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Australia, Water Scarcity

Overcoming Water Insecurity

One of the many luxuries enjoyed around the world that not everyone thinks about is water. Here in the United States, we by and large have all the water we could want and enjoy. Unfortunately, that is not the case in many parts of the world, including Australia. According to National Geographic photographer Adam Ferguson, Australia is the driest inhabited continent in the world while being the third largest consumer of water (Heggie, 2015). Many families, rural and urban, go without running water and the other necessities that we have become accustomed to using in the United States. In Australia, water scarcity is becoming all too real. In the past, wild bush fires caused the Australian government to use millions of gallons of water to fight the fire back trying to keep its citizens safe. While they were successful in such attempts, using that much water left the civilians of Australia with a limited water supply, and in some areas, dry.

Australia is governed by a federal parliamentary democratic government. Australia is covered in many areas within the interior by a hot, desert, or desert-like climate. Australia is also known for a diverse range of snow-capped mountains and woodlands, with a mild climate and many amazing animals but the vast majority of its three million acres is hot and dry. Their major agricultural exports are beef, wheat, and wool. Australia has a population of 25,739,256 with 90% of that urban living in cities, and the other 10% living in the countryside. The average family size is two parents and one child. Most Australian families have complete access to nutritious foods mostly grown in Australia and make a reasonable amount of money annually, \$78,832 to be exact (Australian Bureau of Statistics, 2021). All families have access to education and Australia's healthcare is affordable for all. (Australian Institute of Health and Welfare, 2020). Sydney is the capital of Australia and is known for its amazing concert hall and beautiful harbor.

According to Statista, a leading provider of market and consumer data, water consumption per household in 2020 in the Northern Territory is the highest at approximately 0.32 megaliters or 84,535 gallons and the lower end of consumption is at 0.16 megaliters (42,267 gallons) on average in Victoria resulting in approximately 1.82 million megaliters consumed overall by households in 2020 (Granwal, 2022). That's over 480 billion gallons of water consumed overall by households in 2020 (unitconverters.net, © 2022) The Australian Bureau of Statistics indicated the 2019 household average is 0.18 megaliters or 47,550 gallons (Australian Bureau of Statistics, 2021), which is right in line with the 2020 averages across the States which ranged from 0.32 megaliters to 0.16 megaliters as mentioned earlier (Granwal, 2022).

Australia is an enlarged island surrounded by the Pacific Ocean. Half of the continent is a desert and as we know, deserts do not get much rain. In fact, the desert in Australia receives 250 mm or 9 inches of rainfall on an annual basis. According to the Australian Government Bureau of Meteorology, over the past two years, 2019 and 2020, Australia has experienced its driest 24-month period on record (Bureau of Meteorology, 2020). So where has Australia been getting all their water over all these years? The Australian underground is covered in aquifers big and small (Svinos, 2018). This is where the Australians have been pumping all their water from, but this water source is finite in its use. As the aquifers around the large cities started to see a decline in water availability, they were forced to start drawing water from the rural communities away from the major coastline cities. Now that the major coastline cities are pumping their water from the rural community's water sources it is leaving the rural communities dry (Heggie, 2015). There is a problem with having enough water to grow the food and livestock that feeds their country and brings the government money from exports.

Water Scarcity in Australia is one of the biggest problems the country faced in 2020-2021. Not only were its citizens left without enough water for necessities, but it has caused huge competition between urban settings and agriculture and the supporting industry for water usage. In 2021, the situation became worse with severe drought indicating a severe problem for Australians' sustainability. The aquifer levels kept dropping with increased usage. Australia is on a path to being a country with a limited water supply and in dire need of aid. Some of the biggest contributors to the depletion of the aquifers are the use of irrigation to grow feed and irrigate pastures for sheep and cattle as well as total urban water use. These distinct and separate uses must prepare for a future without ample water for either group unless a solution is found to serve all needs (Svinos, 2018).

There are several solutions to the problem of not having enough water. Some of these solutions require cooperation between the federal government and local governments. Some require investment in infrastructure. All require a commitment to saving water. The first solution I have come up with is called desalination, which is where you take undrinkable water, like saltwater, remove the salt and other minerals from the saltwater, and convert it into drinkable water (Scientific Scribbles, 2019). This is a workable solution because Australia is an island surrounded by saltwater. In addition, the major cities of Australia are all located on the coast where multiple desalination plants can be constructed and utilized. Since the desalination plants will be located by the coast it will take less energy and money to build the pipelines and transfer the water. But you are asking yourself "What about the rural communities, they cannot put desalination plants where there is no surface water?" With the installation of desalination plants along the coast, the major coastal cities will need less water from the aquifers and should reduce pumping water from the rural communities' aquifers (Svinos, 2018). This should have it to where the aquifers only get water pumped by those rural communities.

This will not be an easy task to complete. The construction of a desalination plant is expensive; according to an independent power plant, SMIPP Ltd, that cost is approximately \$100 million to serve 300,000 people (McGovern, 2017). The amount of energy needed to run a desalination

plant will require careful planning of energy resources and use. Part of the energy needed will be offset by a reduction in energy use from pumping water from the interior of Australia. The Australian government will have to be willing to ask for help from major companies and impose a “water” tax on its citizens to create more revenue; all for clean drinking water and basic water uses.

Though this desalination process appears to resolve the water supply issue for Australia, it does not come without problems. For one it takes a lot of power to run desalination plants and the plant cannot operate 24 hours a day. It also takes lots of money to construct and operate these plants. Based on the Australian Water Association’s estimates in 2014, producing and recirculating desalinated water could range from \$1-4 per kiloliter or 264 gallons (Australian Water Association, 2014). With energy costs increasing significantly since then, it is much higher in 2022. Another expense is the payroll of the employees that will be needed to operate the desalination plant.

The second part of the answer may lie in imposing water restrictions upon use. The state of California has imposed certain water use restrictions that might be useful in water-scarce areas. This state has water restrictions to keep its water usage down. These restrictions inform the citizens of California when the lawn may be watered or when the car may be washed. Certain restrictions even dictate when people can bathe or wash clothes (Weiser, 2018). Australia could review these restrictions and make their own controls from them. Of course, some people will think that those restrictions do not apply to them, but here is how you deal with that. Place water sensors or meters in the homes that record water usage, this would provide valuable data to show usage and water flow. On days households or individuals are not supposed to be watering their lawns or washing clothes, fine them one hundred dollars for every gallon they use, and then put that money back into making more clean water for the citizens to drink. Incentives or rebates may also work if they are attractive enough financially to change habits (Balsom, 2021).

There are other solutions as well. This solution could be used in my state of Texas to help supplement water use. The process of rainfall collection is where the rain that falls on a building and moves through the gutter system is collected in tanks or barrels of assorted sizes (Texas AgriLife, 2022). This water could be used along with the desalination process to supplement groundwater use. This will be harder to accomplish on a large scale, but if each home puts in a 250-gallon tank (approximately 1,000 liters) or bigger to collect rainwater, suddenly people will have clean water to use along with the water that was pumped from the desalination plants. It will give the people of Australia enough water for drinking and watering while relieving the stress of water use upon the aquifers. This is an area where the government could encourage water capture instead of imposing sanctions. The idea of using a carrot instead of a stick comes to mind.

Now water is one of the most valuable things we need, in times of drought it becomes hard to find and we need to ration it. With rainwater collection tanks you can collect rain on the days and

weeks it rains and keep that for saving or use it for just a specific task such as water dogs, animals, crops, and plants, or as bathing water. Water collection tanks are not cheap but are worth it. As previously stated, water use for the domestic sector in 2020 is 1.82 million megaliters of water. The pricing for a rainwater harvesting or collection system depends on the size of the collection tank and the materials used to maintain the system. However, with the average cost of water per household at \$3.46/kiloliter, and the range of use at 0.32 to 0.16 megaliters per household, the cost per year for water is \$ 1,107.20 to \$553.6 in Australian currency. Based on an article on hipages.com, purchasing a rain harvesting system could range from \$3,000 to \$4,000 for 2,000-liter storage, but then there could be additional costs to fit the home to direct water to the collection system (Gibson, 2022). The size of the home or structure, amount of water, and the efficiency of collection would all have to be factored in to determine the potential amount of rainfall harvest. If we consider a house that has a 2,000 square foot roof, and the rainfall of three feet from the 2021 floods with a 90% collection accuracy, based on a rainwater harvesting calculator, approximately 169,798 liters (169.798-kiloleters could be stored (Rainwater Harvesting Calculator. Watercache.com. 2022). If water expense is in the higher range of \$1,107 per year, the investment may be worth it.

During the floods in Australia during the summer of 2022, they received at least three feet of rain throughout the entire time of downpour. Even though flooding caused damage to homes and businesses this helped them with their water shortages. According to the Center for Disaster Philanthropy (Center for Disaster Philanthropy, 2022) “By the end of the first week in March, Southern Queensland, and northern New South Wales (NSW) had each received more than a year’s worth of rainfall in a week. Torrential downpours hit the east coast again on April 7, with Sydney receiving a month’s rain overnight. Thousands of people were ordered to evacuate their homes. The first three months of 2022 brought a year’s worth of rain to Sydney.” That is an incredible amount of water to receive in such a short amount of time. Even though this caused damage to the cities, it ended an awfully long drought and with rain harvesting collection tanks in place, Australia could have stored water for the years when they have an extreme drought.

Water scarcity is no joke and Australia is a notable example of why many countries need to become organized and take care of the water we currently enjoy. In the Australian Water Association Deloitte 2014 State of the Water Sector Report, 96% of the respondents believe that desalinated seawater may be “treated and managed to a level that is sufficient for safe and reliable potable” water (Australian Water Association, 2014). Multiple solutions have been presented for consideration; some of which are already being practiced around the world and even have been started in Australia. The Australian government needs to look at other countries that are already doing these practices that have been suggested. Israel, in the middle of a desert with limited underground water and almost zero surface water, utilizes the process of desalination (Galloway, 2020). The Australian government could go to Israel for some guidance on how to build and operate one of the desalination plants.

The two other solutions suggested, rainfall harvest and water use restrictions, should be implemented immediately by the Australian government, its citizens, and its industries. This can be done through collaboration between academia, industry, and the government to study, develop

and implement a strategic plan that considers the needs and circumstances of each State. In addition, education must be part of the solution to enable Australians with information about their daily water use and steps to take for conservation. Australians must understand they are in a water crisis and that these practices could mean the difference between having clean water or any water at all. With just one desalinization plant Australia could produce 250 million gallons of water for its citizens daily if operated correctly (Australian Water Association, 2014). Combining the desalination of water with the implementation of water restrictions and rainfall harvesting, the water crisis in Australia may be averted, and be a great model for other parts of the world.

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