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The Impact of Climate Change on California Wildfires

Each year, California wildfires run rampant across the state, leveling homes, destroying ecosystems, and sending smoke high up into the air that can be seen for miles. Wildfires are nothing new to the west coast; however, wildfire seasons are becoming longer, more intense, and more destructive, and every year, people are left scrambling to find a cause and solution for the increase in wildfires. While many suggest poor forest floor management, the culprit is climate change, more specifically, the increasing California temperatures caused by increasing greenhouse emissions. According to NASA, "Five of California's 10 largest wildfires on record happened in 2020, and the state set a new record for acres burned" (Buis par. 1), and "temperatures in California have increased approximately 2 degrees Fahrenheit (1.1 degrees Celsius) since the beginning of the 20th century" (Buis par. 6). It is clear that California, along with the rest of the Northern Hemisphere, has seen an increase in temperatures in the past decades, which has led to more severe wildfires. Increased temperatures have created the perfect conditions for more intense wildfire seasons, for according to Scientific American, "the number of dry, warm, and windy autumn days—perfect wildfire weather—in California has more than doubled since the 1980s" (Miller par. 3). Climate change in California continues to exacerbate these effects — fossil fuel emissions increase, the greenhouse effect gets worse, temperatures increase, wildfires become more destructive, and more emissions are released. This vicious cycle plagues California year after year. Wildfires, both the intensity and duration, in California will continue to increase and become more devastating to the ecosystem, economy, and climate of California because of climate change, namely the increase in California temperatures as a result

of increasing greenhouse emissions, for climate change creates the perfect conditions for wildfires to rage across the state.

Climate change increases air temperatures and prolongs droughts in California, which dries vegetation and creates the perfect conditions for wildfires. One of the clearest signs of climate change is the greenhouse effect, and California is not immune to its effects. The greenhouse effect is the process by which greenhouse gasses in the atmosphere, such as carbon dioxide, absorb infrared energy radiating upward from Earth's surface and radiate some of it back to the surface, which increases Earth's temperature and warms the planet. The more greenhouse gases in the atmosphere, the more energy is absorbed and radiated back to the surface, so an increase in greenhouse gas emissions leads to higher temperatures. A report released in December 2020 by the California Green Innovation Index showed that "the state's emissions increased by 830,000 metric tons of carbon dioxide-equivalent in 2018, representing a 0.2% increase from the previous year" (Noor par. 3), and California's average temperature continues to increase as a result of increased emissions. These increasing temperatures lead to the perfect conditions for wildfires to thrive. Wildfires in California are a natural part of ecosystems; however, the extreme severity of the wildfires seen in recent years is abnormal. The culprit for this increase in wildfire intensity is global warming. Warmer air temperatures and drier air soak up water from the atmosphere and from vegetation, and an increase in temperature increases the amount of water the air can hold; consequently, in California, the recent extreme heat has dried out large amounts of vegetation and created the perfect fuel for wildfires — dry and dead vegetation: "Intense, record-breaking heat waves like the ones that encompassed the West during August and early September likely caused major crisping of burnable material, as the regional vapor pressure deficit and associated drought climbed to record levels" (Borunda

par. 9). A greater availability of fuel for wildfires obviously allows wildfires to run out of control.. Alan Buis, from NASA, makes a similar connection between increased fuel and wildfire intensity, saying, “Another factor driving changes in the U.S. Western wildfires is a greater availability of fuel. Drier air stresses vegetation, making forests more susceptible to severe wildfires, while droughts are creating more dead fuel” (Buis par. 7). In short, increased greenhouse emissions increase the surface and air temperatures of California, which creates the perfect conditions for wildfires and perfect sources of fuel, all of which increase the severity and intensity of wildfires, and without a decrease in greenhouse emissions and temperatures, wildfires will continue to get more destructive.

In addition to increased fuel for wildfires, climate change has prolonged droughts in California and extended the fire season by multiple months. Climate change has significantly altered the patterns of precipitation in California, leading to massive droughts that have plagued the country for the past decade. Rain is one of the factors that helps control wildfires, but a lack of rain in California is also drying out the surface. Additionally, increased temperatures have led to snowpacks melting earlier than usual each year, which leads to soil and plants drying out for longer periods of time and extending the dry season: “Fire seasons are starting earlier and ending later each year, while snow packs are shrinking, leading to earlier spring snowmelt and longer, more intense dry seasons” (Buis par. 8). As the fire season starts sooner and ends later, drier and hotter weather persists into the fall, which increases the possibility of extreme wildfires: “Higher autumn temperatures and less precipitation—in particular, a growing delay in the onset of winter rains, which usually puts an end to the fire season in California—have led to a 20 percent increase in the number of autumn days ripe for burning” (Borunda par. 16). These prolonged periods of droughts have also led to a mass die-off of trees in California, which also increases the

sources of fuel for wildfires. Large amounts of dead vegetation, killed by the lack of precipitation, provide wildfires with even more fuel, so extreme droughts in California not only prolong the fire season but also increase fuel sources. This creates the perfect storm for intense and extremely destructive wildfires throughout the state: "During the recent 'hotter' drought, unusually warm temperatures intensified the effects of very low precipitation and snowpack, creating conditions for extreme, high severity wildfires that spread rapidly" (CA.gov par. 2). Since 1980, the fire season in California has increased by a total of 84 days, and since climate change has severely decreased precipitation in California and increased severe droughts, wildfires have increased in severity, length, and intensity, a clear result of climate change.

While climate change and global warming are some of the direct causes of more intense wildfires in California, the wildfires themselves contribute to even more global warming, a dangerous cycle that impacts human health and natural ecosystems: "Wildfires release carbon emissions that affect climate and drive climate change-related events that contribute to even more wildfires" (Buis par. 28). Whenever vegetation is burned, carbon is released, and since carbon dioxide is a greenhouse gas that contributes to global warming, wildfires just contribute to the harmful climate cycle that caused them in the first place. The amount of carbon that is released is an incredibly high amount because the amount of vegetation burned in these wildfires is extreme: "To put the carbon dioxide emissions from wildfires into perspective, September 2020 data from the Global Fire Emissions Database show that California wildfires in 2020 generated more than 91 million metric tons of carbon dioxide. That's roughly 30 million metric tons more carbon dioxide emissions than the state emits annually from power production" (Buis par. 30). Carbon emissions from fires are increasing, for in the summer of 2021, "California fires emitted twice as much CO2 as during the same period last year, and far more than any other

summer in nearly two decades" (Fountain par. 6). This is a trend that is not getting better, and this cycle will continue to bring devastating effects upon the state of California. Not only is the climate affected by wildfires, but these extreme wildfire seasons largely affect the ecosystems and habitats of the California wilderness. Vast amounts of land are destroyed, forests are wiped out, and natural vegetation is removed, and these drastic disturbances to California's nature have profound consequences on these ecosystems. Finally, humans are also impacted greatly by wildfires. Thousands of people are evacuated from their homes each year and many end up losing their homes. The impacts of wildfires can not be ignored, not only for humans' sake, but also for the sake of the environment, and while there might be multiple solutions to mitigating these effects, the first and most important step to stopping this destruction is reducing emissions. As Rebecca Miller, a Ph.D. candidate at Stanford writes, "We must dramatically reduce our greenhouse gas emissions. Otherwise, in a few decades, we might recall the more than four million acres of California burned so far this year—that have already shattered the prior record, set in 2018—as a relatively light wildfire season. That prospect, rooted in science and devastating to life and property, is unacceptable" (Miller par. 7).

Addressing this issue of increasing wildfires requires community cooperation and recognizing that responsibility for this issue is shared among all of California's residents. California, and specifically Southern California, prides itself on being a very close knit community that has a distinct sense of togetherness that distinguishes itself from the rest of the country. However, in Los Angeles County, wildfires disproportionately affect people who live in the outskirts of the city and in the hills, where the risks of fires are the highest. As stated earlier, the cause of wildfires is not just one person or one entity. Accidents can happen and random sparks can ignite a blaze, but everyone is in some way responsible for climate change. Therefore,

everyone is responsible for creating an environment that breeds the perfect conditions for wildfires to erupt out of control, and on the flip side of that, everyone is responsible for fixing that environment so that wildfires do not have the perfect conditions to run rampant. It is not right that a certain group of people who live in certain areas of Los Angeles County bear the worst consequences of wildfires when everyone, even when people who live in the city (and who arguably produce the most greenhouse gas emissions) contribute to this problem. This goes against the shared community values that Los Angeles, and California in general preaches. In order to solve this issue of wildfires, everyone must work together and do their part in addressing climate change and global warming. Local and federal governments must implement policies that limit greenhouse gas emissions for large corporations and must enforce strict standards on pollution for California's biggest cities. People must make lifestyle changes that reduce their carbon footprint, such as buying an electric car, eating more plants, supporting sustainable agricultural practices, or switching to solar energy. And businesses must invest in more ecologically sustainable practices and technology that limit their impact on the ecosystem. Doing these things together will help lessen the impacts of climate change, and over time help to reduce greenhouse emissions in California, which will slow down global warming. That way, the conditions under which wildfires thrive will be removed, thereby addressing the root cause in the first place.

Complacency and inaction are not an option. The risks are too high. Wildfires are getting worse and longer every year. More homes will be destroyed. More people will be displaced. More habitats will be scorched. And more health issues will be reported. Those sunny skies and mild weather that Southern California boasts about will be a thing of the past if nothing is done. Creative and innovative solutions are required to address this issue, but pooling together

community resources and assets during community cooperation will allow this to happen. However, none of the solutions that people create will be effective, unless this issue is framed in terms of climate change.

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