atmospheric Rivers: Cal-Adapt already serves daily precipitation data, but visualizes precipitation on the annual scale only; several participants indicated that visualizations showing projected changes in ARs and extreme precipitation events would be very useful;
* Projected changes in landslide risk as a function of precipitation;
* Higher resolution SLR data in southern California: one participant noted that SLR data in southern California have less spatial resolution that those in the San Francisco Bay and Delta, and that it would be helpful to have higher resolution data for southern California;
* Models of potential penetration of air conditioning would be useful for electricity sector planning, especially in parts of southern California where the increase in hot days may change A/C use substantially;
* Projections of spatially disaggregated population;
* Integrating existing data related to the Heat Island Effect (e.g., CalEPA has data quantifying the Urban Heat Island Effect Index); this would be particularly useful in the context of exploring extreme heat events.

**Projected Wildfire Risks**

This break-out discussion focused on two main areas: wildfire data visualization and understanding the available wildfire modeling outputs generated by UC Merced. Principle Investigator LeRoy Westerling was present at the break-out session so it was a great opportunity to talk to the primary researcher about the modeling framework and results to understand what uses of the data were possible and reasonable.

Data Visualization suggestions and comments:

* Additional chart that would allow users to understand timing and severity of wildfires throughout the year would be helpful. This could be generated through the monthly data.
* In particular, being able to look at fire season length distribution over time was suggested (similar to the extreme heat “Timing of Extreme Heat Days” visualization). Is there predicted to be a shift in fire season starting time and length? Because the fire scenarios are based on ignition date rather than control date, however, such a tool would be more accurate for start of fire season than for end of season.
* Comparison to baseline: visualization similar to the wildfire tool (Fire Risk Map) on the original Cal-Adapt site, which looks at projected increase in potential area burned. The earlier Cal-Adapt tool shows the ratio of additional fire risk for an area as compared to the expected burned area for each grid cell.
* It would also be helpful to have comparisons between GCMs and between RCPs to see how much they affect results
* Another user suggestion was to include the number of fires by month. This is an additional output generated by the fire modeling approach.
* A user commented that the amount of area burned might matter less as an index of risk than the fire severity.

Fire Modeling Data and Guidelines/Observations

* Discussion of observed historical wildfire data that is not currently on Cal-Adapt: Dr. Westerling noted that there is gridded data observed data from 1984 to recent time. Note to Cal-Adapt team to request this data from UC Merced.
* Addition of the fire severity variable. The severity output has been generated for the BAU (business as usual) scenario, without fuels management. The severity output is the area of the cell that is subject to high severity fire, which is defined as over 90% of the basal area burned. Index is referred to as BA90.
	+ Severity is currently run out to mid-century
	+ It will also be run for various fuel management treatments.
	+ There will be a sensitivity analysis of the effect of tree mortality on the BA90 values.
* Definition of “large fires” (in the large fire presence/absence layer). Large fires match the MTBS (Monitoring Trends in Burn Severity) minimum size for fires, which is 1,000 acres in the western US.
* Discussion of whether it is possible to present wildfire data by percentiles to highlight extremes and not just averages. Dr. Westerling noted that fire events are too rare in the simulations to have enough non-zero samples within a cell for this approach to be meaningful. Participant Gary Fitts mentioned that he had tried aggregating over many years and simulations, but that even the 70th percentile values were still zero.

**Snowpack, Streamflow, and other Hydrological Projections**

All of the participants have experience using Cal-Adapt. Prior uses of Cal-Adapt include:

* Pulling data from Cal-Adapt (100-yr storm depth);
* Use of Cal-Adapt data and visuals in developing reports (Environmental Impact Statements, Climate Adaptation Plans, Local Plans) for local governments and clients;
* SWRCB\* has internal guidance to use Cal-Adapt to assist in its consideration of climate impacts. (\*The Board regulates water quality and administers water rights.)

Regarding what was helpful, and what could be improved on Cal-Adapt:

* Cal-Adapt is integral to participant’s work.
* GovOps’ API allows pulling data for multiple addresses at once. Is it possible for Cal-Adapt to incorporate this functionality?
* Best Practices guidelines for using climate data and projections to foster appropriate use of Cal-Adapt, e.g., when is it appropriate to use 30-year averages.
* When copying links for manipulated graphics in Cal-Adapt, the link for the graphics will show the correct grid cells, but defaults back to the original settings. This can cause confusion for stakeholders and recipients of consulting reports. Please fix.

Additional visualizations and/or data that participants felt would be useful:

* Additional streamflow data are needed. More work/discussion would need to be done to evaluate which locations are priorities for the electricity sector as well as for other sectors.
* Freeze and Thaw cycles, relevant for infrastructure maintenance and construction (e.g., transportation infrastructure). Would it be possible to explore these issues using existing VIC data?
* Range of temperatures of 24 hours. Also important for elasticity of construction materials.
* Engineers (among others) want outputs cast in terms of probability.
* Water supply: projections of how climate will affect.
* Storm water runoff and damage/flooding.
* Data portraying risks associated with compounding influences of wildfire/flooding/water quality.
* Output comparison between Cal-Adapt and DWR methodology that is used for implementation of Sustainable Groundwater Management Act.
* DWR, with FEMA and/or USACE revising 200-year flood plains. Potential data layers for Cal-Adapt?

**Ca-Adapt API**

*  Groups within state and local government have a multitude of facilities within their jurisdiction which require reporting on future climate impacts. While Cal-Adapt currently provides programmatic access to a suite of climate variables based on location, writing client code to make this happen was identified as an impediment to use. A tool to make bulk intersections by points with climate grids would alleviate the need to write any code.
* In addition to batching of points and polygons, the need to intersect polylines such as in road and transmission line networks would be advantageous.
* Along these lines, it would be helpful to interactively draw the area of interest and highlight the intersecting pixels for immediate feedback on which cells would be included in the aggregation.
* To more conveniently handle multiple locations, it would be helpful to support uploading spreadsheets (csv or Excel) directly with latitude/longitude columns in addition to the Geodata formats Cal-Adapt supports now (shapefile, etc.).
* There is a desire to add derived data sets such as extreme heat to the existing set of variables within Cal-Adapt, so users can directly download the extreme heat data, instead of accessing the daily temperature data and recreating the calculations. Currently extreme heat is calculated dynamically on the client side.
* The inclusion of additional data sets like the urban heat island index, canopy coverage, and CoSMoS sea level rise would be useful in adaptation planning efforts.
* Some thought should be given to units of measure and their ease of use or lack thereof. This was noted as a struggle particularly for precipitation which uses a density measure unfamiliar to potential consumers of this data.
* Interest in a visualization of extreme precipitation events, similar to extreme heat events. In addition there is interest in seeing what part of precipitation falls as snow vs. rain.
* Also an interest in having an easier method to calculate temporal summaries, e.g. monthly averages.