

Center for Ecosystem Climate Solutions

https://california-ecosystem-climate.solutions/ • @CA\_CECS

California needs relevant, actionable information and tools to tackle the tremendous challenge of managing its natural lands in the face of climate change. While a vast amount of geospatial data exists, there are few scientifically rigorous, stakeholder-informed methods that have produced tailored data for decision makers.

The **Center for Ecosystem Climate Solutions (CECS)** is supporting the state's land management needs through data-driven science and technology. CECS is powered by a team of nearly 50 scientists at 8 research institutions, with support from partners at state and federal agencies, nonprofits, and the private sector, all working together to develop thoroughly evaluated, open source data products to inform and optimize land management decisions.

CECS is focused on four central efforts:

- Developing **consistent**, **integrated geospatial datasets** to track dynamics of land surface characteristics
- Determining the effects of past and ongoing land management activities on carbon stocks, wildfire spread, water balance, and vegetation drought resilience
- Building publicly available online tools to inform management decisions, including tools for data download, visualization, assessment of proposed management, and ecosystem service valuation



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

- Valuing the **multiple benefits of land management practices** in order to incentivize financing of future projects

	Current & annual ecosystem conditions since 1984 30 m resolution	Potential ecosystem response following disturbance scenarios, annual for 30 years <i>30 m resolution</i>
Land surface conditions	Management and disturbance history (year and type (fire, management, die-off) x canopy loss)	Management and disturbance scenarios
	Current surface fuel pools (g/m <sup>2</sup> , 1, 10, 100, 1000 hr, live herb and woody)	Decrease in surface fuels with management
	Carbon stocks (g/m <sup>2</sup> , leaf, wood, roots, detritus) and fluxes (g/m <sup>2</sup> yr, production, mortality, decomposition)	Change in carbon stocks with management
	Water balance (total regolith water, mm) and fluxes (mm/yr)	Change in water fluxes with management
Risks	Tree die-off probability based on drought probability and die-off effect (% canopy loss probability/year)	Change in tree die-off with management
	Fire probability, including severity and smoke emissions (%/yr)	Change in fire probability with management
	Carbon loss due to fire and die-off including smoke emissions (long term mean based on disturbance probability and effect, gC/yr)	Change in carbon loss and smoke emissions due to fire and die-off with management
	Water supply loss with drought and increase with disturbance (long term mean based on drought and disturbance probability and effect, mm/yr)	Change in water supply with management

## Stakeholder-Driven Decision Support Tools

Informed by input from our stakeholders, CECS is developing a suite of web-based tools for scientists, land managers, legislators, the private sector, and the public. The four kinds of tools will include:

- 1. **Data download**: tailored spatial datasets for download and use
- 2. Visualization: interactive map for visualizing geospatial trends of key attributes that define the landscape's physiographic state
- Decision support: interactive map delivering an assessment of change after disturbance/forest management practice
- 4. **Ecosystem service valuation**: Sitespecific tools for valuation of land management outcomes

Figure: The decision-support tool will allow users to identify a project area, observe current conditions, and choose a management intensity for the project area. The tool will then forecast changes in carbon, water, fire probability, and forest health over a 30-year period in the future.



## Ecosystem Service Valuation

Forest restoration provides many benefits in addition to reducing the risk of high-severity wildfires, including sustaining forest carbon stores, increasing streamflow and water supply, reducing the threat of erosion, and much more, with



beneficiaries at many scales. The ability to project and verify these many benefits is key to driving public and private investments in restoration projects, but there are few methods available to do so.

The CECS team is developing tools for valuing ecosystem services in order to overcome key information roadblocks to monetizing the benefits of restoration and apportioning benefits. The primary 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, accelerating the pace and scale of much needed restoration.

We'd love to collaborate with you! Please reach out with your input and ideas. Director: Michael Golden, UC Irvine, <u>mgoulden@uci.edu</u> Co-Director: Roger Bales, UC Merced, <u>rbales@ucmerced.edu</u> Stakeholder Contact: Jaquelyn Lugg, UC Merced, jlugg@ucmerced.edu

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