



California needs improved datasets and more accessible decision making tools to better prepare its natural lands for climate change. Powered by a team of nearly 50 scientists at 8 major research campuses, with support from partners at state and federal agencies, nonprofits, and the private sector, the **Center for Ecosystem Climate Solutions (CECS)** is developing open-source, statewide datasets and tools to support land management decision-making. CECS is building scientifically rigorous data products that document California’s current and recent ecosystem conditions; assess ecosystem vulnerabilities; and evaluate the effects of management options on water, vegetation health, fuels and carbon stocks.

**What Sets CECS Apart?** CECS is creating new datasets to **fill critical gaps**, including statewide maps of disturbance, water balance, vegetation stress, surface fuels and ignition probability. CECS analyzes water, vegetation stress, fire, and carbon as a **coupled system** and quantifies ecosystem properties in transparent physical units that allow apples-to-apples comparisons across space and time. CECS data products are created with reproducible software and are designed for **rapid refresh and continuous improvement**.

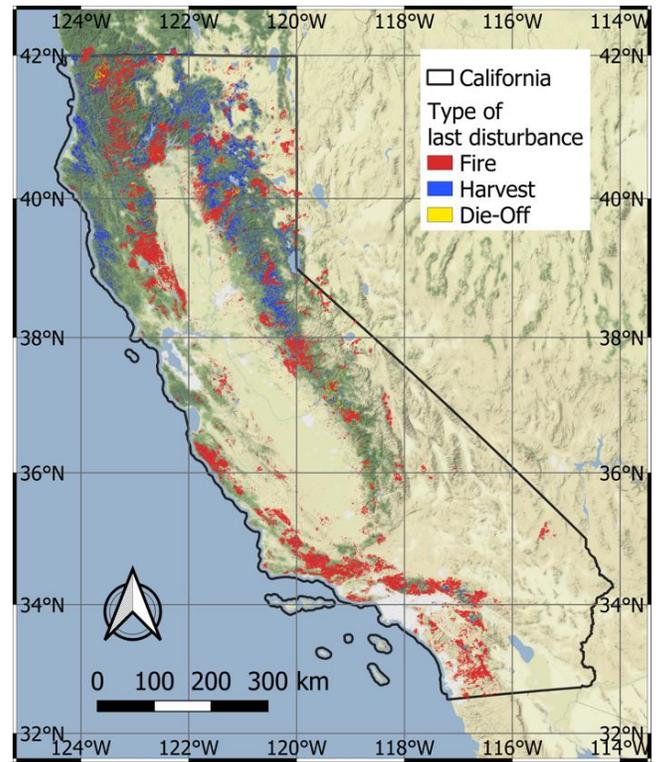


Figure: Most recent disturbance – either fire, die-off, or harvest – across California since 1984.

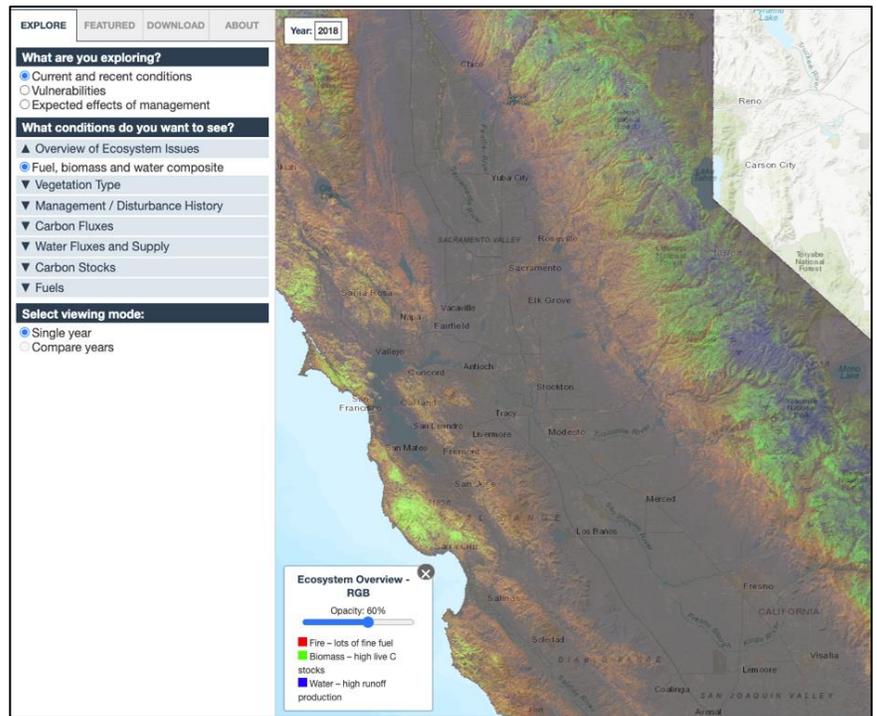
DATASETS BEING BUILT BY CECS		
<i>Datasets are 30 m rasters for all CA wildlands x 37 years x ~100 ecosystem properties.</i>		
	Current and recent conditions and vulnerabilities: Annual observations for 1985-2021	Predicted conditions and vulnerabilities: Effects of management alternatives
Ecological conditions	Disturbance and management history: Type (fire, die-off, management) and severity (% tree and shrub canopy loss)	Disturbance and management scenarios: Type (fire, die-off, management) and severity (% tree and shrub canopy removal)
	Water conditions: Evapotranspiration, runoff, plant moisture deficit (mm yr <sup>-1</sup> )	Water conditions with disturbance or management: Immediate changes and recovery trajectory
	Fuel conditions: Dead and live fuel (1, 10, 100, 1000 hr, live herb, shrub, canopy, g m <sup>-2</sup> )	Fuel conditions with disturbance or management: Immediate changes and recovery trajectory
	Carbon conditions: Stocks (leaf, wood, roots, detritus, g m <sup>2</sup> ) and fluxes (production, mortality, decomposition, g m <sup>-2</sup> yr <sup>-1</sup> )	Carbon conditions with disturbance or management: Immediate changes and recovery trajectory
Risks and vulnerability	Water vulnerability: Sensitivity of water supply to drought or disturbance (change in water supply with drought or disturbance, mm yr <sup>-1</sup> )	Water vulnerability with management: Avoided water shortfall during drought
	Tree die-off vulnerability: Probability of tree die-off with drought (long term % yr <sup>-1</sup> )	Tree die-off vulnerability with management: Avoided tree die-off
	Fire vulnerability: Probability of fire (long term % yr <sup>-1</sup> and expected severity)	Fire vulnerability with management: Avoided wildfire
	Carbon vulnerability: Probability of C loss from fire or die-off (long term based on disturbance probability and effect, g yr <sup>-1</sup> )	Carbon vulnerability with management: Avoided carbon loss from fire or die-off

## Stakeholder-Driven Decision Support: The CECS Ecosystem Solutions Toolbox

CECS is developing a suite of stakeholder-driven web tools called the **CECS Ecosystem Solutions Toolbox**. Targeted end-users include: decision makers, managers, owners, experts or researchers in agencies, NGO's, the private sector, or universities. Users may explore CECS data visualization and decision support tools directly to inform project planning, or export and use CECS data in their own tools or prioritization frameworks.

The CECS Ecosystem Solutions Toolbox will include:

- **Visualization:** interactive map for visualizing geospatial patterns and trends that define the landscape's physiographic state
- **Data download:** consistent spatial datasets for download and use
- **Decision support:** interactive maps of changes in ecosystem services after disturbance or management
- **Ecosystem service valuation:** Site-specific tools for valuation of land management outcomes



## Ecosystem Service Valuation

The CECS team is developing tools for valuing ecosystem services to overcome information roadblocks to monetizing the benefits of restoration and apportioning benefits. The focus is on carbon, water, and wildfire risk reduction, further extending to air quality, public health, and local community benefits.

These valuation tools can be leveraged to support partnerships and agreements on a project-by-project basis; to motivate project investments from the different beneficiaries; and to accelerate the pace and scale of much needed restoration.

We'd love to collaborate with you! Please reach out with your input and ideas.

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