

From Hunter-Gatherer
To
Rancher-Farmer
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Abstract

Before there were people, there was only water; Sierra Miwok creation story (Fagan, 2003, p. 4). The mention of water as a precursor to life agrees with the Biblical text; "...the Spirit of God moved upon the face of the waters" (Genesis 1:2). These two cultures, half a world away from each other, recognized the value and importance of water.

This study provides high-level analyses that follows the paths taken by humanity from a precarious existence, scrounging in the dirt for whatever may sustain for the moment, to the small-scale crop farmers (USDA-ERS, 2013) of Goleta, California, in their struggle to manage their operations during the current water crisis.

Introduction

It would seem a foregone conclusion that virtually every living thing on earth must have water to live (Woolf, 2015, p. 259). Water is such an important component to sustaining human life that the United Nations has declared it a human right to have access to safe drinking water and sanitation (UN, 2010). Gleick (1996) reports that this same conclusion had been arrived at as early as 1977, when the Mar del Plata conference stated that "...all peoples, whatever stage of development and their social and economic conditions, have the right to have access to water in quantities and of a quality equal to their basic needs". Gleick (1996) further states that the 1992 Earth Summit in Rio De Janeiro strongly reaffirmed this position expanding it to include ecological water needs. Gleick (1996) recommended that a standard of 50 liters per person per day be adopted by all levels of government. This amount would vary depending the factors such as climate or culture.

Though there is an abundance of water on the planet, there are many who do not have a sufficient supply, or their source is at best questionable and at worst toxic (Gleick 1999). The reasons for this are many, but if we are to survive, we must overcome them to the extent that there is at least the bare minimum to sustain life.

Since 1944 the authorities in Goleta, California have been aware of the prospect of an issue with providing adequate water for their growing community. There have been efforts to engage policies and processes which were intended to meet the needs of flourishing agriculture and industry. However, the results have been less than satisfactory as successive drought events have left the city with a shortage of water (Goleta Water District, 2018).

The current drought condition in Goleta, California should serve as a wakeup call to the rest of humanity. This is not an out of the way location of minimal means and affluence; it is a city in a sought-after location that is well known for the celebrity residents and vacation destination.

The planet earth may well be on an irreversible course to worldwide fresh water scarcity. The forces of nature (solar and cosmic radiation, volcanic action, climate change, et al) combined with human eco-exploitation has driven the ecological context to a state as yet unseen in the historical and geological record (Craig, 2010, p. 13).

Detailed analysis of the circumstances of the Goleta drought offers lessons that may be applied to other locations.

Human Needs

Water

Gleick

In 1996, Peter Gleick published *Basic Water Requirements for Human Activities: Meeting Basic Needs*, the findings of exhaustive research into the various human uses of water. His results gave exacting details of the several purposes of water, including drinking, food preparation, bathing and waste disposal (Gleick, 1996, p.83-85). At the time of his writing, Gleick stated that there had been no satisfactory analysis of the additional use of water related to the processes of growing food necessary to meet the minimum caloric requirements for human survival (Gleick, 1996, p.86). Hence, the actual value required for this critical function could then only be estimated.

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Gleick concluded by stating that there are efforts afoot to address the issue of meeting basic human needs for water (Gleick, 1996, p.88). These included efforts to integrate environmental issues as well as sustainable economic and social development. This produced the concept of "Basic Water Requirement" (BWR) whereby access to at least 50 liters of clean water per person per day (l/p/d) should be considered a fundamental human right (Gleick, 1996, p.90).

In 1999 Gleick published a continuation of the 1996 paper with fresh data and a new title: *The Human Right to Water*. The 1996 data indicated that nearly one billion people lacked access to the standard specified as the BWR (Gleick, 1996, p.88). During the interceding three years that number had exceeded one billion. Gleick further states that almost three billion people do not have access to adequate sanitation facilities. These conditions were believed to lead to substantial, unnecessary human suffering which was preventable. At the time it was estimated that 14 to 30 thousand people were dying daily because of water-related disease; most of these being the young or elderly (Gleick, 1999, p. 2).

Gleick posits that "in some ways this right to water is even more basic and vital than some of the more explicit human rights already acknowledged by the international community, as can be seen by its recognition in some local customary laws or religious canon" (Gleick, 1999, p. 2). Gleick enumerates various acknowledgements from this body dating as far back as 1948. None specifically speaks to a fundamental human right to access adequate clean water however. Gleick poses the question, "is water so fundamental a resource, like air, that it was thought unnecessary to explicitly include reference to it at the time these agreements were forged?" (Gleick, 1999, p. 4).

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Gleick concludes with a formulation which would be suitable as a component of the declarations of human rights extant:

“All human beings have an inherent right to have access to water in quantities and of a quality necessary to meet their basic needs. This right shall be protected by law.” (Gleick, 1999, p. 11).

World Health Organization

The World Health Organization (WHO) report on the Ecosystem and Human Well-Being (Corvalan, C. Hales, S., & McMichael, A. 2005) indicates that the WHO assessment team came to essentially the same conclusion as Gleick, stating, "for the human species and all other forms of life. Human biology has a fundamental need for food, water, clean air, shelter and relative climatic constancy" (p.1). Further, the team specified similar values for the minimum amount of clean water for each person.

United Nations

The efforts of Gleick, et al, contributed to the United Nations' eventual passage of resolution A/RES/64/292, The human right to water and sanitation on August 3, 2010 (UN, 2010, p. 1). The resolution acknowledged the import of equal access to clean water and sanitation as a fundamental element of basic human rights. It further affirmed the duty of governments to promote and protect this right. To that end a commitment was made by the signatory states to achieve the requirements of the Millennium Development Goals; to reduce the number of people who do not have access to safe water to half the value by 2015 (UN, 2010, p. 2). In October of the following year the UN Human Rights Council passed A/HRC/RES/18/1, The human right to safe drinking water and sanitation.

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Perhaps with these standards in mind, the state and local government of Goleta and federal government of California have made efforts to provide governance over the watershed which supplies the Goleta area.

Food

At least since the beginning of the current inter-glacial period, human need for a regular supply of specific nutrients can be seen in various forms. The analysis of hair samples from ancient human populations compared to those of present day indicate little change in the chemical makeup. (Macko, et al, 1999, p. 65). Bone fragments tell a similar story (Richards, 2002, p. 3).

This data stands in stark contract to the ancient ancestors of humanity. Evidence for that period mainly is in the form of the stone tools used for food preparation (ca 300,000 – 500,000 years old). These artifacts indicate a focus on animal proteins (Richards, 2002, p. 4). Prior to this age the dietary regimen was primarily plant based (Konner & Eaton, 2010), Thus, this period would indicate transition from pure gathering/foraging to hunting; that is, from herbivore to carnivore/omnivore.

Hunter-Gatherer, Farmer-Rancher Transition

The Paleolithic age, ranging from 2.6 million years ago, to 10,000 years ago, mark the drastic change in hominid existence (Richards, 2002, p. 4). The hardy souls that emerged from the last major glacial period discovered that the hard, indigestible objects in the foraged crops, would miraculously sprout into plants, producing the same fruit or vegetable. What drove each tribal unit at the various geographically dispersed population of what would one day be Europe, to adopt, first, a simple, primitive form of agriculture, and then to add various species to the

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menu, is still debated (Price, 2007, pp. 100-103). For the California Paleo-Indian groups, the conversion is thought to have followed the extinction of large animals). This was likely a result of a combination of both climate change as well as excessive hunting by humans (Fagan, 2003, p. 59).

As late as the fourteenth century CE, the Californian central coast inhabitants were still exhibiting the practices of hunter-gatherers, mainly with respect to the use of seafood (Moratto, 1984, pp. 247-248). This appears to have been a practice continued from the mid Neolithic age, where the Channel Islands were a base of operation with easy access. At the time the sea level was such that the coastline extended out approximately an additional 20 miles, making the islands a mere 6 miles away (Fagan, 2003, p. 102). As the sea level rose and stabilized, the distance from island to shore resulted in permanent settlements. Middens found on the islands indicate either long term habitability or a short-term camp for specialized processing of various sea life intended for sustenance (Moratto, 1984, p. 247).

In either case, the littoral seafaring method provided a significant portion provisions of seafood of those who would become the Chumash tribe. This process would be employed from the middle of the Neolithic age (Moratto, 1984, p. 247) to the centuries immediately prior to the European invasion (Moratto, 1984, pp. 247-248).

Late in the Neolithic age, climate change impacted the fauna such that dependence on foraged plants became the norm; one of the main staples was the acorn (Fagan, 2003, p.25). The fifteen species of oak, that flourish in California could be expected to provide a generous yield each autumn. Though the humble acorn was not a panacea, it was at least an abundant and easily stored commodity (Fagan, 2003, p.29).

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The full picture of the transition from basic hunter-gathers to rancher-farmers, along with much of the past of California, is clouded by archeological data mangled by the so-called “progress of man” (Fagan, 2003, p. ix) and a historical record that tends to paint the European invaders as saviors for the indigenous tribes; in the location of concern, that would be mainly the Chumash tribe. The enslavement and attempt to enculturate the Chumash to European social norms (Fagan, 2003, p. 10).

By the time of the European invasion the Chumash had a well-developed process for tending the native flora of the California Central Coast. The recurring weather variations, having been noted over the years, were used as a timetable for various tasks to maximize utilization of the respective resource (Anderson, 2005, p. 51). What, in the mind of the ill-informed European appeared to be foraging, was a well-defined and calculated process, scheduled to coincide with specific weather changes (Anderson, 2005, p. 53). That the produce was foreign to the conquistadores perhaps led them to believe these “Indians” were ignorant savages?

Impediments

The difficulties endured by our ancestors entailed issues that present day citizens of developed nations could hardly comprehend. When a natural disaster occurs, such as a hurricane, wild fire, flood or earth quake, we, the privileged of the first world, feel a very slight level of that stress.

This authors wife was born and raised in the Cordillera Mountains on the island of Luzon, in the Philippines. Her family were (and are) subsistence farmers. While she was growing up the closest electricity was a several kilometers walk through the woods on a footpath, since there were no roads. Ignoring the recommendations of her family to quit wasting time with

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school, she moved to a location where she was able to finish secondary education and then to the provincial capital to complete a bachelor's in elementary education.

The description she gives of the arduous days, sleeping in a small hut (parents, three brothers and four sisters) and cooking and heating water over an open pit fire, while trying to grow sufficient food for the family using only rudimentary hand tools is very much like that described by Fagan (2003, p. 297) and Moratto (1984, p. 360) for the early inhabitants of the California Central Coast as they strove to survive nature's obstacles.

The Western Pacific Ocean, famous for unleashing a dozen or more typhoons on the Philippines, would regularly destroy crops, and their simple, primitive homes. The droughts, wild fires and subsequent floods seen on the other side of the Pacific, would pummel the central coast of California, impacting the various tribal units with equal devastation (Fagan, 2003, p. 21, 26, 32).

With any circumstance of want there would invariably be the prospect of those who have not envying and in some cases, attacking those who had stocks of food sources. Details in the archeological record are only vague for these conflicts just showing evidence that the strife had ended (Fagan, 2003, p. 341).

Knowledge of the prospect of drought and/or famine, led to development of storage systems (Anderson, 2005, p. 53). Granaries were erected to store seeds of various sizes and provided a certain level of water resistance. Keeping grains dry was particularly important, since even a little moisture could allow bacteria or fungi to grow and spread, leaving the contents inedible (Anderson, 2005, p. 53). In addition, certain plants were used to line the structure, acting as an insect repellent. The outer walls were tightly assembled to minimize the possibility of entry by vermin.

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Coincident with the difficult times were the rise of chieftains; “Big Men”, as Fagan calls them, or aggrandizers. These exercised leadership skills to coordinate with the various “triblets” (a term coined by Alfred Kroeber, Fagan, 2003, p. 147), to form alliances to share resources. While this effort can be seen to have minimized violence, the “Big Men” would also take advantage of the power to improve their lot above that of the rest of the people; hence, the moniker, aggrandizer (Fagan, 2003, p. 32). The definition of classes within the society invariably produced nepotistic elevation of leaders. Such that, wealth, as well as the influence that goes with it, would pass within a family or a circle of friends (Fagan, 2003, p. 149).

The implementation of what is essentially a natural system model, would present an additional impediment to the production and distribution of food (Scott & Davis, 2006, p. 30). That being the potential that a succeeding generation in a dynasty might be, and occasionally was, incompetent to the task of leading (Fagan, 2003, p. 150). And as with any form of social caste system there will always be those who are treated better than other. Thus, social injustice became a stowaway on the ship of state that was the Chumash tribal system (Fagan, 2003, p. 151).

In the end human ingenuity is thought to be driven by the varying climate and increasing population to invent the various processes and implements used in providing food (Glassow, et al, 2010, p. 203)

Net Impacts

The impediments to food production through the ages have not changed much. In our location of focus (California Central Coast, in general, and the city of Goleta, in particular) though there is no intertribal warfare, the issues of social standing can impact the ability for a

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specific operation or group to produce sufficient crops to be financially solvent. In the end it is the access to an adequate water source that determines whether there will be success or failure. This has ever been the driving force in agriculture; as some bumper stickers intone, “where water flows, food grows”. Water is the “life blood” of all living entities on planet Earth as well as all those species which have been long extinct (Ash, Hanson & Norman, 2002, p. 6).

Droughts bring death to humanity at various levels. First there is the obvious dehydration. There is also the famine that follows that brings death by starvation. Leadership may provide guidance that manages the various factors impacted by these cascading natural disasters. However, with the unpredictable nature of climate change, the complexities of this sequence can exceed even the best laid plans (Devereux, 2000, p. 4).

Global

Climate change is complicit in bringing about food shortages. Specific events include extremes in weather; heatwaves, droughts and floods. This is particularly an issue in developing countries as well as impoverished regions of developed nations (Pagdham, 2009, p. xvi). Combined with potential financial crises these climate driven events will have an elevated negative impact (Alwang & Norton, 2011, p. S140). These realities have a particular impact on the small-scale/smallholder farmers. With little or no governmental or collective supports the prospect of a cascading family catastrophe are very real (Alwang & Norton, 2011, p. S139).

These issues prevail in virtually every part of the globe. Efforts are underway in some nations to minimize these impacts by way of price controls. Nations of note include the Americas, Ethiopia, Egypt, Indonesia, Mexico and Morocco (Alwang & Norton, 2011, p. S141). In Mexico, the rural poor farmers are eligible for cash pay outs if their children will stay in

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school. In addition to the general support of the small-scale family farmers, there is the added benefit (and perhaps more important) that increasing school attendance, which enhances the possibility of the next generation rising out of poverty (Alwang & Norton, 2011, p. S144).

Since water scarcity plays a prominent roll in agricultural production it therefore has a significant negative impact on any farming operation. (Roco, et al, 2015, p. 958). The global nature of this scarcity is expected to become worse in the coming years (Sheffield, Wood & Roderick, 2012, p. 435). Water consumption by agricultural efforts tend to utilize most of water supply of any locality (Roco, et al, 2015, p. 969). It stands to reason that continued pace of climate change driven weather anomalies will affect the small-scale farmer at an increasing rate.

Local

As with water scarcity issues from around the globe, the circumstance in the Central Coast of California has been (Fagan, 2003, p30-31) and is (Hundley, 1992, p. 400-401) essentially the same. The early inhabitants, mainly the Chumash tribe, contended with droughts regularly from the age of hunter-gatherers to the eventual farmers of the acorn (Gamble, 2005, p. 93).

Despite the droughts, the acorn was an ever-present asset, due to the variety of oak species and abundance of natural groves (Fagan, 2003, p30-31). In addition, the El Niño-Niña cycle only marginally impacted the supply of seafood, thus providing sufficient sustenance for the tribe (Fagan, 2003, p32-33). Still, the relative lean times required agricultural and fishing processes to be well organized to ensure equitable distribution of food. In times of abundance the tribe operated in an egalitarian mode with little need for direction from the elders. As supplies

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lessened stricter organization was implemented by those known as the “Big Men” (Fagan, 2003, p178).

Today, the subsistence of the agricultural community is subject to the potential of the same natural disasters experienced by their predecessors (Solomon, 2010, p. 12). And, not unlike those “Big Men” aggrandizers of old, there are those who attempt to, and occasionally successfully, corner the water market through affluent connections, thus short changing the current small-scale farmer, who’s voice is too small to have any impact (Zenovich, 2017).

With public policy (regarding water scarcity) requiring the reduction in water use to all users, agriculture cannot continue to irrigate as they would during periods of normal water availability (Bachman, 2011). Without additional water from precipitation or private well, Goleta small-scale farmers are guaranteed to have lower crop yields (Steduto, et al, 2012, p.1).

During the current drought conditions, the per capita water use in California, at large, fell from 178 gallons per day to 130 (Mount & Hanak, 2016). With agricultural water use constituting 80% of all water use in the state, crop yields for farmers who rely solely on public utilities for irrigation, will have suffered to some extent. Fortunately, for the farmers sake, crop yield has improved in the decades since the late 19th century, because of greater scientific knowledge and application as well as advances in technology (Hanak, 2011, p.171).

Since small-scale family farms constitute 87% of crop production, the loss is no small issue (MacDonald, Korb, & Hoppe, 2013, p. iv). Analyses of small-scale farmers are few and far between. Jara-Rojas, et al (2012) speak to the improvements observed in those of Central Chile because of implementing water conservation practices. Amsalu (2006) addresses the use of stone terraces in Ethiopia and Sidibé restoration of degraded soils in Burkina Faso (2005).

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Though these studies are valuable in that they discuss different methods for improving any farming operation, they make no effort to express the human toll when even the best systems are employed during a condition of water scarcity.

Believers

Whether there is a transcendent reality beyond the empirical will not be debated nor resolved here. However, it is certain that, as the Chumash relied on 'Iwhi-nmu'u to bind them together for the common purpose of survival (Greenberg & Greenberg, 2013, p. 33) the organization of human effort should be oriented to a collective of common intent for the benefit of all. To the Chumash it was not a person so much as a personification of a sacred place (Loeb, 1926).

Conclusion

This miniscule monograph is certainly insufficient to the task of fully addressing the issues endured by the local small-scale farmers of Goleta, California. However, at least two things can be seen from this study, which are immutable; though humanity has certainly had an impact, the elements of this universe, especially our planet, mostly behave without any consideration for our benefit and the rudimentary animal nature of humanity tends to be self-serving.

The value of the small-scale farmer is not well understood by the general populace (Stumbos, 1993). Too often it is stated that, in California, agriculture uses 80% of the water but only contributes 2% of the gross product (Mount & Hanak, 2016). This comparison is the classic “apples and oranges” paradigm. According to the most recent data reported by the Bureau of Economic Analysis, the industries of Information Educational services, health care, and social assistance, Finance, insurance, real estate, rental, and leasing Government, Professional and

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business services, constitute a total of 62% of California GDP (U.S. Department of Commerce, 2018). Yet these industries clearly do not require water as a major contributor to their production whereas without water there would be no agriculture.

Water scarcity can be expected to be a consistent issue for the foreseeable future (Ingram & Malamud-Roam, 2013, p. 8). Water shortage began to be an issue of concern for about 2% of the world population in the year 1900. By 2005 that number had increased such that 35% of the world population was under a chronic water shortage condition (Kummu, et al, 2010, p. 1).

Ice core data indicates that during the last deglaciation (aka interglacial period) both global temperature and atmospheric carbon dioxide concentration of the plant increase significantly just before the onset of the last glacial epoch (Shakun, et al, 2012). Since our current period is essentially an interglacial period, it can be assumed that this behavior will be replicated.

With the continuing global drought, the state of California in general, and the city of Goleta have continued to experience a general state of water supply emergency (Goleta Water District, 2018). The requirements established by the Goleta Water District Board of directors stipulates certain reductions in water use by all users connected to the district supply system (Goleta Water District, 2017).

Though all are impacted by these restrictions, residential connections, the main users in the community (of which the author is a member), are not affected in a manner that would be a general danger to their lives or health. The primary issue to deal with is that of landscaping on personal property (Goleta Water District, 2014). However, in addition to the reduction in water

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availability from the Goleta Water District the sinking water table makes the natural subsurface supply harder to reach (Glazer, & Likens, 2012, p. 657). Thus, the implementation of drought regulations only exacerbates the problems experienced by the agriculture community. An ideal policy might consider the human value impacts rather than simple arbitrary percentages for reduction and set time-frames for watering allowance.

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