How to Ease California's Water Crisis

California has a water crisis. The governor declared a drought state of emergency in April 2021, and our water reservoirs in May 2021 held only 58 percent of the average amount of water for spring (NOAA 7). But California is not the only state with this problem. The six southwestern states—Arizona, California, Colorado, Nevada, New Mexico, and Utah—from "January 2020 through August 2021 have been exceptional in the instrumental climate record since 1895 . . . which together imposed an unyielding, unprecedented, and costly drought" (NOAA). Droughts have been a long-term problem, not just isolated to California, and will only get worse. So what can we do about it? Most solutions seem not to work; imported water and groundwater would soon run out, and desalination plants are much too expensive. To alleviate California's water shortage, we can conserve the water that we already have by using alternative water sources in agricultural and urban use and simultaneously work to improve desalination.

California and a few other southwestern states have been in drought for almost two years. A drought has been defined by the National Oceanic and Atmospheric Administration (NOAA) as occurring "when a water deficit at the land surface ensures that water demands cannot be met" (5). There are three types of drought. A meteorological drought, causing the most droughts, occurs in a lack of precipitation; an agricultural drought occurs in dried soils and are usually, but not always caused, by meteorological droughts; and a hydrological drought occurs when river and stream flow are low (NOAA 5). Any one of these events is appalling, but what is worse is that California has been declared to be under all of them. NOAA announced that the drought plaguing the Southwestern U.S. "began in the winter of 2019-2020 . . . as a meteorological drought and by summer of 2020, became both an agricultural and hydrologic drought" (5). The

lack of precipitation has quickly spread to affect our agriculture and landscape, and without further measures, it will affect even more of our daily lives.

To solve the water shortage, we should conserve our water in urban and agricultural use. Importing water from other parts of California is expensive and will run out because northern California—where California gets most of its water (*California Department of Water Resources*)—is already short on water. Water from surrounding states is not a long-term solution, for they are suffering from the same drought that we Californians are. Importing water and pumping groundwater is not maintainable in the long run, for with changing climate, California is predicted to be "15 to 35 percent drier by the year 2100" (Carle 144). Desalination at first seems to be a good solution because the ocean seems to be a never-ending water resource. But the energy cost to produce desalinated water is about three times that of recycled water (Qin and Horvath). With technological improvements, it will become cheaper. However, in the meantime, we should start with the cheaper—but no less effective—option: conserving the water that we already have. This will be a skill that will be needed more frequently in the future, when less rainfall will replenish traditional water sources. Where conservation can be done best is in what is classified as agricultural use—accounting for 40 percent of California's water used—and in urban use—accounting for 10 percent (Mount et al 1). Environmental use should not be reduced, for ninety-five of California's original wetlands have disappeared (Carle 147). Reducing the amount of water for taking care of the environment would hurt California's wildlife even more, as the Los Angeles Aqueduct did to Mono Lake's streams by reducing its volume by half and thus doubling its salinity (Carle 208-10). Until the levels of water worsen such that it endangers human life, only agricultural and urban water should be reduced.

Water taken for agriculture can be reduced by using recycled water and stormwater. Using recycled water might disgust some people, especially if it will be touching our food, but it should not be feared. The water recycling standard in California, set by Title 22, is "one of the most stringent regulations on the use of recycled water in the world," requiring that recycled water meet the same standards as drinking water if it will touch a crop's edible portion or humans (Qin and Horvath). Recycled water is safe to use for landscaping and irrigation. Currently, recycled water amounts are estimated to be around 1.5 billion cubic meters per year. This number should be taken with caution because it was "estimated based on the amount of wastewater generated in California . . . in 2015" (Qin and Horvath), and the number is probably now less than that because of more water saving measures and because not all wastewater will be recycled. However, the estimation shows the effects of using recycled water on agricultural and urban use. If the 1.5 billion cubic meters of recycled water were combined with annual stormwater between 520 and 780 million cubic meters, the total amount could increase either the alternative water in urban land irrigation from 4.6 percent to 48, or the ratio of alternative water in agriculture from 0.84 percent to 5.4 (Qin and Horvath). Though the percentages of alternative water are still low after the changes, it is incredible progress toward conserving water. It would approximately increase the total alternative water use in irrigating urban land by ten times, and in agriculture by six times. Using the otherwise wasted water would replace the other sources of water like groundwater and water in lakes and streams that are depleting, and would provide Californians with more water.

To execute this plan requires quite a sum of money. Recycling the water would cost around $900 million, a large number that nevertheless represents just 1.8 percent of California's

agricultural revenue (Qin and Horvath). The cost is not as unreasonable as at first glance and can be funded by individual agriculture companies.

Urban water use can be decreased by more Californians following the strategies already promoted by the state. The water used in urban areas includes water used for consumption, toilets, showers, landscapes, car washes, businesses, and industrial processes (*California Department of Water Resources*). This type of water usage can be decreased by a variety of acts. Gardening wisely will greatly affect the water crisis, for landscape watering takes up around half of urban water use (*California Department of Water Resources*). Californians taking care of their gardens can water at night, a lower temperature than the day, to lessen evaporation. We can also change our plants to be more suited to drier climates, which, as a quick internet search will reveal, are just as beautiful as a grassy lawn but much less thirsty. Using water-efficient bathroom appliances, such as using toilets and shower heads intended to conserve water, will also reduce water use. Every gallon saved from going down the drain is another gallon of water stored for our future. Ultimately, conserving water strains our finances, the environment, and the climate less than recycling water, and thus, it should be the focus of the solution.

Further in the future, desalination could provide more water for California. Using recycled water and stormwater depends on wastewater and storms, two sources that are shrinking; desalination is the solution for when those become scarce. Currently, turning seawater into drinking water is very costly. In small amounts—from 0 to 12 million cubic meters—desalinated water costs around $2.29 per cubic meter compared to recycled water's $1.25 price (Qin and Horvath). However, in larger amounts, such as at California's largest desalination plant in Carlsbad, the nearly 70 million cubic meters of desalinated water is a rate of $1.73 per cubic meter (Qin and Horvath), a much more competitive price. But in addition to cost

are the problems of energy and greenhouse gases. One study in Ventura County, one of California's top agricultural counties, found, "For lemons, celery, and avocados, switching to desalinated water would at least double life-cycle energy use and GHG emissions" (Qin and Horvath). Since increased greenhouse gases correlate to intenser droughts (NOAA 16), using desalinated water with the current methods might not ease the problem but exacerbate it. Though its processes are not yet cost-efficient, desalination should still be explored by building more plants or studying it more to improve its technology. Perhaps someday we will be able to use desalinated water widely, without burdening California's budget or its climate.

We can fill pages discussing this water shortage, with statistics telling how bad it is or with plans outlining what we can do about it. But to escape the red-hot drought already spreading, nothing will work unless each of us Californians *acts* on these plans. We must call for those growing our food and using 40 percent of our water to use more recycled water. In our homes, we must conserve water. There will be sacrifices—parting with our gleaming green lawns, spending less time under the warm shower water, or taking time to write to newspapers about solutions to this crisis—but does not every act of heroism come with a cost? The ability to save California's water from running dry is literally in our hands.

Works Cited

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