Section 1: The Archivist Perspective

Digest #1

As an archivist, I have noticed a big change throughout the last few decades which has led to a global freshwater crisis. While the amount of freshwater on the planet has roughly stayed the same, the global population has grown tremendously over a short time period. In 2000, the global population was just over 6.1 billion people. Now, in 2040, it is roughly 9.2 billion. With the majority of our water being seawater, which cannot be consumed by humans, only a very small percent of it is fresh and less has been available to us as the population has grown and only continues to do so. Over the last forty years or so, water reuse has become a prevalent practice, especially where I live in California, in an effort to save as much water as possible. Many people in the state were using freshwater for purposes that didn't need it so using recycled wastewater helps to reduce this. Recently, the accumulation of droughts in California, one of the most water-stressed states, along with pollution, waste, an overdraw on aquifers, and other damaging practices have made freshwater scarce. Our state government has recently required that families conserve and reuse water with the expectation that they cannot rely on finding more of it. Being a historian and an expert on this topic, I intend to conjure up the history of water recycling, specifically in California, to see how we have gotten to this point. I will also look at what current practices are being implemented to ensure that water is reused as much as possible.

Back in the earlier days of this century, the Environmental Protection Agency of the United States said that "water recycling has proven to be effective and successful in creating a new and reliable water supply without compromising public health" (EPA). I would agree with this statement since water reuse is even more prevalent now in the year 2040 than it ever was in its beginning stages. Everyone in California recycles non-potable water now, which can't be consumed, but can be used for other purposes. It has become very widely accepted over the last forty years as treated wastewater can be used for "irrigation, recharge of aquifers, seawater barriers, industrial applications, dual-distribution systems for toilet flushing, and other urban uses" (Angelakis & Snyder, 2015). With the implementation of treatment equipment throughout the state, I have noticed more communities moving forward in creating new systems to allow for even more uses of this reused water (M.W. Watermark, 2016).

Looking back on the origin of recycling water, I've seen that "wastewater treatment and reuse is not new, and knowledge on this topic has evolved and advanced throughout human history" (Angelakis & Snyder, 2015). Going way back to prehistoric times, civilizations like Mesopotamia used wastewater for irrigation. Later on in Europe in the sixteenth century, it was used for crop production. The first modern wastewater treatment systems came about in the mid-nineteenth century, but the practice of water reuse began in 1932 when treated water was used to irrigate Golden Gate Park in San Francisco. As a proud Californian, this is a fact I love to tell people! There has since been a lot of progress in our state. With an increase in global water demand by 55% since the year 2000, with much of the demand driven by agriculture, Monterey

County has become an inspiration (Smedley, 2017). In 1998, the area started to use reclaimed water to irrigate 12,000 acres of crops. This project still operates to this day and has been very prosperous (M.W. Watermark, 2016). Monterey County's practices have since inspired Californian farmers all over the state to follow suit and use reclaimed water in this way to decrease the amount of freshwater needed and still grow crops successfully.

A little over twenty years ago, which feels like forever ago considering the significant changes that have been made in California since, the rate of reuse was "nowhere near enough to provide the supplemental resources needed to help reduce the state's vulnerability to droughts and other water-supply constraints" (James, 2016). In 2011 to 2016, Californians suffered the state's worst drought in 1,200 years (Smedley, 2017). "Its major aquifers receded at a combined rate of 16 million acre-feet per year, and roughly 1,900 wells ran dry. Then, in the first three months of 2017, rain fell at 228% more than its normal level" (Smedley, 2017). I remember when the Oroville Dam had become so overwhelmed by the rush of water at the end of this record rainfall, that its spillway eroded and residents in the county had to be evacuated. A friend of mine living just a few miles from the dam had said that he was just one of almost 200,000 people who had to leave. Despite the magnitude of the rainfall, it did not refill the aquifers. Only after ten years of rainfall did they fill back up. Citizens in California, myself included, were ready to bring water recycling into their daily routine.

A survey conducted in California in 2016 "found that 76 percent of respondents believe recycled water should be used as a long-term solution, regardless of drought" (James, 2016). Not only did people want to reuse water, but they were required to in 2030 when our state government called for every household to have water reuse systems outside their home. In the first quarter of the century, greywater reuse systems were implemented, but as the freshwater crisis became more severe, a wastewater reuse system was heavily researched and implemented throughout. The state government also began putting limits on the amount of freshwater intake per month for each citizen. Knowing that the average person uses roughly 80 to 100 gallons of water each day, the government set a limit of 2,000 gallons of water to be used per month by each resident of the state (Perlman, 2016). Based on what I've seen in the last forty years, this is much better than just telling people to use less water, which does not work. Also, limiting freshwater intake per person as opposed to doing it per household allows for better management and is more equitable. For instance, some families which may only have two children will be held equally accountable as families with four children. In Los Angeles, large scale water recycling plants were implemented less than five years ago. It is possible that in the near future, desalination plants to purify seawater will be built in California and other parts of the United States. Australia's drought that lasted for twelve years at the beginning of the century had state governments there building these plants, which has inspired California to do the same (Phillips, 2015). Additionally, farmers and owners of large commercial buildings have been urged to look into possible leaks and faulty pipes in their irrigation systems. More efficient irrigation methods have been put in place recently, such as micro-irrigation systems, which use lower pressure and

flow than a traditional system. Since the start of the twenty-first century, there has been an increase in the science and technical understanding of the water industry, as well as an improvement in the quality of wastewater (Cotruvo, 2015). The current practice of water reuse is very positive in California, and its future looks promising. It has been and will continue to be an integral part of how citizens in this state live their everyday lives here on out.

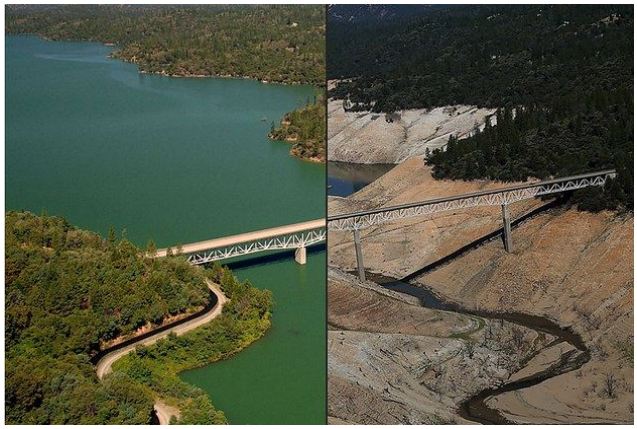
Digest #2

Here in 2040, we are in the midst of dealing with the worst California water crisis in recent history. How did we get here? There are a few specific factors that have developed over time that have pushed us to the breaking point, and then beyond that to where we are now. One of these factors is the exponential population growth that has gone unchecked. In 2000, the global population was just over 6.1 billion people. Now, in 2040, it is roughly 9.2 billion. Now while all of these people need water for consumption and hygiene, the real issue lies with the amount of food needed to support that population, and the amount of water that the traditional agricultural process takes. In fact, 70% of the water consumed around the period of 2018 was consumed by agriculture. As time has passed, and what was once a passing drought (referring of course to the mid 2010s California drought) has now become the status quo, forcing us to adapt.

Among those adaptations is water reuse, a technology that has existed since before our crisis began. In the past, water recycling was approached fairly unenthusiastically, but the initial California drought really opened the door to the beginning of public acceptance of this technology. This was the lasting impact of this historic drought, critical in shaping the world we have today. After enduring receding aquifers and restrictive living conditions, along with the general unease of living water-limited, Californians were eager for a long term solution that would provide them with greater water security and also allow them to more efficiently use the fresh water that they did have. And so, wastewater treatment plants began springing up, recycling greywater and other wastewater into nonpotable clean water that began to find huge success in irrigation and industrial uses.

In addition to the implementation of water recycling systems, the state government of California has also begun to enforce a 2000 gallon per month per citizen freshwater use limit, in order to deter wasteful habits. With these measures in place, the state of California is currently holding steady, however, the government is still looking towards the future, specifically the possibility of government subsidized farm conversion, transforming traditional farms into large scale hydroponics operations in order to further save on water usage in the state.

Archived Photos:



The long infographic on the left is an example of information dispersed to the public during the great drought of California. The image in the bottom right shows the drastic changes in water level during the same drought in the early twenty first century. Finally the top picture depicts an example of a water reuse system being implemented in a water recycling building.

Explanation:

To clearly understand the freshwater crisis, it is crucial to have a historical account of the timeline. The archivists above provide in depth analysis into the development of the water shortage in California explaining possible causes such as population booms and improper agricultural processes. Along with the causes, the archivists are able to display the temporary and lasting effects of the California drought. If you look at the picture above that an archivist dug up from the early 21st century showing a dam before and after the great drought, one is able to clearly visualize the issue at hand. In order to act appropriately to any situation, it is important to

understand what past courses of action were. The archivist provides detailed accounts of the transition to and implementation of new technologies such as water reuse systems into Californian life up until present day in the 2040s. Combining causes, effects, problems, and solutions into one report is pivotal to keeping this crisis as a reminder of what could happen going forward into the second half of the twenty first century if humans stray from their new sustainable path.