

Possible drought solutions for central california



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Abstract

It goes without saying that drought is a big problem in central California. It only takes but to look, at the once green, full of life fields, that have now turn to nothing but bare dust, on plain fields. We live in an age where technology has solved a few issues and made our life run at a faster pace, but we have a problem solving this issue. So, for the following I will discuss possible solutions that can one day give the farmers of central California the water they need, to feed a big part of the world that depends on them. Many people claim there is no drought, but I will show, what caused the drought based on experts, along with why it has not in proved. I will go over the definition of drought, causes of drought, effects of drought, interdisciplinary reasoning, possible technological solutions, conclusion and references

First let's look at the definition of drought, so there is a clear understanding of the topic. The definition of drought is written in the Merriam Webster dictionary as;

“ 1: a period of dryness especially when prolonged specifically: one that causes extensive damage to crop or prevents their successful growth resistant to drought

2: a prolonged or chronic shortage or lack of something expected or desired a drought of creativity. “(Drought. n. d.)

A simpler way to understand the definition drought would be what meteorologist and author Michael E. Mann said, which was “ Drought, most simply defined, is the mismatch between the amounts of water nature

provides and the amounts of water that humans and the environment demand.” (Mann, 2015). In addition to understanding the meaning, it is important to understand what are the causes of drought before we get into the question about, how can technology help solve the drought issues in central California?

Secondly some of the known cause of this problems has been that growing population,

low precipitation (rain fall), record high temperature. According to a research “ the state’s urban population has been expanding exponentially since the 1950s, particularly in southern California, reaching 36. 4 million in 2010” (Economic Research Service, 2011). Furthermore, the population is getting bigger, “ California’s population growth is expected to continue over the next 10 years to reach 44. 1 million by 2020” (Economic Research Service, 2011). This is important to know because back in 1930-1940 which I read, the population was significantly smaller. This is also important because in those years were when the Central Valley Project, Colorado River Aqueduct, and the State Water Project, which are water storage, were made to help support the population. “ As the most highly engineered river in the world, the Colorado River supports almost 30 million people...traveling through the seven states of Colorado, Wyoming, Utah, New Mexico, Nevada, Arizona, and California in the U. S....” (Hyun, 2008). What this means is that as more and more people are born, them must be new forms of storing water to meet the needs. In addition, the lack of rain is not helping the valley, along with high temperatures, that only absorb water. The following quote sums this part up, “...less precipitation and more evaporation and

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transpiration, at the same time.” (Mann, 2015). Meaning we are not putting the amount of water that is being taken out, leading to the problem.

As a result, the drought affects many people directly or indirectly, meaning it just doesn't affect the California people but many more people around the world. William Gamble an economist, president of emergency market strategies and international lawyer said this, “ The economic impact of the drought will be wide spread.” (Gamble, 2012). As Andrew Reeves environmental writer who specialty is water, states, “ Increased prices in food” (Reeves, 2018). Well it all goes back to California growing a big portion of the world's food. This is referring to anyone who buys fruit, vegetable, or dairy products or anything that is affected by the drought in California which are many. “ The US is expecting food prices to rise by 4% to 5%.” (Gamble, 2012). Since the drought food prices has gone up and continue rising. Since some growers abandoned their field due to lack of water. There has been as Andrew Reeves, “ Increased budget for disaster relief programs” (Reeves, 2018) Other great effect of the drought have been the death of both fishes and other wildlife. Even livestock have been hurt by the drought. There has been a reduction in tax due to growers abandoning their dying trees due to the drought. Meaning less money to fix other problems. There has been an increase of fires and some people even had to abandon their homes in rural areas also due to the drought. Disaster relief programs have had to come in and help families remain in their homes by providing delivered water to their homes, a temporary solution.

Despite this problem there are some solutions that use interdisciplinary reasoning with the help of technology as a primary source to help solve this

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water problem. For instance there is the oceanography, that uses Desalination, which is a pump that uses technology to control and pull out ocean water. Then it treats it using oil and solar power to turn it into fresh water. Now desalination is not new, it has been around since 1869 but frowned upon because it burned too much oil, however they are now using solar power to get the same results. Since the earth's surface is 71% salt water or ocean, this would help find a solution to the drought that is being faced in California. On the other hand, the salt waste also becomes a problem. This was just one of the possible technological solutions that are helping to solve the drought problem with the help of the environment.

For example, there is Wastewater recycling, that takes waste water and recycles it using membrane technology, to separate byproducts and clean the water. The highlights in wastewater recycling according to the author Jiale Xu, who is a Structural and Environmental Engineer,

“ Rejection of sixteen disinfection byproducts in forward osmosis (FO) was evaluated. Aquaporin membrane exhibited higher rejection to DBPs than CTA membrane. Organic fouling decreased the disinfection byproducts (DBP) rejection in FO membranes.” (Xu, 2018).

Although there is enough confirmation to confirm or verify that all the byproduct that is originally obtained is removed through this process. Other problems from this form becoming a solution is the transportation costs. Plus, there are many political resistances associated with this type of solution being the solution to the drought. This also became a temporary or helper to the drought situation. However, wastewater is not drinking water. This could

and was used during the hardest years of the drought as a source to help relief some of the pressures of having not water in some rural homes. Many people used this water to flush the toilet, water plants, give water to animals and shower. But there is the question about cost. According to TZE Ling NG, an environmental and civic engineer, she states that;

“ While seawater flushing requires a separate network of mains and, therefore, a greater capital cost, wastewater recycling has a higher ongoing treatment cost. Wastewater recycling, depending on the potability of the recycled water, may also require a separate network of mains, but one with a lower maintenance cost due to its lower vulnerability to corrosion compared to seawater mains.” (Ng, 2015).

Nevertheless, technology is playing a role in moving forward, with the help of databases to help find a solution to the drought that is hurting many people in California. Even though I only mention two in this paper, there are many other machines that are using technology to help fight the drought like, that can relate to other disciplines, for instances other solutions that I found but didn't elaborate are Wells, Geoengineering rain, fog catchers, Atmosphere Water generation, just to mention a few, there are many more. The reason I choose to only mention two are because these are the two most popular solutions that are being used, as an alternative to the lack of water or drought.

In conclusion, technology is helping with different alternatives to the drought problem that California is facing. However, this ongoing problem is not one that can be solved overnight. This is a problem that will continue because of

the consistent population of people and lack of water for people. This is not a new problem, but a growing problem based on what I read. Everyone is effect when you buy a gallon of milk or cheese or pieces of fruit or vegetable. What I discovered was that these solutions are only temporary solutions because they all had a down fall or created other problem. Technology can assist us in finding a solution. Technology has merged into the solution but in what direction is still not clear. Both solutions, started off every promising but had some issues whither is was the cost or the problem that it could cost of the environment.

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