Our Ocean Backyard

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Megadroughts

It seems in California that we oscillate between floods and droughts, with a few normal years in between. Our average annual rainfall in Santa Cruz is about 30 inches but looking at our roughly 150 years of local precipitation history, the city has been deluged with as much as 62 inches in a single water year (which run from October 1 of one year to September 30 of the next) and suffered through as little as 10 inches.

The last two years were dry, and in case you hadn’t noticed, really dry, averaging just 13.3 inches. The meteorologists who keep track of these things report that these have been the two driest years in California since measurements began about 1870. We have experienced a lot of extremes in recent years and none of these have been good – highest temperatures, biggest fires, highest sea levels, lowest reservoir levels, most damaging hurricanes, to list a few. The climate of the entire planet is changing and this means more than it is just a little warmer when we step outside.

But scientists are pretty clever, and while we may only have 150 years of accurate rainfall measurements, dendrochronologists have been analyzing tree rings and now are able to extend our climate record in California back about two thousand years. Bristlecone pines, that eek out an existence in the generally arid southeastern part of the state, can live as long as 5,000 years. These trees and many others put on annual growth rings that reflect the climate or moisture they experience. They typically form wider rings when rainfall is abundant and growth is good, and narrow rings when it’s dry and times are tough.

By looking at hundreds of these tree ring records, we can identify what have now been labeled megadroughts, or dry periods that lasted more than two decades. A recent study looked at landscapes of the west from Montana to northern Mexico and from the Pacific Ocean to the Rocky Mountains by analyzing tree rings that offer clues to soil moisture levels throughout the last twelve centuries.

The period from 2000 to 2018 was determined to have been the second driest in the past 1200 years. With the exceptionally dry conditions of the last two years, however, marked by record breaking heat waves, declining reservoirs and huge wildfires, this period has now been pushed to number one, the driest megadrought in the past twelve centuries! By comparing conditions in earlier megadroughts with the past 20 years, the scientists who carried out this research concluded that human-caused global warming accounted for a 42 percent increase in drought severity. This is not good news, but is confirmation that what is happening is real, it’s bad, and we are in large part responsible.

Severe drought conditions are now impacting nearly two-thirds of the American West. Both Lake Mead and Lake Powell – the largest reservoirs in North America - reached the lowest levels on record during the summer of 2021, and they are continuing to drop. In California, Lake Shasta is now at 38% of capacity, Oroville is at 46%, Trinity is at 29%, and San Luis Reservoir is at 36%. These numbers are very low for this time of year and are far more than just statistics. These very large reservoirs and many others in the state provide the water that feeds the state’s agricultural industry, and our homes, schools and businesses, not to mention their importance for hydroelectric power generation and the recreational benefits they provide. And we have a massive state-wide plumbing system that moves this water around from where it is collected to where it is used. Most of California’s cities and farms are dependent on water from somewhere else, with the greater San Francisco Bay and Los Angeles areas being good examples that don’t have any significant local water sources.

Santa Cruz County is somewhat unique in central California in being hydrologically self-sufficient. All of our county’s water comes from within our borders, other than all of that imported bottled water sitting on the shelves of our local markets. Locally, Loch Lomond on Newell Creek, which is our main water storage facility, is now at 86.7% of capacity. We have had a series of water managers over the years that have effectively planned for local water needs, although we all know in the middle of an extended drought that we need to reduce our usage, and we have been effectively doing well so far. It’s likely to get worse, however, along with all of the other impacts of global climate change.

This year hasn’t helped long-term conditions. California experienced one of the driest Januarys on record and February brought record heat waves. There is no silver lining to this trend,x and climate scientists believe that the multi-decade dry conditions will likely continue to increase. There is really only one way to get ourselves out of this warming climate dilemma we are in, reducing our consumption of fossil fuels as rapidly as is humanly possible and moving to renewable sources of energy simultaneously. We owe it to ourselves, our children and grandchildren.