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We Need More Funding for Interdisciplinary Prescribed Burns

The Policy Problem

California continues to see larger and more destructive wildfires, such as the Camp Fire in 2018. Hotter and drier conditions increase the severity and frequency of chaotic wildfires, placing homes, livelihoods, and the environment at risk. Fire dynamics in the coastal foothills, home to sage grasslands, shrublands, oak woodlands, and nearly 27 million Californians, are not well understood. As climate change intensifies and the threat of extreme wildfire increases, we need to adapt to these changes. Researchers develop best practices and create novel strategies for policy that address climate change's impacts, playing a critical role here. Interdisciplinary research is crucial to comprehensively understanding how best to ensure the coastal foothills are resilient to wildfires and climate change.

One challenge to interdisciplinary research across the board is that funding is usually for projects that involve only one discipline, providing narrow insights that could be much more robust. While climate science, ecology, and climate data modeling have similarities, scientists in these fields have different approaches to their work and view issues differently. Because climate systems are highly complex, including perspectives from different experts provides a more robust understanding of an environment. For example, funding for a research project may ask a fire ecologist to specifically study moisture in vegetation. However, that project would not identify the multifaceted effects of climate change or create as effective of climate adaptation solutions that a collaborative research team would find.

What is Prescribed Burning?

Prescribed burning is the practice of using controlled fire to reduce wildfire risk, and to promote the regrowth of native species. Prescribed burning is key to adapting to worsening fire conditions. This method allows for the control of smaller, productive fires while simultaneously decreasing the risk of catastrophic wildfires. In addition, smaller prescribed burns reduce the amount of smoke and toxicity produced by an uncontrolled fire, making them vital to managing the coastal foothills' fire-prone landscape.

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What Is Interdisciplinary About Prescribed Burns?

"We cannot go anywhere without a holistic view of science." - Leila Carvalho, Atmospheric Scientist and Director of the Climate Variations and Change Lab at the University of California, Santa Barbara

To know how fire might affect a place, we need to be able to model it. But, a model is only as good as what goes into it, so prescribed burns let us measure everything we can on the landscape before, during, and after the fire. Modelers collaborate with fire ecologists to know how much moisture is in the vegetation before the fire. Modelers work with ecologists to quantify what plants are there before, and what sprouts up after, a prescribed burn. Modelers work with climate scientists and meteorologists to know what temperature and precipitation levels to expect with climate change. In short, prescribed burns let different scientists measure the before and after to be able to use a model that predicts the future.



This means we can predict how a future prescribed burn might affect the vegetation on the landscape. In turn, knowing what is likely to happen to the plants tells us how much fuel there will be for future fires. That helps us to plan for safer prescribed burns and less damaging wildfires. Studying fire dynamics, ecology, climate, moisture, and modeling on their own can lead to knowledge gaps. **Studying these topics together leads to stronger and more useful results because each of these topics create the landscape we call home. Understanding and adapting to wildfires requires this holistic approach.**

Why Collaborative Research is More Insightful

- Interdisciplinary research develops comprehensive, deployable protocols for implementing and monitoring prescribed fires. It provides guidelines for reproducing a prescribed burn that not only reduces fuels but achieves other management goals like increasing native species' adaptability to fire and revealing new information about fire in the coastal foothills.
- The case study below allowed scientists to collaborate and gain new insights that improved the accuracy of their models. For example, oak specialists provided information about how oaks work, which allowed computer scientists to align their fire model with results taken from the ground.

Case Study: The Building Resiliency to Wildfire Project

The BRW Project is a holistic and collaborative research project investigating the impacts of prescribed burning in California's coastal foothills. This project took place at the University of California Santa Barbara's Sedgwick Reserve (Sedgwick) located in Santa Barbara County. Several of the BRW researchers noted how important and valuable it was to research prescribed burning in an interdisciplinary research project. The BRW Project focused on gathering information about the conditions of the landscape before, during, and after the prescribed burns to allow for comparisons between each stage of the process. The diverse team of interdisciplinary researchers on this project included fire ecologists, landscape ecologists, biologists, geomorphologists, atmospheric scientists, eco-hydrologists, herpetologists/community ecologists, and computer scientists. It can be challenging to collaborate across as many fields as this project covers because researchers often have different ways to speak about the same thing -- almost as if they are speaking in different languages. Because of this, it is critical to have team members who are able to help "translate" across disciplines and to have ample time to develop relationships and trust amongst the team members.



While each component of the project was impactful and contributed independently to high-level research, working together to better understand prescribed burning and its impact ultimately created novel research questions, collaboratively-sourced data, and insightful lessons learned/solutions. For example, computer scientists and ecohydrologists worked together to develop a fire prediction model. The model would not be as effective without the data from the atmospheric scientists collected at their weather stations and the flux tower at Sedgwick. In addition, ecologists collected data on the amount of moisture in a plant at Sedgwick that also funneled into the model. Additionally, data collected in the field by ecophysiologists studying oak trees helps the models predict whether these iconic trees benefit, survive, or die in response to fire. Through and through, this project relied on collaboration. The comprehensive perspective about fire and the specific site creates a deeper understanding of fire's impacts to this kind of environment.



"The most exciting thing to come out of this research project was the collaboration of high-caliber scientists. We discovered what is possible when the right people work together." - Max Moritz, UC Cooperative Extension Statewide Wildfire Specialist and Director of the Moritz Fire Lab at the University California, Santa Barbara

The BRW Project also united the work of several pre-existing research efforts to answer new questions about fire. These research efforts focus on California's freshwater supply, predictive fire modeling, prescribed burning programs, quantifying moisture in plants, and collecting localized wind and weather data. By collaborating, the diverse array of experts asked and answered questions more comprehensively, applying each expert's field – water, vegetation, fog, local weather, and more – to better understand fire in coastal California. Although research that is interdisciplinary is less common, we have found that the exchange of knowledge from different disciplines allows for the development of articulate and comprehensive research goals. In the context of the BRW Project, uniting researchers from different academic disciplines forged relationships and collaborations that led to a comprehensive prescribed burn plan with several goals. With the perspectives of this diverse team of researchers, an extensive analysis of fire in coastal sage shrublands, oak woodlands, and grasslands was conducted.

How to Fund Successful Interdisciplinary Research

- Grant awards for wildfire and prescribed fire research should go to projects that involve a variety of academic disciplines. These projects must also have a "translator," an academic researcher who is able to develop a shared language and trust amongst the researchers.
- Funding for interdisciplinary research projects should sustain longer timelines than traditional research. These projects need more time to build relationships, develop shared language, and conduct thorough research that generates impactful solutions.

All photos were taken by Ethan Turpin. Please explore his work with the Burn Cycle Project here.