

AI-Powered Data Informs Wildfire Hazard Assessment in California

by Ada Perello

Climate change is intensifying wildfire risks, with longer fire seasons, severe droughts, and vast areas burned in Europe and California. In response, geospatial technologies are becoming essential tools for effective fire management. Credit: Ada Perello/EAASI



Wildfire threats have intensified globally over the past decade, with increasingly severe seasons affecting not only traditional fire-prone regions like California and Australia, but also European countries from Portugal to Greece, and even northern territories previously considered low-risk.

Climate change has extended fire seasons, increased drought conditions, and created unprecedented challenges for emergency response agencies worldwide. The 2023 European fire season alone burned over 500,000 hectares, while California continues to face annual threats across millions of acres of vulnerable terrain.

Against this backdrop of escalating wildfire risk, innovative geospatial technologies are proving essential for modern fire management strategies. The California Department of Forestry and Fire Protection (CAL FIRE) has recently selected EAASI observer Ecopia AI to deliver comprehensive, AI-generated mapping data across the state's Fire Hazard Severity Zones—a project that exemplifies how advanced geospatial solutions are revolutionizing wildfire preparedness.

Precision Mapping at Unprecedented Scale

Ecopia AI, a leader in artificial intelligence-based mapping with over a decade of experience, has undertaken one of the most comprehensive wildfire risk mapping projects to date. Using high-resolution aerial imagery provided by EAASI member Hexagon, the company's advanced AI systems have digitized

geospatial data across California's Fire Hazard Severity Zones, covering more than 32 million acres—approximately 30% of the entire state.

The scope of data extraction demonstrates the sophisticated capabilities of modern AI-powered geospatial analysis. Ecopia's systems have identified and mapped buildings, roads, bridges, driveways, parking areas, sidewalks, pavement, swimming pools, sports fields, grass, shrubs, railways, open water bodies, tree canopy, and barelands. This comprehensive dataset enables CAL FIRE to analyze critical relationships that influence fire behavior and spread patterns. Particularly significant is the attribution of essential proximity data to each building footprint, including distance to nearest trees, water bodies, and neighboring structures—factors that directly impact fire vulnerability and spread potential. This level of detailed analysis, delivered at scale through AI processing, would be practically impossible using traditional manual mapping techniques.

Supporting Multi-Phase Fire Management

The Ecopia dataset addresses multiple phases of wildfire management, from prevention through recovery. During the preparedness phase, the

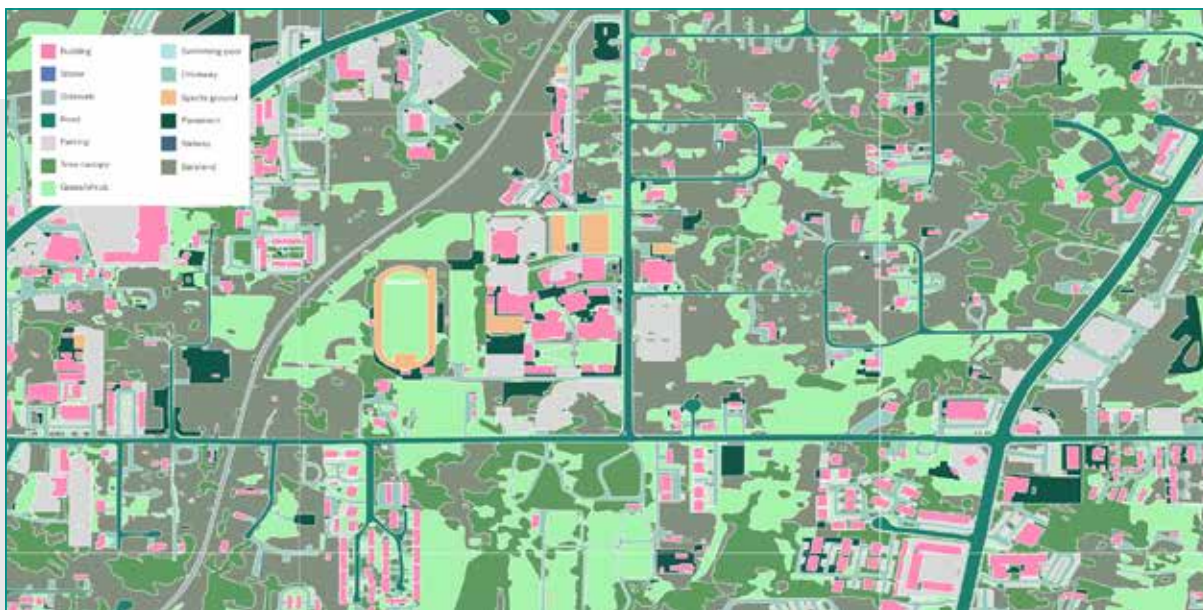


Image 2: A sample of high-precision data extracted by Ecopia in Paradise, California. Credit: Ecopia AI

data enables sophisticated hazard zoning, ensuring that new construction and redevelopment are accurately classified within California's fire hazard framework. Post-fire applications prove equally valuable, with the detailed building and infrastructure data supporting rapid damage assessment and recovery prioritization. The ability to compare pre- and post-fire conditions using consistent, high-precision datasets accelerates both insurance processing and reconstruction planning.

Data-Driven Future of Fire Protection

While this project addresses California's specific needs, the methodologies and technologies deployed have clear applications for fire-prone regions worldwide. European countries facing increasing wildfire threats—from Mediterranean nations dealing with annual fire seasons to northern European countries confronting unprecedented forest fires—

can benefit from similar comprehensive mapping approaches.

The scalability of AI-powered mapping systems means that the techniques proven in California's 32 million-acre project could be adapted for pan-European applications, supporting coordination between national fire services and enabling standardized risk assessment methodologies across borders.

This project demonstrates how the geospatial industry continues to provide essential infrastructure for public safety applications. As wildfire threats intensify globally, the combination of advanced imagery acquisition, AI-powered analysis, and comprehensive data integration offers hope for more effective protection of communities and critical infrastructure.

The integration of Hexagon's high-resolution aerial imagery with Ecopia AI's processing capabilities showcases the value of collaborative approaches

within the geospatial industry. Both companies, as EAASI members, represent the type of technological leadership that advances the broader crewed aerial surveying and mapping sector.

KEYWORDS

WILDFIRE; ECOPIA AI; GEOAI; AERIAL IMAGERY

ABSTRACT

As climate change exacerbates wildfire risks globally, innovative geospatial technologies are becoming crucial for effective fire management. This article discusses a groundbreaking project by the California Department of Forestry and Fire Protection (CAL FIRE) in collaboration with Ecopia AI, which utilizes AI-generated mapping data to assess wildfire hazards across California's Fire Hazard Severity Zones. Covering over 32 million acres, this comprehensive dataset includes detailed information on buildings, infrastructure, and environmental features that influence fire behavior. The project enhances wildfire preparedness, supports rapid post-fire recovery, and offers a scalable model for fire-prone regions worldwide. By integrating high-resolution aerial imagery with advanced AI analysis, this initiative exemplifies the potential of geospatial solutions to improve community safety and infrastructure resilience in the face of escalating wildfire threats.

AUTHOR

ADA PERELLO
COMMUNICATION@EAASI.EU
EAASI