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# Wineries Earn More Per Bottle When They Adapt to Climate Change

Chelsea Hicks-Webster, Kerrigan Unter | March 27, 2024



More frequent wildfires are damaging grapes in California. Wineries are sourcing grapes from more vineyards to reduce risk – and it's paying off.

Kerrigan Unter comes from a long line of farmers, growing everything from dairy to corn, chickens, and pigs. When Kerrigan decided to do a PhD, she wanted to “study something that reflected where I’m from,” she says.

English

And increasingly, one of the issues facing farmers is [climate change](#). The impacts of climate change vary by region, but can include wildfires, droughts, and even flash floods and frost snaps. In California, wildfires are one of the largest threats to the wine industry. Even if fires don't engulf a vineyard, the smoke travels for miles and can [taint the flavour of the grapes](#). Smoke also threatens farmworkers and can prevent them from harvesting grapes.



Climate change is scary, but companies are finding ways to reduce the impacts – to [adapt](#). In a [recent NBS article](#), we saw how a Chilean winery is lowering the impact of droughts through on-site modifications like a backup reservoir and soil moisture measuring. These efforts don't make climate change go away, but they help companies operate effectively in a changing world.

For her PhD research at [George Washington University School of Business](#), Kerrigan studied a specific type of adaptation. She wanted to know whether wildfire risk motivated wine companies (or wineries) to start sourcing grapes from more vineyards (the farm where grapes are grown). That could mean setting up a new vineyard of their own, or sourcing grapes from a third party. Diversifying production sites is a traditional risk management strategy – so if disaster strikes in one area, all is not lost.

She also studied whether there was financial payback for this type of adaptation. (Spoiler alert: The answer is 'yes' to both questions!)

Kerrigan won a best paper award at the [2023 Ivey-ARCS PhD Sustainability Academy](#) for her research, conducted with her colleague, [Dr. Jorge Rivera](#). Read on for details on how climate is

threatening one industry and how wineries are adapting and finding value.

## Wildfires Damage Grape Production

California wine producers fear wildfires, and climate change leads to larger and more destructive fires. “Smoke taint” is a particular problem. Even if a vineyard doesn’t catch fire, its grapes can absorb smoke from nearby fires, changing the taste. The damaged grapes must be either thrown out or mixed with other grapes to dilute the smoke flavour.



The impact of wildfires is growing, and not just in California. Wildfires are on the rise in other wine producing regions, such as Europe and Australia. And wine producers aren’t the only ones affected. As wildfires grow in size and frequency, they damage many types of crops and grazing lands, and limit workers’ ability to manage farms safely.

## How 535 California Wineries Are Responding to Wildfires

In California, wineries have traditionally housed all of their operations at a single site. That includes the vineyard and the facilities to make, bottle, and distribute the wine. This structure makes companies vulnerable to wildfires because there’s no back-up location. If fire damages grapes at the only vineyard, the company’s entire crop is affected.

In her research, Kerrigan wanted to understand whether these single-site winery owners decided to source grapes from a greater number of vineyards in response to wildfire exposure. She also wanted to know if that choice had any financial upside, specifically on the value of the wine. Maybe efforts to respond to climate change could have unforeseen benefits?



To find the answer, she mapped the location of 535 wineries in California and the location of wildfires each year from 1981 to 2019. She could see which wineries had a wildfire within 25 km, which is close enough to cause smoke taint — and maybe scare owners into diversifying their grape supply!

Then, Kerrigan used the Wine Spectator – a popular wine magazine – to collect data on the wines produced by those wineries. She could tell how many vineyards were sourced from for each type of wine during a given year, plus the wine's price.

## Diversifying the supply chain boosts price

Kerrigan found that wildfires affected nearly 70% of the wineries in her study at least once between 1981 – 2019. And these exposures seemed to have a significant impact on sourcing decisions. Each exposure to wildfire was linked to decision-makers being 7% more likely to start sourcing grapes from additional vineyards. Overtime, that adds up.

And when winery owners added new vineyard sources, it paid off. They earned an average of \$0.75 more on each bottle of wine for every new source of grapes they added. (If we assume a cost of

\$20/bottle, that means a 3.75% price boost for each additional grape source.)

Why the higher price? Kerrigan believes it reflects increased wine quality. That could happen for two reasons. First, more sources mean less smoke taint. Even if grapes at one vineyard are affected, grapes at the other vineyards are likely okay.



Why the higher prices? Kerrigan believes it reflects increased wine quality. That could happen for two reasons. First, more sources mean less smoke taint. Even if grapes at one vineyard are affected, grapes at the other vineyards are likely okay. Second, in the process of selecting new sources, growers can choose regions with ideal soil and weather characteristics, which improves grape quality. If they are setting up a new site from scratch, they can also optimize vineyard set up, including how vines are planted and installing state-of-the-art technology.

The result? Tastier grapes, and wine that sells for more.

### Wineries Can Earn More Per Bottle By Adapting to Climate Change

Climate change impacts wineries in many ways. Explore one example:



Climate change causes larger and more destructive wildfires →



“Smoke taint” damages grapes, reducing their quality and value →



Wineries “diversify” by sourcing grapes from multiple vineyards in different locations →



Wineries make ~\$0.75 more per bottle with tastier, higher quality grapes.

How does climate change affect wineries?

How do they adapt?

As with any research study, these findings have some limitations. The data can't tell us whether the new sources were pre-existing vineyards, or brand-new ones. This matters because it's easier to optimize new vineyards during the set-up process, than to modify an existing vineyard.



The data also don't include total revenue. So, researchers know that more growing sites lead to wine that sells for more per bottle. But we can't say for certain whether total revenue went up.

## Considerations When Adapting Your Farm to Climate Change

This study shows that adaptation can help businesses sustain a quality product and even boost price. But Kerrigan is the first to admit that adaptation is also complex and expensive.

Intensifying wildfires aren't the only change brought by global warming. Farmers will also experience higher average temperatures and hotter, more frequent heat waves. This can bring water shortages, though more frequent flash flooding is also likely.

For most grape producers and other farmers, adapting to climate change will require careful thought. The exact environmental changes will vary by location, so there's no one-size-fits-all approach to adaptation. Before diving into costly adaptations, consider asking an agriculture or climate science expert to help you project future climate risks. Experts can help identify high risk locations, the type of risks you might face, and specific adaptation strategies to reduce harm or take advantage of climate change impacts.

Kerrigan's main message is that change is unavoidable, and farmers should plan for it. "Mostly, I want to tell business leaders to be careful not to let their past experience dictate future decisions," says Kerrigan. "The future will be different than what you've experienced in the past."



## Lessons for Any Business Leaders

Climate change *will* impact your business. Try to educate yourself on what the future holds. If experts predict you'll experience damaging fires, heat waves, or droughts down the road, you should start adapting now.

Adaptation will have upfront costs, but the right adaptations support long-term financial performance. To learn why climate change is relevant to every sector, and best practices for adapting, check out our primer: [\*How Can Business Adapt to Climate Change\*](#).

## Ivey/ARCS PhD Sustainability Academy

Kerrigan's research won a best paper award at the 2023 [PhD Sustainability Academy](#), co-hosted by the [Ivey Business School](#) and [Alliance for Research on Corporate Sustainability \(ARCS\)](#), and directed by [Dr. Oana Branzei](#). The event convenes 15 promising PhD students, mentored by senior researchers in sustainability. Participants come from multiple disciplines and use [diverse approaches](#).

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## Authors



Chelsea Hicks-Webster

Hi, I'm Chelsea. I have a Masters degree in Sustainability, where I studied ecosystem health. I'm also a Certified Life Coach. I used to be the Operations Manager for NBS, but now I just focus on my favourite part of that job – the writing! I also run a social enterprise, called Creating Me, dedicated to strengthening maternal and family well-being. I know first-hand how difficult it can be to balance career goals, impact, and one's own well-being. When I'm not working on my own impact goals, I offer executive coaching and writing support to help researchers and change-makers grow their impact and well-being. ([creatingme.ca/sustainability](https://creatingme.ca/sustainability)).

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Kerrigan Unter

Dr. Kerrigan Unter is postdoctoral research fellow for the Institute for Economy and the Environment at the University of St. Gallen. Her research broadly focuses on the interconnectedness between business and the natural environment. More specifically, she examines the relationship between biophysical conditions, such as climate change, extreme weather, and biodiversity, and business performance and response strategies. She received her Ph.D. in Business Administration with a focus on Strategic Management and Public Policy from George Washington University's School of Business.

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