

GOAL
02

Fight Climate Change



Mitigate climate change impacts and adapt to the changing climate in our food system

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Introduction

How we grow, move, eat, and waste food all contribute to climate change. Land use changes—cutting down forests to make fields; employing practices that lead to soil erosion; burning fossil fuels for equipment, transportation, refrigeration, and processing; and methane emissions from livestock and food rotting in landfills—make up 21-37% of global greenhouse gas emissions.

Increased greenhouse gas emissions in turn trigger climate changes—droughts, fires, and other extreme weather events—that threaten our food supply, the viability of farms and fisheries, producer and worker livelihoods, ecosystem resilience, and human health. Low income, BIPOC, and other socially disadvantaged communities across the world are disproportionately impacted by the consequences of climate change.



¹ IPCC, 2019, [Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems](#), [P.R. Shukla, J. Skea, E. Calvo Buendia, V. Masson-Delmotte, H.-O. Pörtner, D. C. Roberts, P. Zhai, R. Slade, S. Connors, R. van Diemen, M. Ferrat, E. Haughey, S. Luz, S. Neogi, M. Pathak, J. Petzold, J. Portugal Pereira, P. Vyas, E. Huntley, K. Kissick, M. Belkacemi, J. Malley, (eds.)].

CLIMATE CHANGE AND OUR FOOD SYSTEM

Food systems are a major driver of climate change. They generate approximately 21–37% of global greenhouse gas (GHG) emissions from the cultivation of crops and livestock, land use changes, energy use along supply chains, and waste.¹ Carbon dioxide (CO₂) is the primary greenhouse gas emitted by human activities, but two other gases have higher global warming potentials: Methane has 28-36 times the heating potential of CO₂, while nitrous oxide has 265-298 times the heating potential. Food systems are the largest contributors of methane and nitrous oxide emissions since they rely on fossil fuels, synthetic pesticides and fertilizers, monoculture farming, and also produce a significant amount of waste.

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A 2020 study found that, due to the emissions of food system activities, even if our reliance on fossil fuels for energy production stopped immediately, we could come up short on efforts to limit global warming to 1.5 degree Celsius (2.7 degree Fahrenheit) above preindustrial levels—the central goal of the Paris Agreement and 'red line' that scientists warn is the threshold for intensified droughts, wildfires, glacial melt, food shortages, and more.² Unfortunately, methane and nitrous oxide emissions continue to increase globally, in the U.S., and in California (trend data is not available for San Diego County³).

Ironically, food systems are also particularly vulnerable to the impacts of a changing climate. As one California farmer wrote in the New York Times, “We don’t need to read the science—we’re living it.”⁴ The most recent U.S. National Climate Assessment warns:

*Rising temperatures, extreme heat, drought, wildfire on rangelands, and heavy downpours are expected to increasingly disrupt agricultural productivity in the United States. Expected increases in challenges to livestock health, declines in crop yields and quality, and changes in extreme events in the United States and abroad threaten rural livelihoods, sustainable food security, and price stability.*⁵

While the assessment for ocean and marine resources is equally dire:

*The Nation’s valuable ocean ecosystems are being disrupted by increasing global temperatures through the loss of iconic and highly valued habitats and changes in species composition. Ecosystem disruption will intensify as ocean warming, acidification, deoxygenation, and other aspects of climate change increase...Marine fisheries and fishing communities are at high risk from climate-driven changes in distribution, timing, and productivity of fishing-related species.*⁶

² Clark, Michael A., et al., November 6, 2020, “Global Food System Emissions Could Preclude Achieving the 1.5 and 2 C Climate Change Targets,” *Science*, 370(6517): 705-708.

³ While the City of San Diego reports progress on meeting GHG reduction goals, the County of San Diego, where most agricultural land is located, is updating its Climate Action Plan.

⁴ Sano, Alan, August 9, 2019, “Farmers Don’t Need to Read the Science. We Are Living It,” *The New York Times*.

⁵ Gowda, P., J.L. Steiner, C. Olson, M. Boggess, T. Farrigan, and M.A. Grusak, 2018: Agriculture and Rural Communities. In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 391–437. doi: 10.7930/NCA4.2018.CH10.

⁶ Pershing, A.J., R.B. Griffis, E.B. Jewett, C.T. Armstrong, J.F. Bruno, D.S. Busch, A.C. Haynie, S.A. Siedlecki, and D. Tommasi, 2018: Oceans and Marine Resources. In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock,

and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 353–390. doi: 10.7930/NCA4.2018.CH9.

⁷ Pathak, Tapan B., et al., 2018, “Climate Change Trends and Impacts on California Agriculture: A Detailed Review,” *Agronomy*, 8(25).

⁸ Jasperse, L., and Amber Pairis, 2020, *Climate Change Consortium for Specialty Crops: Southern California Region, California Department of Food and Agriculture, Climate Science Alliance.*

Sufficient evidence exists that California’s climate has changed significantly, will continue to do so, and has already impacted agricultural production (e.g., decreased yields).⁷ Although climate change means multiple, compounding risks for all regions, an analysis prepared by Four Twenty Seven and the New York Times in 2020 highlights the most significant climate threat in each county in America. The greatest risk in San Diego County, as in much of the Western U.S., is very high water stress due to drought and water demand (Figures 1 and 2, on following pages). As a result of water stress, higher temperatures, and increased risk of wildfires, projections suggest decreased avocado and citrus yields, the two major crop categories in San Diego County.⁸



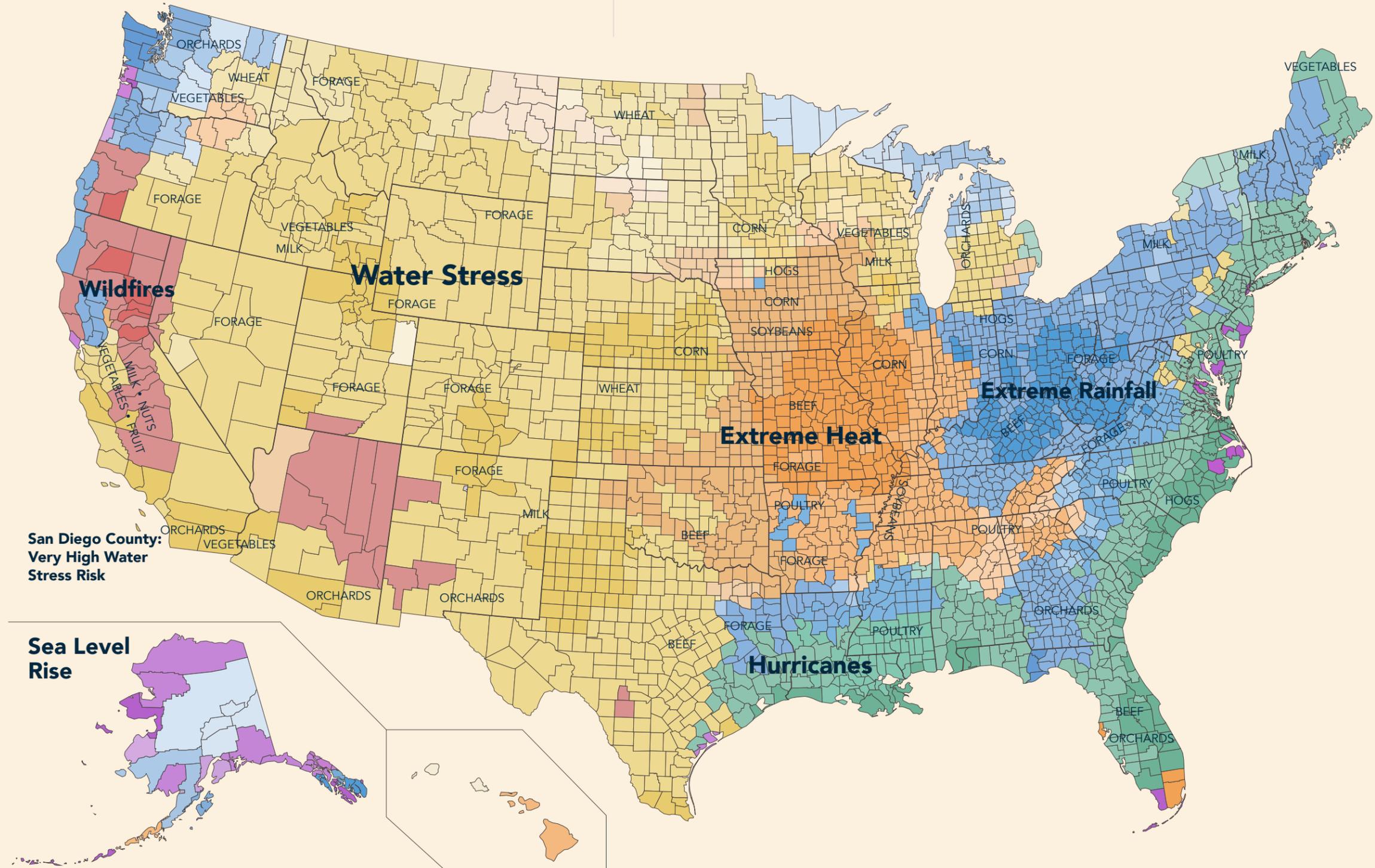
FIGURE 1

Major Climate Risks by U.S. Agricultural Production Regions

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Sources: Stuart A. Thompson and Yaryna Serkez, "Every Place Has Its Own Climate Risk. What Is It Where You Live?," The New York Times. Based on data from Four Twenty Seven. Major agricultural products data based on USDA Ag Atlas Maps.

FIGURE 2

Climate Change and Water Stress

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Climate Risks

Major Climate Risk by County

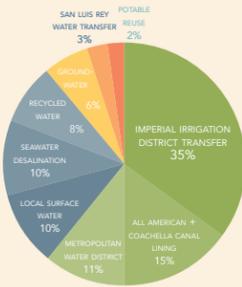
- WILDFIRE** → 16 events, 383 deaths, \$81.9 billion (cost of 2020 wildfires to be determined)
- WATER STRESS** → 12 events, 331 deaths, \$100.9 billion (cost of 2020 drought to be determined)
- EXTREME RAINFALL** → 8 storm + flooding events, 299 deaths, \$20.2 billion
- SEA RISE** → California also had 3 freezing events with 1 death and \$12.7 billion in damage.

Source: NOAA National Centers for Environmental Information (NCEI), 2020, U.S. Billion-Dollar Weather and Climate Disasters, www.ncdc.noaa.gov/billions.

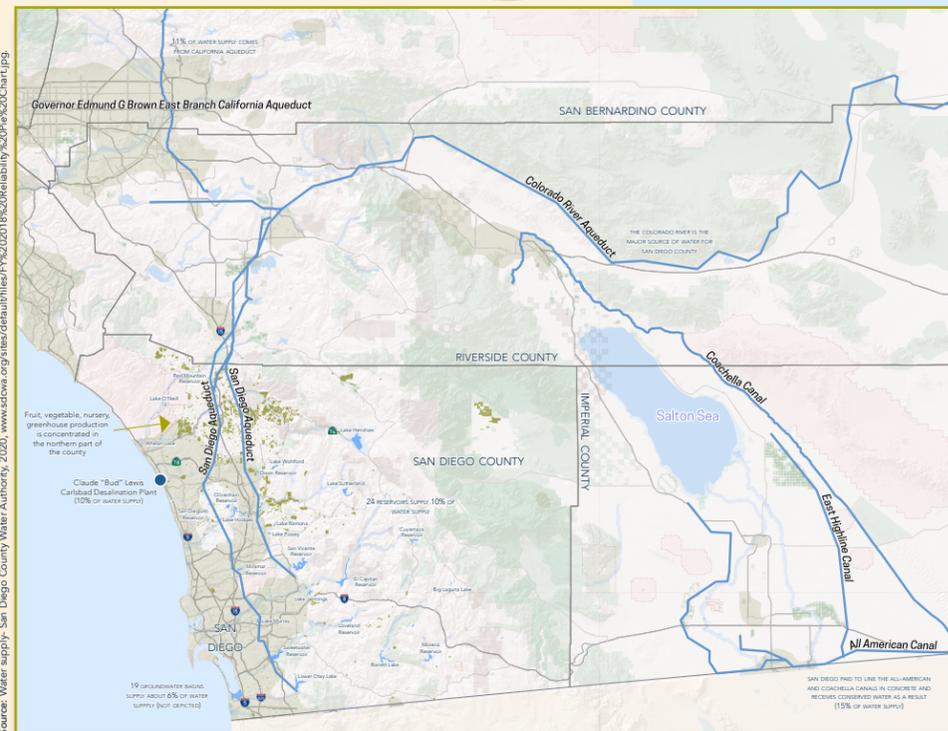
Climate change means multiple, compounding risks for all regions. A recent analysis highlights the most significant climate threat in each county in America. The greatest risk in San Diego County, as in much of the Western U.S., is very high water stress due to diminished snowpack, drought, and water demand. Weather related disasters have already cost California billions of dollars and hundreds of lives.

Water Stress

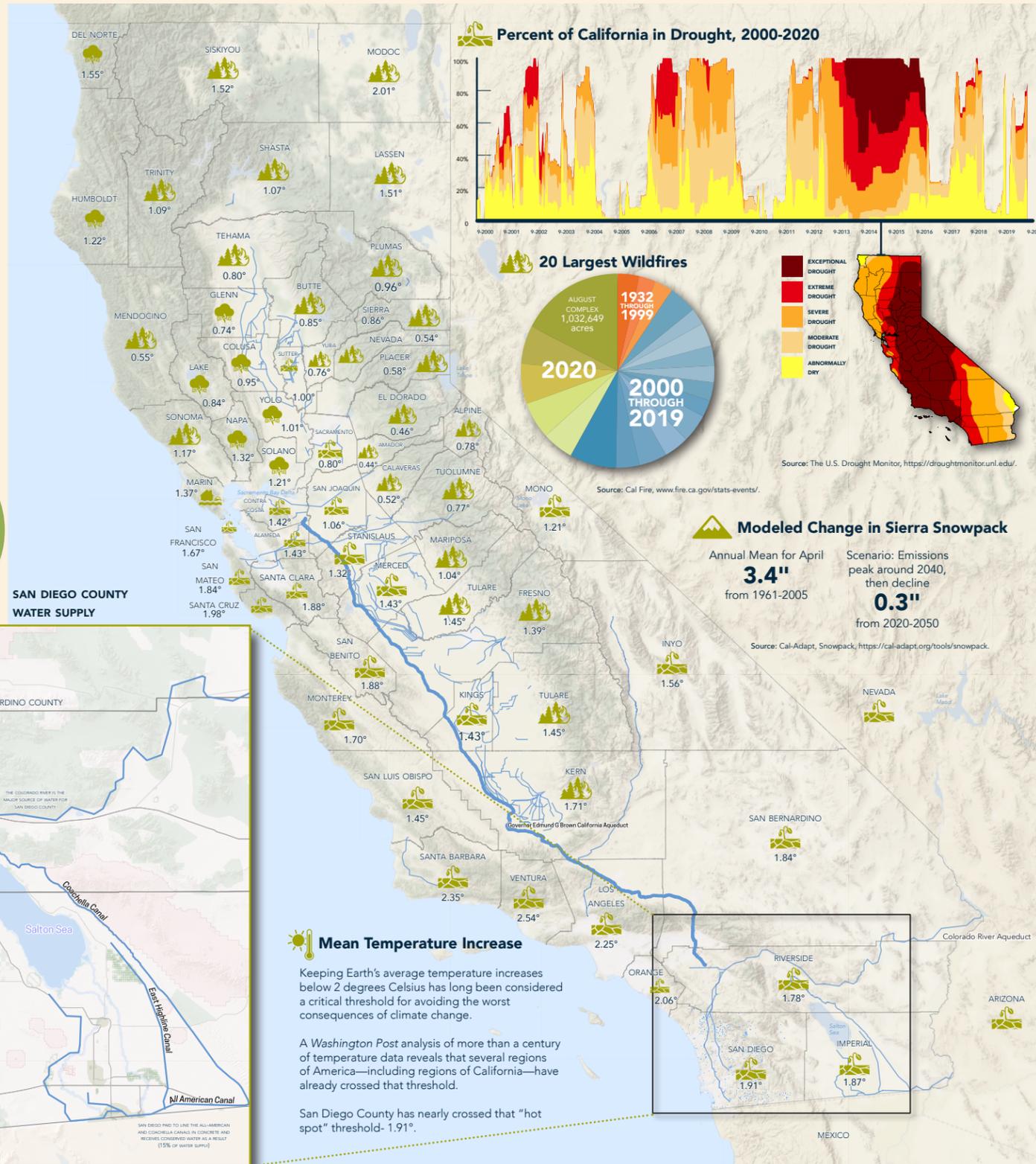
As the San Diego County Water Authority says, our region—which only gets about 10 inches of rain a year—sits at the end of very long pipelines. San Diego's water supply has diversified over the years but most of it originates with the Colorado River, which is projected to experience severe water shortages due to climate change. Going forward, the plan is to substantially increase the recycling of water. San Diego County farmers pay the most for water of any farmers in California, but, under a new program, participating farmers will pay a reduced rate (\$1,295 per acre-foot). The catch is that farmers agree to a lower level of service during droughts.



SAN DIEGO COUNTY WATER SUPPLY



Source: Water supply- San Diego County Water Authority, 2020, www.sdawa.org/files/default/files/FY%202018%20Reliability%20Plan%20Chart.jpg



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It Can't Be Up to Our Farmers Alone to Solve Our Climate Crisis

WRITTEN BY JENA THOMPSON MEREDITH – FOUNDER AND CEO, OCELOT COMPANY

60 years of farming. That's what the United Nations said our worldwide farmers have left if we continue to destroy our topsoil with chemical-heavy farming techniques, deforestation which increases erosion, and the impacts of global warming. It takes about 1,000 years for the earth to generate just three centimeters of rich, good dirt. In my son's lifetime, it could be gone.

When the soil can't replenish and ultimately degrades, it leads to a release of carbon into the atmosphere. About half of the U.S.'s agricultural lands and a third of its forests have degraded soils, which is bad news for farmers, farmworkers, fishermen, and our food supply.

I'm not a farmer, but it's in my blood. I was eight the first time I spooned a layer of thick cream from a jug of fresh milk at my great aunt and uncle's dairy farm in northern Nevada. As a teenager, my father woke before dawn to drive the tractor across the alfalfa fields. Today, the cows are long gone from the 110-year-old farm. My cousins have switched to teff, a 6,000-year-old, gluten free grain that needs little water to thrive.

It's innovation, driven by climate change, that will keep their family farm, and my youngest cousin, Miles, in business for at least one more generation. It can't be up to



our farmers alone to solve our climate crisis.

We need to rapidly diversify our food system, and lift up our leaders who are Black, Indigenous, and People of Color. We need to identify and conserve our most threatened and valuable agricultural lands and soils, and invest in long-term, more sustainable production of food. We need to restore our forests, rivers, and wetlands, keeping water in our streams for fish, wildlife, and people. These natural sponges clean and filter water as it leaves our farms, and flows into the ocean, feeding our fish with nutrients, not plastic and poison. We need access to technology that drives invention, and infusions of capital to scale our supply and value chains for farms and fisheries.

The hard truth is, we don't have 60 years to lose. We may not even have 30. Building a resilient, vibrant, and equitable food system across San Diego County—one resistant to climate change—requires a vast movement fueled by compassion, creativity, and collective vision. The transformation begins now. I hope you'll join us.

Each of us holds the power to make our region and our world better.

⁹ Solly, Meilan, May 15, 2019, "Carbon Dioxide Levels Reach Highest Point in Human History," *Smithsonian Magazine*.

¹⁰ Flannery, Tim, 2005, *The Weather Makers: How Man Is Changing the Climate and What It Means for Life on Earth*, New York: Atlantic Monthly Press.

¹¹ IPCC, 2018, Global Warming of 1.5°C. *An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels...*, World Meteorological Organization, Geneva, Switzerland, 32 pp.

¹² NOAA, *Global Climate Report - Annual 2020*.

¹³ CalFire, *Top 20 Largest California Wildfires*.

¹⁴ Wells, Carlie, November 30, 2020, "2020 Hurricane Season Officially Ends: Here Are the Records It Set," *Nola.com*

¹⁵ National Oceanic and Atmospheric Administration, October 7, 2020, *U.S. Hit by 16 Billion-Dollar Disasters This Year. So Far*.

¹⁶ *Center for Disaster Philanthropy*.

¹⁷ Francis, Jennifer, and Natasa Skific, July 13, 2015, "Evidence Linking Rapid Arctic Warming to Mid-Latitude Weather Patterns," *Philosophical Transactions A*, 373(2045).

¹⁸ Flavelle, Christopher, Brad Plumer, and Hiroko Tabuchi, February 20, 2021, "Texas Blackouts Point to Coast-to-Coast Crises Waiting to Happen," *The New York Times*.

¹⁹ Rich, Nathaniel, August 1, 2018 "Losing Earth: The Decade We Almost Stopped Climate Change," *New York Times Magazine*.

People and Our Planet

Daily activities we commonly take for granted—flipping on a light switch, turning on a faucet, driving to the store, eating a hamburger—activate energy systems that are still largely dependent on the combustion of fossil fuels. Human activities, namely fossil fuel combustion and land use changes, have increased the composition of greenhouse gases in our atmosphere to their highest level in 800,000 years, and levels keep marching up!⁹

We Are Reaching a Tipping Point

The increase in greenhouse gases is warming our atmosphere and oceans, leading to sea level rise from melting glaciers and ice sheets, altered and more severe weather patterns (e.g., droughts), and changes in the composition of local plants and animals.¹⁰ A 2018 Intergovernmental Panel on Climate Change (IPCC) report, Global Warming of 1.5 °C, states that "Climate change represents an urgent and potentially irreversible threat to human societies and the planet," and that, given current trends, Earth would reach warming of 1.5°C (2.7°F) by 2040. This is the red line that scientists have warned about that may intensify droughts, wildfires, glacial melt, food shortages, and more—and it's only 19 years away. ¹¹ A Washington Post analysis of multiple temperature data sets found numerous locations around the globe have already warmed by at least 2°C (3.6° F) over the past century, including Los Angeles County and nearly San Diego County.

Climate change is having a devastating impact across the planet. Ten of the hottest years on record have occurred in the past twelve years. ¹² Making headlines in 2020 were the worst wildfire season in North American history, including five of the six biggest fires in California history, ¹³ as well as substantial wildfires in Australia and the Amazon; a record-breaking Atlantic hurricane season;¹⁴ 16 different billion-dollar weather-related disasters in the United States;¹⁵ and many instances of hurricanes, tornadoes, typhoons, and flooding across the globe. ¹⁶ In February 2021, a continent-wide winter storm—likely influenced by changes to the jet stream due to Arctic warming¹⁷—provided a glimpse of a future of failures in governance, critical infrastructure like roads, railways, drinking-water systems, power plants, electrical grids, industrial waste sites, health care delivery, and even the livability of our homes.¹⁸

Six Intergovernmental Panel on Climate Change reports, four U.S. National Climate Assessments, four California Climate Change Assessments, and thousands of articles all paint an increasingly ominous picture where "long-term disaster is now the best-case scenario."¹⁹



Opportunities for Transformation

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“We need to start being better ancestors.”

CONNOR MAGEE

Climate Science Alliance, Pala Band of Mission Indians

Through Food Vision 2030, we have many opportunities to creatively mitigate climate change impacts by reducing emissions and enhancing carbon sequestration on agricultural land.²⁰ For example, at least 23 of the 100 solutions for reducing GHG emissions proposed in [Project Drawdown](#)—a global research organization partnering with policy-makers, universities, nonprofits, businesses, investors, and philanthropists—are connected to food systems, accounting for 33-35% of GHG drawdown (Table 1).

²⁰ Toensmeier, Eric, Dr. Mamta Mehra, Chad Frischman, and Dr. Jonathan Foley, December 2020, [Farming Our Way Out of The Climate Crisis, Project Drawdown](#).



TABLE 1: PROJECT DRAWDOWN FOOD SYSTEM SOLUTIONS

Food System Solution	Scenario 1: Stops climate change at 2°C		Scenario 2: Stops climate change at 1.5°C	
	Total Atmospheric CO ₂ Equivalent Reduction (GT*)	Percent of Total CO ₂	Total Atmospheric CO ₂ Equivalent Reduction (GT*)	Percent of Total CO ₂
Reduced Food Waste	87.45	8.8%	94.56	6.0%
Plant-Rich Diets	65.01	6.5%	91.72	5.8%
Improved Clean Cookstoves	31.34	3.1%	72.65	4.6%
Silvopasture	26.58	2.7%	42.31	2.7%
Managed Grazing	16.42	1.6%	26.01	1.6%
Perennial Staple Crops	15.45	1.5%	31.26	2.0%
Tree Intercropping	15.03	1.5%	24.4	1.5%
Regenerative Annual Cropping	14.52	1.5%	22.27	1.4%
Conservation Agriculture	13.4	1.3%	9.43	0.6%
Abandoned Farmland Restoration	12.48	1.3%	20.32	1.3%
Multistrata Agriculture	11.3	1.1%	20.4	1.3%
Methane Digesters	9.83	1.0%	6.18	0.4%
Improved Rice Production	9.44	0.9%	13.82	0.9%
Biogas for Cooking	4.65	0.5%	9.7	0.6%
Perennial Biomass Production	4.0	0.4%	7.04	0.4%
System of Rice Intensification	2.78	0.3%	4.26	0.3%
Nutrient Management	2.34	0.2%	12.06	0.8%
Biochar Production	2.22	0.2%	4.39	0.3%
Landfill Methane Capture	2.18	0.2%	-1.6	-0.1%
Composting	2.14	0.2%	3.13	0.2%
Waste-to-Energy	2.04	0.2%	3.0	0.2%
Sustainable Intensification for Smallholders	1.36	0.1%	0.68	0.04%
Farm Irrigation Efficiency	1.13	0.1%	2.07	0.1%
Food System Subtotal	335.83	35.4%	520.06	32.9%
ALL SOLUTIONS TOTAL	997.17	100.0%	1,576.47	100.0%

* A gigaton (GT) is equal to 1 billion metric tons.

Source: [Project Drawdown](#)

To fight climate change, we must reimagine our relationship with nature and realize that food deeply intersects with climate change. We can pursue opportunities to adapt and invest in climate-smart agriculture, carbon sequestration, plant-rich diets, zero waste initiatives, indoor food production, community-based food systems, and more to create a more sustainable food system in San Diego County.

Food Vision 2030 Objectives and Strategies for Fighting Climate Change in San Diego County

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OBJECTIVE 1

Preserve Agricultural Land and Soils, and Invest in Long-Term Food Production

The greatest climate change risk in San Diego County and the West is water stress.¹⁶ Avocados and citrus yields are expected to decrease as the heat rises.¹⁷ Objective 1 uplifts strategies that elevate research and increase support for climate mitigation and adaptation best practices and expand and incentivize climate-smart agricultural practices.

OBJECTIVE 2

Increase the Viability of Local Farms, Fisheries, Food Businesses, and Workers

Climate change is going to disrupt the viability of food system businesses, whether through the supply and cost of water, the availability of labor and ingredients, or health threats. Objective 2 uplifts strategies that expand and link business planning and technical assistance services (particularly for BIPOC communities), promote community wealth building opportunities (like employee ownership) and farm viability models (like investing in crops that will thrive in a warmer climate), and expands funding for climate change preparation, mitigation, and adaptation.

OBJECTIVE 3

Scale Up Local, Sustainable, and Equitable Food Value Chains

Climate change is already impacting food supply chains around the world. Objective 3 uplifts strategies that explore building more local food infrastructure for aggregation, processing, storage, and distribution.

OBJECTIVE 4

Elevate Wages and Working Conditions, and Improve Career Opportunities

Climate change is going to disrupt the way we work and provide new career opportunities throughout the food system. Objective 4 uplifts strategies that provide meaningful career opportunities for food system workers while advocating for better wages, access to health care, and other frequently cited needs.

OBJECTIVE 5

Expand Integrated Nutrition and Food Security

Climate change presents a wide range of threats to public health and food security. Objective 5 uplifts strategies that include supporting coordinated efforts and collaboration to expand an integrated nutrition and food security system.

OBJECTIVE 6

Improve Community Food Environments

Vulnerable communities that were historically redlined are also disproportionately exposed to extreme heat, including in San Diego County.¹⁸ Objective 6 uplifts strategies that include expanding support for urban agriculture and community gardens.

OBJECTIVE 7

Scale Up Food Waste Prevention, Recovery, and Recycling Initiatives

Project Drawdown estimates that reducing food waste is the top action we can all take to mitigate climate change. The state of California says that reducing short-lived climate super pollutants like organic waste will have the fastest impact on the climate crisis. Objective 7 uplifts strategies, like scaling up food waste recovery logistics, that bring together the considerable expertise in San Diego County to creatively solve our food waste problem.

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OBJECTIVE 8

Increase BIPOC Leadership Across the Food System

A common thread has always been that vulnerable populations—for example, low-income individuals and families, people of color—not only bear the brunt of climate change impacts, but also have the least resources to adapt to climate changes.¹⁹ Objective 8 uplifts strategies that engage and defer to BIPOC communities in food system planning, elevate voices of BIPOC people, places, and programs, and invest in the next generation of leaders to fight climate change.

OBJECTIVE 9

Build a Movement that Uplifts a Local, Sustainable, and Equitable Food System

Objective 9 uplifts strategies that cover the need most frequently cited by interviewees, namely, more education around food system issues, including education on strategies for fighting climate change.

OBJECTIVE 10

Plan for a Resilient Food System

There are many examples of communities planning for a more climate resilient future. For example, the City and County of San Diego both developed Climate Action Plans, California’s Climate Investments initiative put billions on the table for mitigation and adaptation, and tribes across the nation have responded with ambitious plans.²⁰ Now it’s our turn to plan for a more resilient food system. Objective 10 uplifts strategies that harness energy to “reset the table” to avoid the worst consequences of climate change from taking place.

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