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Mitigating 2021 California Drought

Over the decades, California has experienced many severe droughts because of its arid weather, lack of precipitation, and climate change. They are known for receiving little snow and rainfall therefore, there is not enough water to replenish groundwater sources, rivers, or reservoirs. Of course, there is no way to create rainfall or speed up the summers, so policies need to be implemented regionally and statewide in order to mitigate the effects of the drought and prevent future ones. As of 2021, California is preparing for another expected drought but they are not quite equipped to do so yet. This won't be California's first experience with water shortages. In 2020 California experienced extreme drought where wells dried up, aquifers were over pumped, and the dry atmosphere caused many large wildfires. This continuous drought is a result of climate change as well as their vulnerability to natural disasters. Within the past few years, there have been policies implemented by previous Governor, Jerry Brown, in order to conserve water and combat the disasters of the drought but the future does not look too promising. Even with these policies in place, California seems to be headed towards another severe drought. Not only has the drought affected the water supply of Californian's, it has affected the environment as a whole, going beyond the Department of Water Resources, therefore policies need to be enacted by the PPIC. A recommendation for the PPIC is to implement a policy where floodwaters are used to mitigate droughts by alternating the structure of surface and groundwater in order to let floodwater in.

California's drought mostly stems from climate change where it is "intensifying the impacts of droughts on communities, environment, and economy" according to Governor Gavin Newsom when declaring a state of emergency. One of the key actors in California's drought policies is Newsom. He only declared an emergency in Mendocino and Sonoma counties even though California in its entirety is facing a drought which caused some political tension within the California government. An article in *Cal Matters* "Drought emergency inflames political tensions," the State Senator, Scott Wilk says "While the overwhelming majority of the state is experiencing extreme drought conditions, Governor Newsom has chosen to only serve his French Laundry wine and cheese crowd." Newsom answers this saying "We need to … approach the challenges with a laser-like recognition that you can't focus this state as a one-size-fits-all solution, meaning we have to target our solutions regionally". Not only is his strategy to only focus on regions experiencing *severe* drought but also allocate funds to restore future damages from the drought instead of directing it towards resilience of the drought. Newsom may be incorrect in his statement here because according to the chart, every region in California has been abnormally dry and most regions are already experiencing extreme drought. Especially with summer coming, the numbers are not expected to change because there will be little to no rainfall.

As the years get warmer and drier, more water evaporates into the atmosphere, leading to dry soil which requires more irrigation. According to the Public Policy Institute of California, "more than nine million acres of farmland in California are irrigated, representing roughly 80% of all water used for businesses and homes". As of 2021, California is in its second dry year and farmers have had to turn to groundwater and their source but the issue is, the groundwater supplies had recently just been regulated so there hasn't been a chance to recharge it yet. A lot of

reservoirs and aqueducts have also been cut to farmlands in order to better allocate water usage throughout every sector. This either results in farmers losing their land and jobs or not being able to produce enough crops. A key actor in facing this drought is the California Department of Water Resources where they allocate water supplies. They announced that only 5% of requested water supplies were going to be delivered to municipal and agricultural users, one of their largest strategies to combat the upcoming drought. Another key actor, or more so was, is former Governor Jerry Brown who "asked urban residents to cut their water use by 20% and then, as the drought worsened, by 25%," according to an article titled "Yes, California is in a drought -- even if officials aren't saying it out loud" written by Peter Gleick in the *Los Angeles Times.* The current approach to California's water policies needs to be changed because many issues have been surfacing such as community wells, springs, and wetlands have been drying up. Vulnerable communities, more specifically poorer and rural communities, are affected because of the lack of groundwater supplies as well as the quality of water. The ecosystem is also in danger because California's native plants and animals are struggling. The PPIC states that "California needs to adapt to increasing drought intensity", "more sustainable groundwater management is needed to maintain this key drought reserve", and "the greatest potential for further water savings lies in long-term reductions in landscape irrigation-- a shift requiring changes in plantings and watering habits". In order for all these to happen to be resilient to the drought, more awareness and information needs to be spread among Californians. In the past the Sustainable Groundwater Management Act, Safe and Affordable Fund for Equity and Resilience Program, and the Administration's Water *Resilience Portfolio,* have been implemented by California to strengthen drought resilience. In November 2015, the Public Policy Institute of California, also known as the PPIC created a policy to allocate California's water in order for reformation. These policies

may have helped in the past but evidently not enough because there is another drought headed for California.

There are three policy alternatives to be considered. The first policy is using floodwaters to mitigate the drought. According to an article written from Stanford University in *Science News,* "Using floodwaters to weather droughts", it states "using a new computer framework, scientists are able to project future floodwaters under a changing climate. The approach could help California water managers plan to redirect floodwaters toward groundwater aquifers, alleviating both flood and drought risks." Because of climate change and global warming, there have been more natural disasters including floods. Most of California's infrastructure is not constructed to sustain floods so stowing away floodwaters would reduce flood risks as well and build water reserves. The process known as water banking "involves augmenting surface infrastructure, such as reservoirs or pipelines, with underground infrastructure, such as aquifers and wells, to increase the transfer of floodwater for storage in groundwater basins" (Stanford University). While this may not be the most feasible solution for California's government due to all the structural changes they have to make and the cost, it will keep the environment sustainable not only because there will be more groundwater stored but it would also prevent flooding. New technological invention would not be needed either because it is just a matter of augmenting the structure of surface and underground infrastructure. According to the article, even though "groundwater basins offer a vast network for water safekeeping, pinpointing areas prime for replenishment, gauging infrastructure needed and the amount of water available remains key, especially in a warming and uncertain climate" (Stanford University). Even though there aren't any floods in California coming soon, this is a good policy to implement in order to combat future droughts and during this dry period, the infrastructure can start being augmented.

Another proposed policy is for Governor Gavin Newsom to declare a statewide state of emergency throughout California instead of only Sonoma and Mendocino county. According to an article written by Dan Walters in *Cal Matters,* Newsom "is clearly reluctant to declare an emergency". Even though Sonoma and Mendocino county are experiencing severe drought, other regions in California are highly at risk as well so people need to be more cautious and better informed and prepared. Rather than Newsom declaring a statewide emergency, he has set over half of a billion dollars in wildfire prevention in damage. If he were to declare a statewide emergency, he could allocate some money in water saving resources and departments to come up with better solutions instead of preparing for the worst. There is no environmental, technological, or even economical downside in implementing this but the problem lies with the implementation criteria. Newsom is hesitant in declaring a statewide emergency.

The final proposed policy is to implement dryland farming, whether it be to incentivize it or to deem it necessary in regions where it is possible. According to an article "Can Dryland Farming Help California Agriculture Adapt to Future Water Scarcity?" written by Lori Pottinger in the *Public Policy Institute of California (PPIC)*, dryland farming consists of growing crops using primarily soil water and rainfall rather than irrigation. Because a lot of the water sources from reservoirs and aqueducts are being cut off from farmlands, dryland farming could be a solution. On some lands dryland farming can possibly be a permanent solution while other lands can switch off from dryland farming to irrigation throughout the year. The economic criteria may be difficult to meet because less crops would be produced meaning less money. For example, "some crops like almonds [pull] in $7,000 - $8,000 per acre. But the commodity crops suited to dryland farming are more like $200 an acre" (Pottinger). However, more and more water may be shut off to farmers as the drought conditions worsen and they may have to consider other

farming practices. Pottinger suggests helping farmers recover from their losses and providing incentives from federal and state programs which relate to the criteria of management and implementation. If federal and state programs lose money for incentivizing farmers, they may not want to implement this policy. However, Pottinger adds that corporate responsibility initiatives may be willing to pay their farmers in order to meet the sustainability quota. It's a double edged sword because where one criteria is met, the other one is not and vice versa. There is still a lot of research that needs to be done so the technological criteria is not a low risk right now but it is not high. However, the one criteria that it most definitely meets is that it is environmentally ethical. Retired lands that are fallowed for a long time can lead to soil erosion, air quality impacts from dust, and economic losses, just to name a few. With dryland farming it eliminates all those environmental issues.

There are four criterias for evaluating the policy options with the first one being economical efficiency. Economical efficiency will determine whether or not essential workers will keep their jobs as well as if it is reasonable for the government to allocate funds to the policy. The second criteria is environmental ethics which determines if the policy is sustainable, keeping in mind future generations. Management and implementation is the third policy which will determine whether or not it is feasible for the state department to implement this policy. The final criteria is the technological aspect which will analyze the technology needed or if it requires new and expensive technology. Based on these criterias, the most feasible policy proposal would be to use floodwaters to mitigate droughts and second would be to propose a California state of emergency throughout the entire state. The least attainable proposal would be for dryland farming just because there hasn't been adequate research done yet.

If the policy is to use floodwater to mitigate drought, not only will it help mitigate the drought but it will also reduce damage from floods, killing two birds with one stone. On one hand state officials and departments may implement this policy because it will definitely help with inevitable future droughts and may even prevent them in the long future. However, they may reject the policy proposal because it requires them to change both the infrastructure of surface and underground water structures. Creating a new infrastructure would not require any new technology though, just changing the structure which makes the policy more appealing. It may or may not be economically efficient because while new technology isn't needed, there will be a cost to making all these changes. This proposed policy is definitely environmentally sustainable, especially in the long run. In "What can help us get through this drought" written by Chandra Chilmakure, an assistant general manager of the State Water Contractors, he states that there needs to be "funding to improve reservoir forecasting so that we can better manage when to store water for supply and when to release water for flood control". If this policy is implemented, there will be a larger water supply, and most likely enough to sustain future generations. It also combats the natural disaster of floods that come with climate change and will protect farmlands, buildings, and wildlife preservation areas. According to the PPIC, "state law now requires water users to bring their groundwater basins into long-term balance by the early 2040s." Implementing this policy would help these individuals in meeting their quota twenty years from now and maybe even exceed it.

The main takeaway from this is that California will only continue to be in a drought if new policies are not implemented. Setting aside funds in order to combat the consequences of the drought does not solve the issue for future droughts. New policies must be implemented as soon as possible because historically, California has waited to implement policies which only

worsened the effects on the drought. Though there is no way to predict the future, California is famously known for dry weather. More precautionary measures need to be taken so vulnerable communities as well as farmers don't feel the full effects of the drought. The recommended policy, redirecting floodwaters to groundwater aquifers will most definitely help reduce the drought in the future. Farmers would also get the water that they need and the distribution of water does not have to be so limited and divided. In the bigger picture, not only will it impact water usage and shortages, it will also help natural disasters as well. Flood destruction is only one of the natural disasters it would prevent along with wildfires. With more water availability, California's land would be less dry which would reduce the spread of wildfires at such a fast pace and maybe even prevent it as a whole.

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Policy Problem: How is California going to mitigate the 2021 drought that is heading towards them?	Economic Efficiency: The policy option will not only keep the jobs of essential workers but also will not put a strain on the government's resources. (Low, Medium, High)	Environmental Ethics: This policy makes sure that the environment is sustainable, keeping future generations in mind as well. (Low, Medium, High)	Management and Implementation: This policy can be implemented by state departments. (Low, Medium, High)	Technology: This policy does not require the use of new and expensive technology. (Low, Medium, High)
Policy A: Maintain and enforce regulations as there are	Medium: Newsom has already allocated money to combat future natural disaster that could come from the drought, farmers will lose their land and job	Low: There are endangered species, dried up wells and low amounts of freshwater	High: Policies are already in place	High: Does not require any new technology
Policy B: Redirect floodwaters to groundwater aquifers	Medium: Creates jobs for architects and constructors but may also require a lot of money to construct	High: It will mitigate the drought as well as prevent future destructions from floods	Medium: To do this would be time consuming and may use a lot of funds	High: No new technology needed, there will only be changes to the infrastructure of ground and surface water systems
Policy C: Declaring a state of emergency statewide to warn residents of drought	High: Essential workers will keep their jobs and there will be no strain on the government's resources because it does not require any money	Medium: It would not solve the issue of the drought but it would also help residence be more aware so they can take measure to make sure they're doing their best to conserve water	Low: Newsom does not think it would be a good idea to issue one statewide and thinks that only regions that are experiencing severe drought need it	Low: No new technology needed but future policy proposals may require it if Newsom does issue a state of emergency
Policy D: Implementing dryland farming in regions that are possible	Medium: Farmers could keep their jobs but bring in less money. However, they could get incentives from the government and corporations. May or may not strain funds depending if governments want to incentivize it	High: This would prevent fallowed lands from harming the environment as well as using less water to farm, meaning more groundwater could be allocated to other sectors	Medium: State departments may not want to provide incentives for them	Medium: There is not sufficient research in determining whether or not new technology would be require but chances are there may be, especially with the start up