

Water Keepers (Winner of the 2021 Janick Prize)

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Among the Potawatomi people, women are the Keepers of Water. We carry the sacred water to ceremonies and act on its behalf. 'Women have a natural bond with water, because we are both life bearers,' my sister said. 'We carry our babies in internal ponds and they come forth into the world on a wave of water. It is our responsibility to safeguard the water for all our relations.

— Robin Wall Kimmerer, Citizen of the Potawatomi Nation

The Colorado River is the lifeblood of the western United States. Geographically, socially, economically and politically, this river has shaped some of the most formative forces in North American history. The river has been tamed for agricultural purposes, resulting in one of the largest hydroelectric facilities in the world, Hoover Dam. As the Colorado Basin dries south of the dam and the western United States faces unprecedented climate challenges, water seems to make its way to the forefront of nearly every environmental conversation. Politicized and monetized, water has rapidly re-evolved into our most valuable natural resource. In this article, the Colorado River and Hoover Dam serve as a case study to the efficacy of hydroelectricity and the interference of agriculture economy and politics in the last century of American history. Included will be an examination of the historical significance of the Colorado River to its surrounding landscape. Additionally, a significant portion will discuss the history through which human agency, including intentions and effect have had on the lands surrounding, the river. Overall, this work explores the context and moment in American history when men chose agribusiness over the well-being of other humans. The displacement and struggle of indigenous peoples, plants and animals only underscore the insidious and continued tension which existed between different human populations during this time. Viewed through the lens of Hoover Dam, this moment in history is exposed as an investment in big business astride the social and economic dismissal of nearly the entire American population.

The Colorado River is well over six million years old. Its history can be gleaned by way of the mightily cleaved limestone geologic structures it has left in its wake, most notably the Grand Canyon. The Canyon ranges in depth from a mile in places to six thousand feet in others, with a width of between ten and eighteen miles. This geology represents not just the river's history, but the history of the entire earth as we know it. Researchers at Arizona State University claim that there are few better places on our planet which better embody the story of the earth's formation based purely on the forces which carved the Grand Canyon. Most notably, the Colorado River has exposed, over the course of six million years, nearly two billion years of our earth's story:¹

Layers of limestone, sandstone, shale, granite, and schist make up the Grand Canyon's rock sequences. These layers continue to be worn away through water and wind erosion, creating the cliffs and slopes that make up this fantastic play of shape and color through time and space.²

For twelve thousand years, indigenous Native American tribes have recognized the importance of the Colorado River, with contemporary Havasupai, Hopi, Hualapai, Paiute, Navajo, Yavapai-Apache, and Zuni Tribes all still a part of vital decision making regarding issues related to the river. There are twenty more tribes in Arizona, making up the Intertribal Council of Arizona whom currently own one-third of the allotment rights in Arizona on the Colorado River. This is approximately 717,000 acre-feet of water rights. Water has always been a significant staple in the formation and success of productive and lasting civilizations worldwide. North American natives were not the only people who realized the necessity of a bountiful water source.³

Prosperous societies require a freshwater source. Water holds a permanent place in the history of civilizations worldwide. Historians have even made sure that water was one of the main criteria in the categorization process. This author posits that water was the main criteria. Without the ability for tribes (otherwise nomadic)

¹ "Colorado River." Nature Culture and History at the Grand Canyon, <https://grcahistory.org/history/colorado-river/>, accessed 27 September, 2020.

² Ibid.

³ Ibid.

to remain in one place to grow food, our ancestors would never have had the time or wherewithal to develop art, laws, or language. They also would not have needed to protect a land which solely offered sporadic food. Water meant the development and enrichment of civilizations in locations where people could settle permanently.

Human history, as something separate from of the history of our animal ancestors, first took shape around seven million years ago in what would be modern Africa. We know that humans evolved from monkeys. With fossil evidence of the isolation of monkeys having developed in Africa, we can also assume that humans originated there. During this period, one association of African apes split in to three separate groups; the modern chimpanzee, the modern gorilla and humans. It was not until 1.8 million years ago and many evolutions later, that the first human ancestor would leave Africa as found through fossilized skeletons on Java, an island in Southeast Asia. In Europe, the reach of humans was even later at 500,000 years ago.⁴

Climate played an important role. Without tools, clothes were improbable and thus the ability to stay warm in temperatures non-conducive to being naked or at least largely exposed was impossible. The indications of the use of tools didn't appear until around the same time as the evidence of humans in Europe; beginning with the harnessing and implementation of fire. Documentation reveals that it was substantially later that humans colonized the colder parts of the world. Just a mere blip on the evolutionary timeline, 20,000 years ago marks the first solid evidence of human habitation in North America.⁵ The Colorado River may have seen some of the first examples of inland civilizations. Humans may have existed in the Americas up to 40,000 years ago, but according to experts, the further one explores in the past, the evidence becomes weaker and less reliable.⁶ The dominant hypothesis is that the migration and first human inhabitants would have travelled from Asia across the Bering Land Bridge. The bridge was only visible when ice is locked on land and the

⁴ Jared M. Diamond. *Guns, Germs, and Steel: the Fates of Human Societies*. New York: Norton, 2017, 36.

⁵ Simon Worrall. "When, How Did the First Americans Arrive? It's Complicated." *Tracking a Mystery: When and How the First Americans Arrived*. National Geographic, June 9, 2018. <https://www.nationalgeographic.com/news/2018/06/when-and-how-did-the-first-americans-arrive--its-complicated-/>, accessed 9 November, 2020.

⁶ Ibid.

surrounding sea levels dropped. This meant that as human ancestors arrived in North America, they would have been bearing witness to the last Ice Age.⁷

Considerably behind the rest of the human race at this stage, the inhabitants of these diffuse areas of the world developed last, but their advancements thereafter were not slow. Choices in location were critical, as geography, as aforementioned is one of the first necessities to the foundation of a civilization. Specifically, this meant access to fresh water for drinking and agriculture. The ability to locate and determine plants and animals which could be domesticated allowed the hunter gatherer style of living to fade away. The earliest North American residents also traded goods on the river to survive. Traversing large expanses of land required many supplies which river trade and travel would eliminate. Trade opened doors for exploration and conquests ultimately resulting in the settlement of areas more south. Once humans grew and cared for their food in the same areas in which they lived, their ideas wandered from a constant need to locate food, to indulge the further elemental requirements of a civilization. This included art, a common language and laws. Around the exact same time, the earliest inhabitants of modern-day Russia were experiencing a very similar situation on their mighty Volga River.

The link between fresh water and agriculture would fuel the ongoing maturation of the human species, primarily because of their dependence on rivers. Colder climates made for shorter growing periods and reduced the variety of what could be grown. As a result, inhabitants of the colder regions, especially in the north, would have most likely been experts in animal husbandry. Specific breeds would have been mandatory. Steppe tundra, the ecosystem found in the plains of primitive North America, would have contained early megafauna which thrived in an environment consisting primarily of permafrost covered meadows. Large amounts of skeletal remains, suggestive of domestication, including reindeer, caribou and bison are among the documented archaeological discoveries found buried in the permafrost there. It would have been with the skills acquired handling, caring for, butchering and preparing these animals which would enable the primitive northern civilizations of North America to survive. Furthermore, using their intense knowledge of these crafts,

⁷ Ibid.

it would be through trade that they really began to thrive; and rivers would serve as essential arteries to connect themselves to one another.⁸

Throughout history, across the continents, spanning climates, water runs like an artery through successful societies. The Egyptians have the Nile River. The Russians have the Volga, the Chinese the Yellow and Yangtze Rivers, South America the Amazon and the Americans have the Colorado. After the Louisiana Purchase, in 1803, the western United States experienced a massive population surge. With the help of the Colorado River, undoubtedly this river supplied our country with technology insurmountable by any other river in the United States. The water from the Colorado feeds crops exported to countries across the globe. Its influence reverberates worldwide, feeding not just the country in which it resides, but so many others as well.

The Colorado River begins on the Continental Divide in the Rocky Mountains. Winding its way 1450 miles south, it ends in the Gulf of California in Mexico:

The hardest working river in the West is as diverse as it is unique. Passing through no less than 11 different national parks and monuments as it tumbles through the varied landscapes of seven states and two countries, it's a critical water supply for agriculture, industry, and municipalities, from Denver to Tijuana, which fuels a \$1.4 trillion annual economy. Fishing, whitewater paddling, boating, backpacking, wildlife viewing, hiking, and myriad other recreational opportunities contribute some \$26 billion alone.⁹

Also featured along this vital waterway is Hoover Dam, the behemoth hydroelectric plant built in 1936. Originally called the Boulder Canyon Project, the dam was commissioned by Franklin Delano Roosevelt as a part of his (Second) New Deal. Both of FDR's "New Deals" included vast ideas and civil projects meant to carry the United States economy out of the Great Depression. In reality, the farmers living in California's Imperial Valley, had been struggling with the damages incurred by the river's annual flooding well before the stock market crashed, before the Great

⁸ Jared M. Diamond. *Guns, Germs, and Steel: The Fates of Human Societies* (New York: Norton, 2017), 100.

⁹ "Colorado River." *American Rivers*, October 15, 2019.

<https://www.americanrivers.org/river/colorado-river/>, accessed September 26, 2020.

Depression, and a long time before Roosevelt's idea to boost the American economy using this monolithic dam. The flooding became politically charged in the early nineteenth century, and The Boulder Canyon Project Act (BCPA) was passed by the seventieth Congress on December 3, 1928.¹⁰ The Act read, "to provide construction of works for the protection and development of the Colorado River Basin, for the approval of the Colorado Compact and for other purposes."¹¹

Pause. This moment is important. In a governmental vacuum, this appeared to be ordinary legislation as a champion for the unemployed emerged, plans in hand. However, this instant marks something pivotal in the larger American (if not world) history, as a distinct choice was made to place one person's interests above another's, again. On this occasion, both farmers and great scores of American citizens heard an ally in government, offering jobs, new technology, and new opportunities for wealth. What the indigenous people, (already relegated to humiliating reservations courtesy of the US Government) heard, was that they did not matter as much as this new technology does, and your lives are not as important as the white American men who need this land to progress and succeed. The Native Americans, including tribes from both the Navajo and Hopi feared the dam's construction would interfere with their water source, even though article seven of the Colorado River Compact, signed by then President Herbert Hoover in 1922, specifically states, "Nothing in this compact shall be construed as affecting the obligations of the United States to Indian Tribes."¹²

This dam may have been part of Roosevelt's New Deal, but it was also an extension of Manifest Destiny. White Americans believed that not only was it their right to develop this land, but their destiny to expand their culture no matter whose culture disappeared in the process. The agenda was clear, to promote and save agriculture, to prop up the struggling American unemployed, and to assert dominion again over Native American peoples. For as much as this civil project was about the promotion of American people, it was as much about the dismissal of those in the way.

¹⁰ Boulder Canyon Project Act (1928), accessed 27 September, 2020.
<https://www.ourdocuments.gov/doc.php?flash=false>

¹¹ Ibid.

¹² Kathleen Lusk Booke and Zoe Quinn. "Hoover Dam and the Colorado River Compact, United States." Building the World. UMass, Boston, March 27, 2013. Accessed November 24, 2020.<http://blogs.umb.edu/buildingtheworld/energy/hoover-dam-and-colorado-river-compact-united-states/>,

Indeed, the Hoover Dam was not the only item on the agenda for the BCPA. From a more structural point of view, flood control was certainly a part of the desired effect; but as was a new electrical source which was desperately needed by the growing populous of the western United States. The Boulder Canyon Act also outlined plans for the All-American Canal, which would eventually connect the fertile agricultural lands of the Imperial and Coachella Valleys with the Colorado River. Added benefits as well to include better navigability on the river. Following the ratification, (or approval) of six of the seven riparian states, the project was certified June 25, 1929 at a cost allocated by the government of 165 million dollars.¹³

Hoover Dam is a giant work of architecture and economic success; it is also a catastrophic scar on the environment of the southwestern United States. At first, the proposal was endearing to the United States citizens. They were looking forward to going back to work. Creating jobs grew the economy. The Wall Street Journal gives this view:

As FDR told 10,000 spectators at the Colorado River dam site and 20 million more via radio, the dam meant gainful employment, cheap hydroelectric power, reliable irrigation and protection from the obstinate elements, all ripped from a forbidding desert canyon by the hand of a visionary federal government. Eleanor Roosevelt, who accompanied her husband on his visit to the Colorado River, would tell friends that the trip brought home to her the sweeping achievement of his administration as if for the very first time.¹⁴

Unfortunately, the dark side of FDR's marathon of economic stimuli, is the disruption of habitats. Hoover Dam is also an environmental nightmare. From an agricultural and agronomical point of view, it was absolutely necessary, but at the expense of an environment which has suffered a traumatic amputation of its natural existence.

Before construction could even commence, the site needed to be ready for the influx of laborers and families who would build it. First, Boulder City was blasted out

¹³ Ibid.

¹⁴ Michael Hiltzik, "Hoover Dam's Perpetual Power: Franklin Roosevelt's Signature Project Created More than Jobs and Energy, It Incited One of Our Nation's Greatest Transformations." *Water Education Foundation*. Accessed September 29, 2020. <https://www.watereducation.org/aquaforia-news/hoover-dams-perpetual-power-franklin-roosevelts-signature-project-created-more-jobs>

of the desert. Intended to be a worker's community, built with the sole purpose of housing laborers for the dam. Next, came a twenty-two foot wide, seven mile long paved highway from the town to the work site. Also constructed prior to Hoover Dam's manufacture was a 23 mile long arm off the Union Pacific Rail Line connecting Boulder City to nearby Las Vegas, as well as a ten mile section built specifically so materials could be transported to the site. Lastly, was the nearly 230 miles of power lines originating in San Bernadino California, which supplied electricity to the Boulder Canyon Project.¹⁵ Only then, did they begin excavation of the actual earth around the proposed location.

First, the mighty Colorado needed to be diverted. Achieving this feat alone was no easy task. Four tunnels were blown through the walls of Black Rock Canyon, each fifty feet in diameter.¹⁶ These tunnels took the water around the construction site which was located in the gorge between Nevada and Arizona.¹⁷ More than 5.5 million cubic yards of earth were removed from the site in preparation for development. Next, another million cubic yards of stone was placed in the construction site before the concrete was poured. Hoover Dam is a concrete arch style dam, with the water load held by both gravity and the horizontal arch. 21,000 laborers worked on site, pouring 160,000 yards of concrete per month for a total of 4.36 million total cubic yards throughout.¹⁸

Hoover Dam, and the Boulder Canyon Project, started with the premise of saving flood-ravaged areas. Unseen consequences have included the displacement, dismissal and devaluation of American indigenous natives, the diminishing, to absolute eradication of nutrient rich silt deposits along the banks, as well as prolific erosion of riverbanks. The dam and consequent lakes also facilitated vital irrigation to an area ready to erupt with agronomy. Regrettably, the environmental debacle lies in the type of habitat around Hoover Dam, forced to endure an agricultural boom with soil non-conducive to the crops introduced and pushed for decades thereafter. This is only one of the many complications of hydroelectricity. Environmental sustainability was not considered; and not only the sustainability of the dam itself but

¹⁵ Bureau of Reclamation, "Hoover Dam," *Hoover Dam, Bureau of Reclamation*, accessed September 29, 2020. <https://www.usbr.gov/lc/hooverdam/faqs/damfaqs.html>

¹⁶ "Boulder Canyon Project Act (1928)" *Our Documents Initiative: National Archives and Records Administration*. Accessed September 29, 2020. <https://www.ourdocuments.gov/doc.php?flash=false>

¹⁷ Bureau of Reclamation, "Hoover Dam."

¹⁸ *Ibid.*

of the biome and habitats it accompanied. Early Twentieth century American Civil projects, while beneficial to citizens, would not have seen the same kind of environmentalist forethought as today. Hydro-power plants, when erected in the wrong location are far worse for the environment than the production of fossil fuel energy they help prevent. Hydro energy is considered “sustainable” because its “renewable”, unlike fossil fuels; but as water levels deplete, the situation for Hoover Dam and the Colorado basin become more dire. Hoover Dam’s hydro power plant is not sustainable long term. As the basin dries, the consequences of poorly engineered agricultural conquests are apparent. A common theme it would appear for early American farmers out west. Desertification is a sweeping problem worldwide. Hoover Dam is a contributing factor to this creeping plague of increasing deserts and the disappearance of arable lands.

Skeptics of Global Climate Change preach that the earth’s natural tendency to warm and cool over periods of time is natural. Scientists say many changes await, and none are more obvious than the upswing in cataclysmic weather events. Desertification is an example. Desertification is not always this slow, centuries-long evolution. Contrary to popular belief, desertification is not synonymous nor comes automatically with drought. It is actually the mismanagement of land during times of drought. The residents of the Southern Plains of the United States found this out relatively fast, in an event that today we call the “Dust Bowl”. At the time of Hoover Dam’s construction, United States farmers were just barely emerging from this similar agricultural disaster of the early twentieth century.

Historically, the Great Plains of the United States were covered by a moisture holding plant called buffalo grass. Stretching from Canada to Southern Texas and wedged between the Missouri River and the Rocky Mountains, the terrain is windy and flat. The soil however, held the water well enough to feel sogginess only twelve inches down. It perfectly resisted the constant wind and was food for the bison who grazed there in mass; with roots that stretched up to five feet below the ground. After the buffalo were nearly eliminated, and the Native Americans forced to reservations, US government promoters deceitfully promised potential homesteaders limitless possibilities in the West. Flocking by the thousands, drawn by the dreams of owning and working their own land, the earliest American residents of the plains states arrived to find a climate where it was nearly impossible to cultivate crops. With

rain rare, coupled with the constant wind, it was too dry to legitimately pursue agriculture, but they had no choice. So they pursued it anyway.

In 1907, the Southern Plains began a wet period. Unscrupulous real-estate agents, and climate “experts” persuaded potential buyers to purchase land, telling them the climate was undergoing a permanent change. Agents told them the wind was slowing down and the rain could actually penetrate the soil better if they cleared the buffalo grass. Wheat became a cash crop almost overnight. World War One proved easy inspiration, as the German blockade of Russian wheat caused a worldwide shortage. In five years, more than eleven million acres of virgin soil were plowed up to begin to grow wheat in the Great Plains, with farmers claiming, “wheat will win the war.”¹⁹ The 1920s proved to be a great time to be a wheat farmer in the plains of the United States.

The stock market crashed October 29, 1929. It wasn’t long afterwards that the first (recorded) dust storm hit Texas in 1932. The storms were frequent thereafter, sometimes every day. Their presence filled the horizon from ground to sky with a black cloud of dirt that could deposit up to three feet of sediment in their wake. As the climate of the plains returned to normal after the wet period, drought followed. The land, previously held in place by moisture dense buffalo grass was now easily lifted in the air by the ever-present plains winds. Daily storms were devastating to both the agricultural boom there and quality of life. Dust pneumonia killed thousands, parents sent their kids away to live with relatives and when the farmers finally fled the plains, they were met with contempt everywhere they landed. It was obvious that Americans placed heavy value on the success of their farmers. The refugees from the Dust Bowl were treated as utter failures.

During the Great Depression, in conjunction with the dust storms in the plains states, a huge mass migration of families emerged from the dead farms of the Great Plains. Nearby, California’s population exploded by nearly twenty percent.²⁰ Regardless of where they arrived from, what their occupation was, or how much money they had, the plains migrants were given one, all encompassing, derogatory nickname. They were called, “Okies.” They were sneered at for talking different and segregated from daily activities, the same as African Americans were. “There was a

¹⁹ “Wheat will win the war,” *The Dust Bowl*, directed by Ken Burns (Washington, DC: PBS, 2012).

²⁰ *Ibid.*

sign in the movie theatre in the central valley of California which basically said, 'Niggers And Okies Upstairs.' Another which read, 'Okie go back, we don't want you.'²¹ They stayed in ramshackle roadside tent cities called "Little Oklahomas", "Okieville", or "jungles", and worked as migrant farm workers on the big agricultural farms in California's Central Valley. Mostly starving and grossly underpaid, families struggled to have basic human necessities. Author, and Dust Bowl refugee Sanora Babb wrote in her memoir, *Whose Names Are Unknown*, "These simple rights are part of the heritage of Americans. It is difficult for them to understand that none of them remain. Their whole lives are concentrated now on one instinctive problem: that of keeping alive."²²

A precedent for the poor and poverty discrimination had already been set. President Hoover was navigating his way through decidedly turbulent waters during the Great Depression. The stock market crash and the ensuing financial crisis caused widespread poverty, but the president believed in limited federal government intervention in the economy. Because he was himself "self-made" in terms of wealth, Hoover believed that it was only going to be through hard work that the poor could extract themselves from their impoverished state. Because of the lack of government intervention, those suffering began to blame Hoover for not helping them. Shantytowns on the outskirts became known as "Hooverville", and the newspaper blankets they used to keep warm were called "Hoover Blankets." The connection between a lack of government compassion for people, and the suffering of those affected by political bulldozing strategies was obvious. This era was one plagued by minority exclusion. People were puppets at first of the US government, only to be thrown aside. The extermination of the buffalo grass, buffalo, Native Americans, wheat farmers followed by a second wave of repulsion for the Native Americans was another way powerful politicians would let nothing stand in the way of progress, no matter who they used and steamrolled in the process.

Anti-immigrant sentiment existed even between states. Nature was blamed for bad luck, and humans migrated to where the food was, bringing with them a southern culture not understood and thus feared in California. The fear of encroaching or new traditions put local residents on edge, and the farmers were

²¹ Ibid.

²² Sanora Babb, *Whose Names Are Unknown* (Norman, OK: University of Oklahoma Press, 2004).

blamed for ruining land which should never have been tilled to begin with. Dust distribution, remnants of the Dust Bowl, from lands well south of the disappearing snowpack in Colorado are definitively to blame for multiple facets contributory to the drying of the Colorado River Basin. The color of dust attracts sunlight being that it is darker than snow, accelerating the melting process and preventing accumulation.²³ According to the United States Geological Survey, peak snow water is accumulated two to three weeks earlier than it was in the 1970s, and snowmelt timing is accelerated 17-18 days from 1993.²⁴ Multiple sites within the Rocky Mountains were measured. Continuous measurements of snow sublimation indicate a seasonal loss of anywhere from 2-30 percent of annual snow water equivalent.²⁵

The ramifications of irresponsible agricultural procedures and thus desertification is ravaging the western United States today. This includes the most important swaths of land designated for growing irrefutably essential amounts of our food and produce products. Additionally, as per agreements like the Colorado Compact, water from the Colorado must not be impeded in any way from flowing at original levels through lands (mostly reservations) designated to Native Americans. Hoover Dam is responsible for the redirection of enough water, that it is catastrophically harming the water table and environment of the western U.S.²⁶ The

²³ Graham A. Sextone, "Colorado River Basin Focus Area Study: Snowpack Hydrodynamics," *United States Department of the Interior*, April 16, 2016. Accessed October 22, 2020.

https://www.usgs.gov/mission-areas/water-resources/science/colorado-river-basin-focus-area-study-snowpack-hydrodynamics?qt-science_center_objects=0.

²⁴ *Ibid.*

²⁵ *Ibid.*

²⁶ This type of large scale, (literally) astronomical damage is common with these behemoth dams. Another example is The Three Gorges Dam along the Yangtze River in China. This is the largest dam and hydroelectric facility in the world. It displaces an obscene amount of water. So much in fact that according to NASA, the lake behind the dam disrupts the lunar relationship between the earth and the moon and elongates the earth's day by .06 microseconds. These facts are humbling; enough to make one ponder their insignificance on earth, and reflect on the ramifications of these massive hydroelectric facilities at the very least. Even more disturbing are the consequences of disrupting the habitat and ecosystems surrounding these architectural monstrosities. The primary function of the Three Gorges Dam was invariably similar to the goals of Hoover Dam and the Boulder Canyon Project. They wanted to protect downstream towns and cities from the river's unpredictable and damaging floods. The three major cities Three Gorges is supposed to "protect" are Nanjing, Shanghai, and Wutan. Yes, the epicenter of the 2020 COVID 19 (Coronavirus) worldwide pandemic. These connections are not accidental. In our quest for bigger and better, humans in the Anthropocene have found loopholes in nature's laws, racing to the deepest, darkest and farthest reaches of our planet. Our ingenuity is leading to both great things as well as terrible, like Global Climate Change and the emergence of super bugs resistant to bacteria. COVID-19 may not be the direct result of the Three Gorges Dam, but the market where it emerged, including animals and meat sold there have certainly been affected by the changes made by the people that live there including the largest dam on the

water levels in Lake Mead have been consistently falling over the past decades. Less than twenty years after Hoover Dam's construction, years after being relocated to reservations in the eastern part of Arizona, the Navajo Native Americans and four other tribes took their Colorado River water allotment grievances all the way to the Supreme Court in a case called *Arizona v. California*. With water necessities for both a growing population of people and crops, California's water usage was always side eyed by the rest of the Colorado Compact signatories. In the original case, called *Arizona I*, the US government stepped in to intervene on behalf of the five tribes looking to secure a future for their water. The verdict was that the government would uphold their agreement with the Native Americans as put forth in the Colorado Compact, securing allotment rights. However, the courts added that the water levels could be open to adjustment, conveying their concern for a lack of settlement of boundary disputes. In the second half of this case, (*Arizona II*) the Quechen tribe, had to give back 25,000 acres of land to the US government in order to make sure their water needs were guaranteed.²⁷ If the US government had not yet effectively humiliated the Native Americans, this was surely another large blow. Dam construction is notorious for burying history and cultures, among other things.²⁸ As an aside, a world away, the Egyptians faced similar struggles at almost the exact same time as they constructed the Aswan High Dam during Nasser's regime.²⁹

planet. For more information, please consider this source: Staff, E&T editorial. "China Officials Insist Three Gorges Dam Is Safe, as Online Rumours of Collapse Rise," *RSS*, July 9, 2019. Accessed September 30, 2020. <https://eandt.theiet.org/content/articles/2019/07/chinaofficials-insist-three-gorges-dam-is-safe-as-online-rumours-of-collapse-rise/>

²⁷ *Arizona v. California*, 531 US. 1 (2000).

²⁸ Zombie diseases emerge all the time. Called "zombies", they are presumed dead, but they are in fact not dead at all and re-emerge at a later date. Global Climate Change has a part to play as well, although not always. A recent example occurred in 2016 in Siberia. According to George Stewart, a medical bacteriologist at the University of Missouri College of Veterinary Medicine, an outbreak of anthrax killed more than 2000 caribou and sickened thirteen people. They caught it from 75-year-old spores stored in the ground, which were released due to the permafrost melting. If humans continue the magnitude of projects like Hoover Dam or Three Gorges, or even just our large fossil fuel consumption, there is a distinct possibility we are reaching heights of achievement or depths for that matter, holding secrets which should stay buried or at the very least, less disturbed. For more information on this please consider the following source: Stephanie Pappas. "'Zombie' Anthrax Outbreak in Siberia: How Does It Kill?" *LiveScience*. (August 2, 2016), Accessed November 20, 2020. <https://www.livescience.com/55621-zombie-anthrax-kills-in-siberia.html>

²⁹ Lake Nasser was formed behind the Aswan High Dam in Egypt in 1964. During ancient times in Egypt, immense garrisons existed along the banks of the Nile River. Their purpose was to intimidate anyone entering the country and to monitor vital trade routes from the South. The garrisons were all located within sight of each other so that if something went awry, reinforcements were never far away. The most grand of these military outposts was located in upper Nubia (now Sudan) very close to the

In western America's infancy, in order to facilitate the development, and support the massive influx of people flocking west, new infrastructure was implemented to carry water to and nourish people and their agricultural conquests. The Colorado River, Hoover Dam and subsequent irrigation pipelines can be understood in the context of these developments. Today, one of the major issues facing modern engineers at many aging civil project sites, are the hundred-year-old underground pipes, with even older technology. Contemporary humans owe a fair amount of our inspiration for water distribution to our ancient Roman ancestors. They were pioneers in water management, burying their pipelines and aqueducts so that the land may be otherwise utilized above ground for dwellings, roads, or agriculture. Today, as in ancient Rome, the damage done by unseen pipes (broken or otherwise) is just as bad, costly and usually noticed well beyond the timeline of an easy or cheap, or health-conscious repair.

The ramifications of these potential pipeline mishaps are only felt when something goes awry, and usually when it does, large amounts of money are needed to address often catastrophic damage due to the unseen (underground) issue. An example faced in ancient Rome was lead leakage even though they didn't know it at the time. Hundreds of Roman pipes were made of lead; some of them stretched for

border of Egypt. It was called the Fort at Buhen. The fortress covered 13,000 square meters, and could house over 3500 troops. The walls were 16 feet thick and 33 feet tall, spanning 490 feet along the shoreline. In 1964 Egypt began construction on two dams, the upper and lower Aswan Dams near these ancient sites. Archaeologists warned the Egyptian government that priceless historic sites would be destroyed if the dams were completed, including the garrison at Buhen. When the government offered no signs of stopping their project, UNESCO formed a campaign in March of 1960 to save the relics from the Buhen site. For more information please consider this source: "Buhen." SFDAS. *French Archaeological Unit Sudan Antiquities Unit* (March 16, 2017), Accessed November 10, 2020. <https://sfdas.com/publications/ouvrages-specialises-en-ligne-ouvrages/article/buhen?lang=en> It became a tourist attraction and rescue mission all in one. A few of the artifacts including the entire 18th dynasty temple were dismantled and moved to the National Museum of Sudan in Khartoum, but the site could not be entirely excavated in time for the completion of the dam. The construction on the dams finished in 1970 along with the formation of Lake Nasser, the reservoir behind it. Lake Nasser completely submerged the entire site of the Buhen fort. As long as there is a Lake Nasser, the remnants of one of Egypt's ancient neolithic monuments will remain submerged in its own watery tomb. Today, the only visitors swimming past its vast walls are the once endangered Nile Crocodiles, whom have made a drastic comeback as the lake offers them a newly protected habitat rich in freshwater food sources. This may be good news for the crocodiles, but as ecologists may argue, the repercussions for just this one animal, a predator with no other natural enemies can change the face of a habitat forever. A statement that people are most certainly not alone in being affected by these dams. For more information please consider this source: Dr. Jan Geisbusch, "Buhen: An Egyptian Fortress in Nubia," *Egypt Exploration Society*, Accessed November 10, 2020. <https://www.ees.ac.uk/buhen-an-egyptian-fortress-in-nubia>

more than 1750 meters, or 5,742 feet.³⁰ Thankfully (to some extent) for the Romans, their water had a heavy concentration of calcium. Calcium deposits lined the pipes and prevented lead from leeching into the supply, but not in the standing water. Evidence of lead deposits in skeletal remains found in Roman archaeological sites suggest lead exposure was common.³¹

Hoover Dam was not built with lead pipes. Instead, the dam's engineers used steel, which was stronger and safer than any available material at the time. The problem with steel is that it corrodes when exposed to moisture and oxygen for prolonged periods of time. There is a lot of both at Hoover Dam. Additionally, with pipes and considerable infrastructure below ground, the corrosion of the steel is worrisome to say the least.³² It is not merely that people won't know there is an issue until the structure exhibits signs of flooding or inefficiency, but the other areas of corrosion which have remained undetected:

Corrosion is the destructive attack of a material by reaction with its environment. The serious consequences of the corrosion process have become a problem of worldwide significance. In addition to our everyday encounters with this form of degradation, corrosion causes plant shutdowns, waste of valuable resources, loss or contamination of product, reduction in efficiency, costly maintenance, and expensive overdesign. It can also jeopardize safety and inhibit technological progress.³³

The fact that something as massive as Hoover Dam could structurally falter due to archaic technology like rusty pipes is daunting on its own. Additionally, the habitat around the dam is suffering due to both depletion of the aquifers in surrounding territory due to irrigation and the crater the dam created in the earth. The fault lines, or tectonic plates nearby are fairly active and pose an immediate threat to the

³⁰ Kathleen Lusk Brooke, and Zoe G Quinn. "Aqueducts of Rome, Italy," *Building the World Blog* University of Massachusetts Boston, (October 21, 2017), Accessed October 14, 2020. <http://blogs.umb.edu/buildingtheworld/waterworks/aqueducts-of-rome-italy/>

³¹ Ibid.

³² David Sedlak, "How Development of America's Water Infrastructure Has Lurched Through History." *The Pew Charitable Trusts* (March 3, 2019), accessed October 22, 2020. <https://www.pewtrusts.org/en/trend/archive/spring-2019/how-development-of-americas-water-infrastructure-has-lurched-through-history>.

³³ Kelly Wardlow. "About Corrosion and Environment," *Corrosion and the Environment*. Lehigh University (2002), Accessed October 15, 2020. <https://www.lehigh.edu/~amb4/wbi/kwardlow/corrosion.htm>

structure and the surrounding lands, habitats and inhabitants. Of particular interest is the Mead Slope Fault (MSF), which lies in Las Vegas, extremely close to Hoover Dam. Specifically, it is located on the southeastern side of Boulder Basin in the Lake Mead area of Arizona. According to the Arizona Geological Survey:

The MSF is one of a number of fault zones in the Las Vegas area that is geologically young (has evidence of late Quaternary activity), but the close proximity of the MSF to Hoover Dam is particularly concerning as it impounds the largest reservoir by volume in the U.S. and supplies water to millions of people in Arizona, Nevada, and Southern California. The NE-SW-trending Mead Slope fault system is one of several faults in the Lake Mead area that have accommodated substantial late Cenozoic left-lateral displacement.³⁴

The lands and peoples around Hoover Dam and the Colorado River are in danger of catastrophic injury from either natural or man-made disasters. The dam was a potential bombing target for the German Luftwaffe during World War Two. The dam is a sleeping giant. America's water infrastructure is old. Some of the foundational elements are left over from the very first investments. They are aging and in desperate need of replacement, but according to researchers at PEW Trusts, the United States government has been reluctant to invest in the water systems. The American Government has notoriously waited until systems have deteriorated to such an extent that they fail, at which point we have no option other than to repair and upgrade them. It is clear that the people who live near these large civil projects have obviously not been the US government's main priority. An example of these archaic and dangerous systems occurred just recently and to devastating effects in Flint Michigan.³⁵ According to US census data, the poverty rate in Flint, Michigan is 41 percent. This means that 41 percent of citizens are living below the poverty line, unable to provide for themselves what the government considers to be necessary daily care. In 2014, Flint city officials switched the city's drinking water supply to the Flint River. Upon doing so, millions of people were drinking water contaminated with lead

³⁴ JY Ben-Horin, "Mead Slope Fault Mapping, Lake Mead, Arizona," *Arizona Geology E-Magazine* Updated March 23, 2018. <https://blog.azgs.arizona.edu/blog/2018-03/mead-slope-fault-mapping-lake-mead-arizona>

³⁵ David Sedlak, "How Development of America's Water Infrastructure Has Lurched Through History." *The Pew Charitable Trusts*, updated March 3, 2019. <https://www.pewtrusts.org/en/trend/archive/spring-2019/how-development-of-americas-water-infrastructure-has-lurched-through-history>

resulting from archaic leaching pipes. When this crisis struck, state and federal officials repeatedly denied that there was an issue despite having concrete evidence that there was a problem. This health crisis is still ongoing, with residents of the city relying on NGO (Nongovernmental organizations) donated bottled water. The government ended their program to supply bottled water last year. The citizens are poor, suffering and *purposefully ignored*, and according to PEW Researchers this pattern of government negligence is common. Hoover Dam, as an appendage of the Colorado River, is similarly interfering with and poisoning the river. With the river's natural function disrupted, ecologies changed and volatile technology crumbling, each play a part in the tragedy both coming and current.

The Colorado River is a vital water source for many, not just those directly situated on its banks. This includes Denver, Colorado, Salt Lake City, Utah, Albuquerque, New Mexico, Los Angeles, and San Diego both in California for public water supply as well as the Imperial Valley in California for agricultural water supply. The river and its tributaries provide water for approximately 30 million people and irrigates nearly four million acres of agricultural land.³⁶ Currently, the Colorado's water supply is managed by a complex system of treaties, interstate agreements, international treaties and Supreme Court decrees.³⁷ According to the United States Geological Study, about 85 percent of all off-stream water use is designated for agricultural, with the majority of on source water being utilized for hydroelectric power. Total water use from 1986-2010, excluding inter basin transfers, averaged about 17 million acre-feet. The geological study also mapped the growth in human population to the Colorado River Basin, with the increase estimated at approximately 4.6 million people in 1985 to 9.4 million in 2010.³⁸ Today, 30 million people live there and depend on the Colorado River for water.³⁹ The water in the dams along the Colorado River supply ten percent of the nation's population with water.⁴⁰

³⁶ United States Geologic Survey. Colorado River Basin Focus Area Study. *United States Department of the Interior* (April 2, 2016) Accessed October 22, 2020. https://www.usgs.gov/mission-areas/water-resources/science/colorado-river-basin-focus-area-study?qt-science_center_objects=0

³⁷ Ibid.

³⁸ Ibid.

³⁹ "Population Growth," *Save the Colorado*, Accessed October 22, 2020. <http://savethecolorado.org/threats/population-growth/>

⁴⁰ David Sedlak, "How Development of America's Water Infrastructure Has Lurched Through History." The Pew Charitable Trusts, March 3, 2019.

The water level on the Colorado has been falling for the last ten years.⁴¹ Simultaneously, the western United States, from Texas to California have faced tragic droughts in recent years and they aren't alone. The allocation of water from the Colorado River for agronomy is staggering. Legal disputes over water allocation rights are increasing and not just in the United States.⁴² The Colorado River spans more than one country, as do many other rivers in the world.⁴³

Transboundary water sources and their associated politics have been a hot topic at the United Nations for decades. On December 8, 1970, the General Assembly adopted Resolution 2669, entitled "Progressive Development and Codification of the Rules of International Law Relating to International Watercourses." This Resolution probes the interdependency of nations and their freshwater resources dating back as far as 1959. In the 20 years that followed the 1970 resolution, many studies were done to research the effects of countries that share a source of water, especially fresh water. This means that the larger goal of the UN during these case studies had to be the creation of some rules on transboundary water sources. The UN Convention in 1997 was focused specifically on this exact issue and

<https://www.pewtrusts.org/en/trend/archive/spring-2019/how-development-of-americas-water-infrastructure-has-lurched-through-history>, accessed October 22, 2020.

⁴¹ Ibid.

⁴² One such river in the midst of a dangerous political volley is the Nile River, specifically the water located between Ethiopia and Egypt. The Nile River Delta is in trouble. A massive hydro electric dam called the Grand Ethiopian Renaissance Dam (GERD) is currently under construction on the Blue Nile in Ethiopia. If the project is allowed to continue its negative effects will be felt region wide as water and nutrient rich silt levels heavily diminish down river. As population numbers continue to rise, the livelihoods of the citizens of the Nile River Delta as well as the surrounding ecosystems are under direct assault by the greed of short-sighted politicians and government officials. According to the latest data from the African Community Advancement Initiative, half of Egypt's 80 million citizens live in the delta region. Of these 40 million people 29 percent of all their jobs in the area are related to agriculture, and 15 percent of Egypt's entire GDP is produced in this specific ecosystem. Farmers are currently facing an array of issues in the area from salination of underground water tables, to global climate change that threatens to raise sea levels enough to swallow 30 percent of the delta within the next 15 years. For more information, please consider this source: Daniel Donovan, "Egypt's Coming Climate Calamity," *US News and World Report*, April 3, 2018. www.usnews.com/opinion/blogs/world-report/2015/04/03/climate-change-is-consuming-the-nile-delta-and-egypt-with-it

⁴³ As the Ethiopians continue construction on the GERD they play god with 40 million people's water-source. It has been estimated that by 2025 1.8 billion people will be living in absolute water scarcity, which is defined as annual per capita freshwater availability below 1000 cubic meters a year. Additionally, two-thirds of the world's population could be living under water-stressed conditions with annual freshwater availability below 1700 cubic meters per capita. For more information on this subject, please consider this source: Inga M. Jacobs, *The Politics of Water in Africa: Norms, Environmental Regions and Transboundary Cooperation in the Orange-Senqu and Nile Rivers* (New York: Continuum International Books, 2018), 2.

on May 21, 1997 this came to fruition as the UN adopted a resolution containing norms that would hold countries liable for their actions on waterways that directly affected other countries dependent on the same shared water source.

These principles outlined strict guidelines for countries to follow stating that one country must give other countries the opportunity for negotiations regarding construction projects on shared water sources. The UN principle entitled the “No Harm Doctrine” also stipulates that watercourse nations must take all appropriate actions to prevent the direct harming of other watercourse nations. Lastly, the most blatantly ignored, is the principle of “Prior Notification.” It states that it is required that other riparian states are informed that a “planned measure might change the course or volume of water resources so that they might threaten the rights of riparian owners of the adjoining sovereignty a claim may be lodged...and thus the interests on both sides will be safeguarded”.⁴⁴

In 1944, the United States and Mexico signed a treaty which mandated that the US provide Mexico with 1.5 million acre-feet of water annually. The treaty also specified that on years when there was surplus that 200,000 additional acre feet would be given to the Mexicans. This treaty is managed by the International Water and Boundary Commission.⁴⁵ The point through which Mexico can access their share of the water on the Colorado River is located at Morelos Dam, between Los Algodones Mexico and Yuma County Arizona.⁴⁶ Consequentially, due to all the dams and man-made re-routing tactics along the river, the water rarely reaches its natural delta, the Gulf of California in northern Mexico. Subsequently, the citizens of Mexicali, Tecate and Tijuana have to ask permission and receive a water allowance. This need to request permission was especially degrading because these municipalities had to ask from a country that erected infrastructure to suit their own needs without taking into consideration that the water they usurped was not all theirs to take in the first place. Global Climate Change has played a role as well; beginning in 2007, Mexico realized they needed to review the treaty. A series of cooperative agreements between the US and Mexico were reached, determining that the United States must aid Mexico in the

⁴⁴Inga M. Jacobs, *The Politics of Water in Africa: Norms, Environmental Regions and Transboundary Cooperation in the Orange-Senqu and Nile Rivers.* (2012), New York: Continuum International Books. Forward pg. 12.

⁴⁵ “Colorado River Water and Mexico.” *Water Education Foundation*, updated October 2020. <https://www.watereducation.org/aquapedia/mexico-and-colorado-river-water>

⁴⁶ Ibid.

restoration of water amounts regardless of shortages. Most importantly, was one of the agreements called "Minute 319."⁴⁷ In the wording, Mexico agreed to take less water in years of drought but sought (and gained) the ability to store water in Lake Mead (the reservoir behind Hoover Dam) in years of surplus. The intention was to be able to bank water in Lake Mead for times of emergency and shortages. Ten years later, in 2017, Minute 319 was edited and finalized, becoming "Minute 323":

A continuation of Minute 319 called Minute 323 was finalized in September 2017. The agreement provides a continuous flow of water to the Colorado River Delta and expands the restored habitat area from 1,700 to 4,300 acres. Mexico will continue to store water in Lake Mead and both governments will provide funding and other resources for research projects along the border and throughout the region.⁴⁸

With aging infrastructure, tectonic activity and what would now seem to be a figurative handcuff to the wrist of another country, the United States is struggling to continue to repair their relationship with Mexico, their riparian neighbor. Another revival of Manifest Destiny is prevailing in this instance, monopolizing the water, livelihood and lives of millions of Mexicans; funding short sighted and expensive conciliatory efforts to remain in control of the Colorado River.

Agriculture economy includes plants, but a factor often and dangerously overlooked in the fight to save water are the growing herds of cattle and other livestock raised on ranches and feed supplied by the Colorado River. Animal agriculture is responsible for 51% of human caused global climate change. People enjoy eating meat, especially those privileged to have grown up where it is a staple of a daily diet. Technology and agribusiness have turned meal expectation on its head. Many Americans have grown accustomed to eating copious amounts of meat every day. Historically, meat was expensive: it was labor intensive, and it was special. This is no longer the case. The average porterhouse steak in a restaurant today is 16 ounces. The USDA recommended portion of meat per meal is 3 oz., which equals the size of a deck of playing cards. For fish, the portion should be the size of a personal checkbook.⁴⁹ That three-ounce piece of meat required 660 gallons of fresh

⁴⁷ Ibid.

⁴⁸ Ibid.

⁴⁹ Choose MyPlate." Choose MyPlate. Accessed November 2, 2020. <https://www.choosemyplate.gov/>.

water to produce. This includes both the water the animal drank as well as the water it took to grow the feed it ate. It takes 2500 gallons of water to raise one pound of beef, 447 gallons for one pound of eggs, and 900 gallons per pound of cheese.⁵⁰ Factory-style farming to feed a growing human appetite is sucking 300 times the amount of water needed from sources like the Colorado River. With government subsidies aiding the mass production of agriculture, US officials have a laser focus on maintaining America's GDP, rather than maintaining the lives of citizens. The current health crisis in Flint, Michigan underscores this point.

The Colorado River, Mexican citizens and existing habitats are suffering at the hands of procrastinating and indifferent United States government officials. Water allocation rights belong to everyone along the river or water source alike. At a certain point, complacency and currency have overtaken ingenuity and integrity. This formidable river has been around for six million years. Through ice ages and our ancient ancestors, this water source has carved a permanent place in the history books. Human's attempts to tame it await a centennial anniversary in the coming years, along with what will most likely be a difficult decision regarding a dynamic environment and vital ramifications involving the people which rely on it.

Globally, rivers and their names reflect the foundations of life as we humans understand them. The Volga River in Russia, originally named the Atil River, in Turkish translates to the word Attila, or father. The Mississippi, named by the Anishinabe people, of the Ojibwe Tribe similarly means, "Father of Waters." The Yangtze transforms to "Child of the Ocean." The Spanish named the Colorado which translates to "tinted red." Like the blood which flows through our veins the Colorado flows through North America. This red river holds a precariously important role, which has been essential to the survival, and development of both the foundation of the North American continent, as well as the United States as we know it today. Notwithstanding, is the relationship water has to people. As an essential element to life, the connection humans have to vital water sources is not just historically relevant, but socially. Like money, or other objects of wealth, water on the Colorado has been used to facilitate certain lifestyles, while ignoring others. The history of powerful and influential people often revolves around money, or valuables, but after observation,

⁵⁰ "Everything about California Water That Matters." *Water Education Foundation* (2017) (data from 1991), Accessed November 2, 2020. <https://www.watereducation.org/all-california-water-sources>

water has emerged as a key component to this story as well. The history of the United States, its business, its economy and its people could just as easily be called the history of the United States and its relationship with water. The Colorado River and the Hoover Dam do not reveal anything new about human nature, but expose an ageless power struggle among people, a tension between those who have and those who have not; a moment when a timeless choice was made between power and compassion. Jacques Yves Cousteau famously wrote that we should not ignore our water resources lest “we forget that the water cycle and the life cycle are one.” We did not forget it, but we definitely used it as power and leverage.