



Center for Ecosystem Climate Solutions

Translating the best available science for land management decisions

The Natural Climate Solutions Toolbox

California's land managers are facing unprecedented challenges, including extreme wildfires, droughts, and ecosystems that must adapt to a warming climate. Addressing these challenges requires managing for multiple, often conflicting, aims. There is a growing need for comprehensive, consistent ecosystem data and tools to inform land management decision making. The Center for Ecosystem Climate Solutions (CECS) is developing California-wide data and decision-support tools to meet these needs.

The Natural Climate Solutions (NCS) Toolbox is a suite of data and tools designed to aid land managers, policy makers, and scientists in evaluating, projecting, and adapting land-management options to meet 21st-century goals and climate conditions. These tools can inform planning, prioritization, analysis, and verification.

The NCS Toolbox is designed for a variety of goals including forest restoration, reducing wildfire severity, and projecting impacts of disturbance or management on water and carbon. Some use cases include:

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- Evaluating past and present ecological, hydrologic, and biogeochemical conditions
- Assessing historical vulnerability to drought or fire, and estimating the effects of management on those risks
- Comparing and prioritizing management options based on multiple goals, such as fire protection, ecosystem resilience, or carbon sequestration

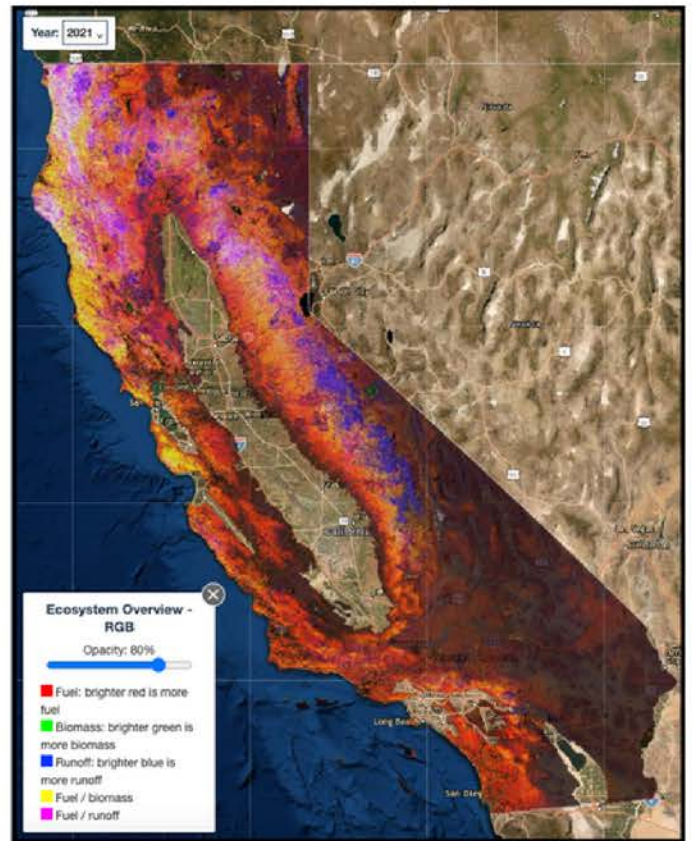


Figure 1: CECS color composite of ecosystem issues (Red: hazardous fuels; Green: high carbon storage; Blue: producing abundant runoff. Areas with multiple ecosystem issues are shown as mixed colors).

ORIGINAL DATASETS

100 ecosystem properties at 30m resolution for CA wildlands from 1986 to present. Current and Historical Conditions.

Ecological Conditions	Vulnerability and hazard
Vegetation disturbance and composition (fire, die off, management)	Impacts of drought on vegetation
Water, evapotranspiration, runoff, soil moisture	Impacts of drought on runoff
Wildfire fuels	Wildfire hazard
Live and dead carbon stocks, plant production	Carbon vulnerability to wildfire and die off

The NCS Toolbox contains the following:

The DataEngine is the foundation of the NCS Toolbox. The DataEngine compiles existing remote-sensing data and ground data and transforms them into hundreds of additional informational data layers using CECS-original ecosystem models. The CECS-original and pre-existing data layers are integrated to create a holistic web of ecosystem metrics using comparable physical units. This data hub includes metrics of management history, vegetation, carbon balance, water, fire, and more. Data layers are 30-m resolution statewide, 1986 to present.

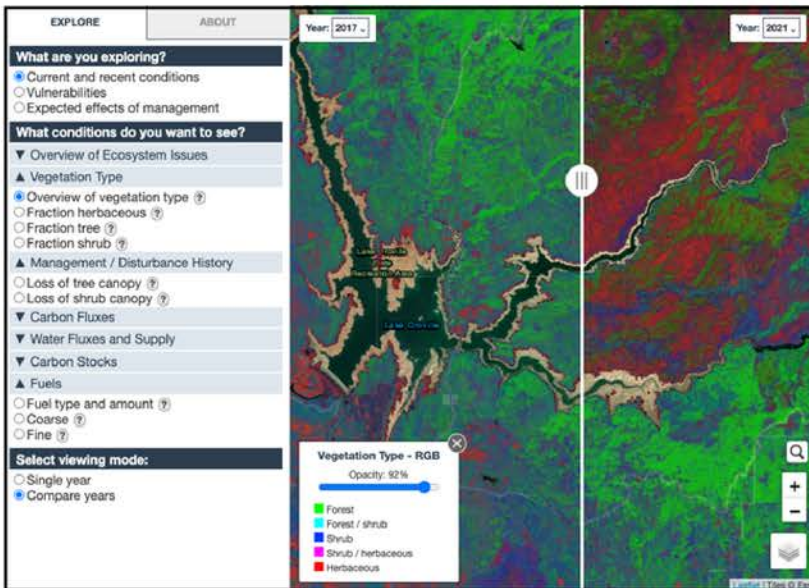


Figure 2: The DataAtlas tool visualizes CECS-original data.

The DataAtlas is an online visualization tool that displays select ecosystem data at 30-m resolution statewide. Every data layer within this tool is an original CECS product, and was created using the DataEngine. The DataAtlas allows users to get an overview of ecosystem conditions, compare years, forecast general outcomes of potential management, and identify areas of interest for further analysis using the DataBridge.

View the DataAtlas here: <https://cecs.ess.uci.edu/data-atlas/>

The DataBridge tools allow a user to select and export ecosystem data from the DataEngine to a user's preferred analysis software. Users select data based on their needs, including for planning, prioritization, or monitoring. Data files can be statewide or for a specific area. The DataBridge creates formatted tables, time series, or shapefiles that can be imported into software such as ArcGIS, QGIS, Excel, R, or ForSys. This tool is best for advanced users with working knowledge of one of these software tools, as well as experience in landscape. Contact CECS for more information.

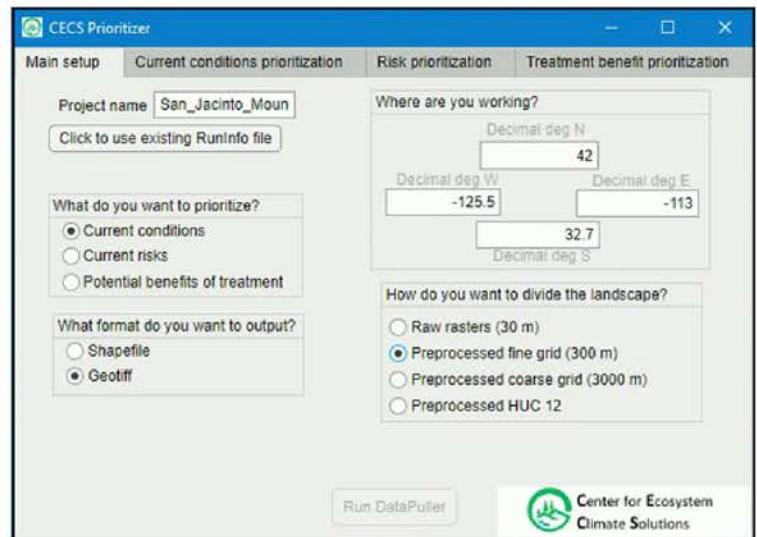


Figure 3: The DataBridge tool extracts data based on a user's needs.



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

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<https://california-ecosystem-climate.solutions/>
 @CA CECS

Rev. August 2022