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Water Politics in a Water-Scarce Landscape:
Examining the Groundwater Debate in California's Central Valley



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Master's thesis in Global Environmental History

Abstract

Ali, A. 2020. Water Politics in a Water-Scarce Landscape: Examining the Groundwater Debate in California's Central Valley. Uppsala, Dept of Archaeology and Ancient History.

The history of California is in many ways a story about water, and the outsized effect that droughts, floods, and seasonal precipitation rates have had on the political and economic development of the state over the past 170 years. This thesis uses discourse analysis of historical and ongoing negotiations that have been presented in federal and state reports, narratives, case laws and legislation to explore how the discourse around water politics has been shaped in the state. From this, an antiessentialist environmental history develops around the relationship between overdrafted groundwater basins in the Central Valley and the agriculture industry located there. Finally, this thesis explores what the future of a waterscape built during the capitalization of modern society may look like as we move towards a new regime of nature.

Keywords: Political Ecology, Water law; Groundwater; California; Agriculture; Climate Change

Master's thesis in Global Environmental History (45 credits), supervisor: Anneli Ekblom, Defended and approved spring term 2020.

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1. Introduction

Is growing food wasting water?

That was the question emblazoned across billboards that popped up along California's I-5 highway in the fall of 2014. The I-5, one of the state's most travelled interstates, paves a straight path directly through California's Central Valley, the epicenter of the state's vast agricultural industry. With over 1000 miles of irrigated waterways crossing through nearly 10 million acres of land, the Central Valley is one of the world's most productive agricultural regions (Agricultural Issues Center 2009; Austin 2015). The agricultural abundance of the Central Valley has long been a source of economic wealth and power for California; however, its very success has also become one of the nation's greatest environmental dilemmas.

Because California has a water problem. Located along the Pacific Coast, the state is known for its abundant sunshine and year-round warm temperatures, but those qualities come at the high cost of increasingly severe water shortages. During summer months, less than an inch of precipitation falls statewide, with much of the annual water supply dependent upon winter snowpack and imports. By 2014, California was well into the third year of a statewide drought, along with many other parts of the arid American West. The summer of 2014 in particular had seen the worst three months of drought conditions in the known history of California, and the coming winter wasn't expected to provide much relief in the form of rain or snowfall. Most of the state, especially the farms of the Central Valley, was relying upon water stored in reservoirs and underground aquifers to meet their needs; but these, too, were draining quickly and refilling slowly. In fact, throughout the Central Valley, farmers were pumping groundwater so quickly and at such volumes that the aquifers were becoming critically depleted, and in some instances the ground was collapsing into them.

In an effort to establish better water practices statewide, three bills focusing on the regulation and management of groundwater were introduced in the legislature that year—SB 1168, SB 1319, and AB 1739. The bills, collectively known as the Sustainable Groundwater Management Act (hereafter referred to as SGMA) were voted into law in August 2014. SGMA was historically important as well, as it marked the first time that legislation about groundwater had passed in the state. Yet, it is important to pause here and consider why this new law come about so late; perhaps, as some argue, too late, given that the scarcity of water was known already in the beginning of the state's history, as I will show in the coming chapters. What sort of legal mechanisms and debate discourses allowed for groundwater to remain essentially unregulated through the state's 170-year history, despite a myriad of other water laws and countless previous drought periods?

These are the issues that underlie the first question that prompted this thesis: why did California only pass groundwater legislation in 2014, in the middle of a drought? From that question came many others: why was groundwater not regulated by the same laws that other state water sources were; and why, in a drought-prone region, was agriculture such a lucrative industry?



Figure 1. Billboard along California Interstate 5, reading “Is Growing Food Wasting Water?”, funded by Central Valley water advocacy group Families Protecting the Valley. Source: Screenshot from 2018 documentary *Shadow of Drought: Southern California's Looming Water Crisis*, directed by Bill Wisneski.

Finally, is growing food wasting water? The purpose of this thesis is not necessarily to answer that last question, though hopefully I can provide some critical insight into the topic; rather, I will analyze how agriculture has shaped the conversation about water in California throughout its American history. From the beginning of statehood in 1850 and the early promise of agricultural excellence, to the calculated water grabs of the 1920s, and through the recent debates leading up to the passage of SGMA in 2014, I will explore how food, water and water justice have been negotiated over time and how agriculture has shaped the water politics of the region.

1.1. Exploring water politics

The aim of this thesis is thus to explore the historical and current negotiations of rights to groundwater, as well as ownership of water and representation of water in California over the last 170 years. In drought-prone California, groundwater is a critically important resource; for some areas it is the sole source of daily municipal water, and during dry periods it supplements the residential and agricultural needs of the entire state. Often hundreds or thousands of years old, groundwater is freshwater that has soaked through topsoil layers and gathered in subterranean aquifers, where these natural reservoirs protect the water from evaporation and contamination. Yet despite the widespread dependence upon the resource, there has historically been very little regulation over its usage. In 2015 - one of the driest years of the most recent drought - data released by the California Department of Water indicated that the groundwater basins which were categorized as being in critical states of overdraft were all concentrated in the Central Valley, the center of California agriculture, as seen in Figure 2.

The questions posed in this thesis crosscut several fields including global food systems, urban food accessibility, industrial agriculture, and environmental law. Through earlier research on the topic of agriculture in economic growth, I was aware of the political importance of the industry in California, and SGMA to me presented the perfect case study for further analysis of the tension between capital gains and planetary limits to growth. Specifically, I will focus on the role of law and politics in negotiating this tension as it relates to groundwater use and its long history of negotiation in California. The policy that has been presented (SGMA) is

strongly influenced by its historical context, and here I try to draw out the main contestations and debates that have reoccurred in the state's history of water politics.

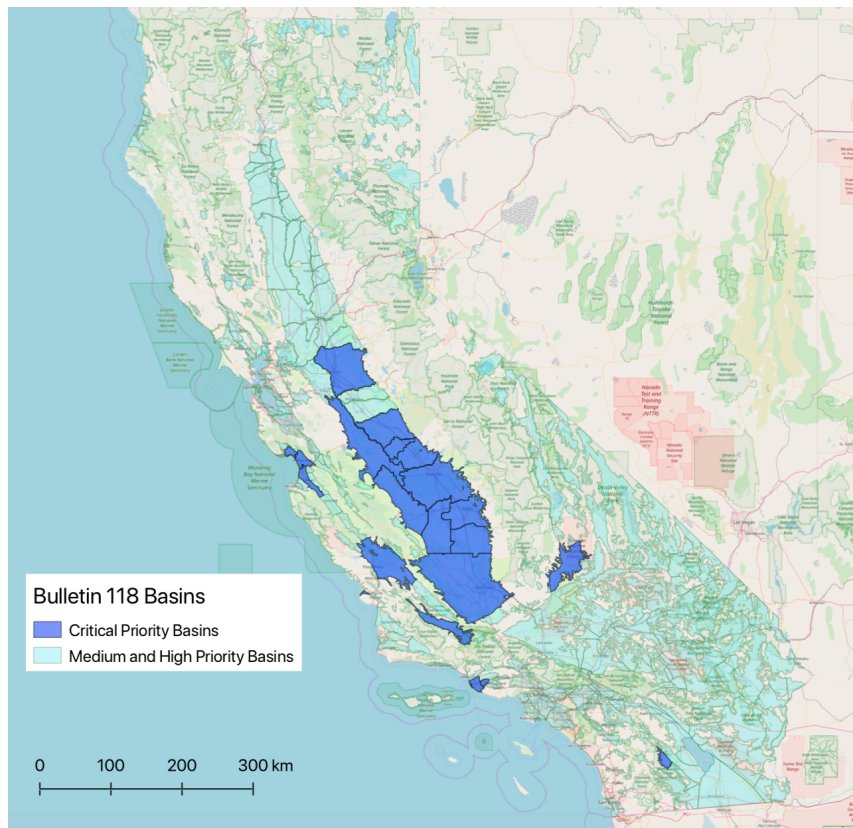


Figure 2. OpenStreetMap (OSM) of California with overlay of groundwater basins categorized by the California Department of Water (DWR) as medium- to high-priority (shown in teal) and critical priority (shown in dark blue). Map produced by the author (2019).

In doing so I will attempt to follow the steps towards developing an antiessentialist political ecology laid out by Arturo Escobar (see Chapter 2). I will explore how the legal institutions of the courts and the state Congress have made decisions regarding the management of groundwater historically. By examining how the legislation and decisions regarding groundwater management were shaped, we can better understand for whom and what interests these laws were intended to serve. Early contestations of water in California, such as the water wars of the 1900's, have been written about extensively; certainly, this historical background is important for understanding the more recent negotiations of water (see similar discussion in Reisner 1993). However, as an in-depth case here I have here chosen the most recently enacted water policy – SGMA – from 2014. The Sustainable Groundwater Management Act was chosen as the main case study for this thesis as it highlights an important tension in the field of environmental law between early conceptions of law as a tool to protect stakeholder interests and new uses of law to protect natural resources from stakeholder interests. The process, negotiations and responses to this law have not been studied before as intended here.

Finally, I will discuss the explicit effect of capitalism on California water law and policy, and what the recent shift towards resilience and sustainable development might mean for the future of the state and its' water. As stated previously, my intention here is not to answer whether or not it is the right choice for California to continue promoting and investing in agriculture – that question would require a much broader scope of analysis and many more stakeholder voices than what is possible for me to reflect within the limits of a master's thesis. My aim for this thesis is to sketch a narrative of the historical relationship between groundwater and agriculture, and the human interests that have so significantly affected that relationship, in

order to explore the main points of contestations and disagreements – an understanding that is important for the shaping of future water policy.

1.2. Outlining the thesis

This thesis continues with a chapter introducing the theories and methods that inspired my own approach to exploring this topic, including a more detailed discussion of Escobar's anti-essentialism and how this conceptualization has inspired the structure and questions posed in this thesis. This chapter situates the thesis within the field of environmental history and in particular motivated the narrative based form chosen for this thesis and my focus on narrative analyses presented in Chapter 5. Following this introduction to the structure, form and conceptualization of the thesis, the next four chapters represent four different ways of approaching the topic of groundwater legislation in California. Chapter 3 uses natural science to explain the conditions of groundwater basins in the state, and the role of climate and geology in the success of agriculture in the region despite a lack of water; this chapter provides necessary background information for the reader to be able to better contextualize the events discussed throughout the rest of the thesis. The subsequent chapters examine the development of California groundwater policy in greater depth. In Chapter 4, federal and state documents are analyzed to establish a timeline of events in the water politics of the state. The chapter also provide a managerial perspective on the core discourses around water and groundwater policy. Chapter 5 is a comparative narrative analysis of two popular books that discuss the topic of water in California. In comparing these two different sources, I also develop the historical context around events introduced in Chapter 4 and analyze how these events have been explained and represented outside of the official discourse. In Chapter 6 I examine the Sustainable Groundwater Management Act (SGMA) itself, along with early iterations of Groundwater Sustainability Plans and a supporting publication. I also discuss the debates surrounding the SGMA. Finally, in a discussion chapter I summarize and explore my findings more deeply, drawing in the theories and themes developed throughout this thesis, closing this thesis with my thoughts on the future of groundwater discourse and management in California.

2. An Antiessentialist Water History?

If the way a narrator constructs a scene is directly related to the story that narrator tells, then this has deep implications for environmental history, which after all takes scenes of past nature as its primary object of study.¹

It is often said that there are two sides to every story, but in truth, there are many more than that. In California where water has been a contested resource since its' beginnings as a state², there are many stories wherein the victor and villain are one and the same, depending on who tells it. Take, as an example, William Mulholland, a man renowned for having 'brought water to Los Angeles' through his engineering (both civil and political); he has both a memorial fountain and a street named after him in his city. Less than 300 miles away in Owens Valley, the area is still recovering more than one hundred years later after Mulholland's water grab of Owens Lake destroyed the town's environment and economy – you won't find any memorial fountains there. Recognizing the tensions in written records is central to the study of history, and especially so in environmental history. As the above quote suggests, the impact of stories in shaping human perception of the natural world is significant. As we look to the past to inform our decisions about the future, it is important that we understand why, how and by whom these stories were told.

This thesis pulls inspiration from several different academic fields in order to develop an analysis suitable for the complexity of the real-world situation. Writing a master in global environmental history, my specific inspiration comes from Cronon's call for the narrative(s) and negotiations of different representation of a human-nature dichotomy to be critically analyzed as a means of value-creation. Arturo Escobar's antiessentialist approach to political ecology was also a key source of inspiration in the overall framing of this thesis, reflected, for instance, in the structure of Chapter 4 and in the formulation of questions and discussion. Finally, this thesis draws from the study of law and specifically theories of natural law and environmental law, that has emerged as a new cross-disciplinary research field. Below, I will elaborate upon these inspirations and the concepts and methodologies which will be used further in this thesis.

2.1. Inspirations

2.1.1. Narratives and environmental history

In the field of environmental history, it is important to always consider the motivations behind a story's telling. The story that surrounds the historical subject, whether a landscape, or a species, or a resource - in this case water - becomes a narrative, shaping our perception of what nature is and has been. Thus, history as the study of past events inherently requires an

¹ Cronon 1992.

² Riparian rights were recognized by the state's legislature in 1850 when common law was adopted as the rule of the land; by 1851, the doctrine of prior appropriation had also received approval from the legislature. These conflicting laws were at the center of one of the most famous water rights cases and decisions in California history, *Lux v Haggin* (1884).

exercise in narrative analysis. In order to understand the lessons of history, we must understand what story is being told, by whom, and why telling the history of nature requires not only interpreting its own recordings—geological layers, fossil records, pollen traces, hydrology—but also the layers of narrative embedded within the story.

In building this thesis I have let myself be inspired by William Cronon's writings. Cronon introduced what is arguably the first narrative analyses on the subject of American environmental history³ with his seminal book, *Changes in the Land: Indians, Colonists and the Ecology of New England* (1983). Cronon's book was the first history of the American landscape written not as a description of nature separate from humans but as a dynamic account of the role of humans in landscape production, specifically the role of human social structures in environmental history (Hoffman *et al.* 2008).

By removing the distinction that had long existed between human and natural history, William Cronon acknowledged that human history is natural history and vice versa. As such, humans have a uniquely important responsibility when narrating nature and human relationships. Cronon presented this best in his 1992 article "A Place for Stories: Nature, History and Narrative" (from which the above quote is drawn), in which he conducts a comparative narrative analysis of two books about the 1930's Dust Bowl of the American Midwest (Cronon 1992). Quoting the closing argument of each, Cronon demonstrates how each author arrives at wildly different conclusions about both the causes and effects of the dust storms due to the main story they chose to embed the account in. The boundaries they use to frame their main story—temporal, spatial, and definitions of what is natural or artificial—delineate what is included in the narrative, but also, conversely, what will be excluded. In these examples, the authors create stories out of what the other has excluded, leading them to tell opposing histories about the very same past event, and this is the central issue for Cronon: the subjectivity of history. Despite genuine efforts to legitimize environmental history with science and fact, as humans "we cannot escape the valuing process that defines our relationship to it" (Cronon 1992). There are strong parallels here with the many ways an environmental history and water history of California can be told. As I will illustrate in Chapter 5, one story may tell of the agricultural industry's quest for water and success at any cost (cf Reisner 1986); an alternative version may describe how the shifts of American political ideology are evident in the built environment (cf Hundley Jr. 2001).

This multiplicity, as discussed by Cronon, should not be seen as a limitation of the field but instead an opportunity. It is this very opportunity from which my own thesis has emerged: we can learn a great deal from these stories and how they are being debated. It is through these various forms of storytelling that we make sense of the world, and while it is abundantly useful to have modern science to deepen our understanding of ecology and geology, it is only through narrative that we can understand the value and contestations of nature. As I will show here, the different narratives are also highly influential in shaping debates and understanding of water politics today.

³ While versions of environmental history as a field of study were already occurring in other parts of the world, I believe there is a degree of region specificity needed in environmental history studies. For example, an environmental history of the UK requires different considerations than that of the US, due to the far longer presence of industrialized human presence in the area. Or, an environmental history of a tundra will look different than that of an island nation. Therefore, while environmental history was not a new field in 1983, it was new to the U.S. in that this was the first time such ideas had been applied and with appropriate consideration given to the political and ecological specifics of the region.

2.1.2. Towards an antiessentialist environmental history

As with many narratives, there is usually a conflict around which this story organizes. In trying to understand the historical arc which this narrative follows, I have been inspired by Arturo Escobar's "After Nature – Steps to an Antiessentialist Political Ecology" (1999). Twenty years ago, Escobar referenced the idea that society had reached a point of being that is 'after nature' meaning that human development, both social and material, have led to a lack of faith in the existence of a nature that is pure and pristine (Escobar 1999). As will be exemplified here, the debates on water in California have little to do with the way the hydrological systems work or the physical water process and its effect in terms of underground storage, but more with the political contestations of what water is for and for whom. Given that nature as an idea is socially constructed, which differs between cultures and is dependent upon the human history of that society, Escobar suggests that the field of political ecology can offer critical insight into the "crisis of nature" (Escobar 1999, 1). The most simple definition of political ecology is that it is the study of the role of politics in environmental issues, but Escobar provides a more specific definition for the purpose of establishing a framework therefrom: "*Political ecology can be defined as the study of the manifold articulations of history and biology and the cultural meditations through which such articulations are necessarily established*" (Escobar 1999, 3). This definition purposefully avoids the words 'politics' and 'nature', thereby removing the specific cultural and social associations these words might bring up and instead reframe the field of study as something akin to environmental history, a study of the relational development of human and nature through continued interaction rather than something defined by certain constructs.

Building upon the concept of being 'after nature', Escobar outlines a framework – steps – which he suggests can be used to identify and evaluate three prominent regimes of nature that he has observed, and that can be extrapolated to account for variations on or combinations of these regime types (Escobar 1999). I will repeat Escobar's definition of these 'regimes of nature' here as I will draw upon them in my thesis and in particular in Chapter 4. Capitalist nature is the most widespread regime in the world currently and despite its name, its beginnings can be traced to the early 1700s, but the growth of capitalism changed human perspective⁴ so fundamentally that the regime is best understood in relation to the societies of production and modernity that developed around that economic system (Escobar 1999). Organic nature is the oldest regime as defined by Escobar; it refers to those systems in which cultural and local knowledge hold power, and in this regime the arbitrary distinction between humans and nature which Cronon sought to move away from was not present nor imposed (Escobar 1999). Societies which still exist within an organic nature regime, though few and far between, are often considered 'underdeveloped' by those which have already become capitalized (Escobar 1999). Finally, the most difficult to define regime that Escobar identifies is technonature, a system that is not widely present today but which is rapidly gaining power, rooted as it is in artificiality and virtuality; technonature may be the most post-nature future system we can readily envision at this point in time (Escobar 1999).

Escobar's 'regimes of nature' is to me an interesting parallel to Cronon's narrative analyses. Escobar's regimes remind us how the 'systems' we subscribe to are but yet another narrative trapping. In this way, Escobar's regimes can be understood as an extrapolation of Foucault's thoughts on regimes of truth and power, which examine the role of power structures in the creation of political discourse (Dean 2010). By examining the regimes of nature in which California groundwater laws have been developed, I can better understand the negotiation of

⁴ While capitalism as a system is not ascribed to in all parts of the world, arguably most all societies in the world have been impacted by it at this point.

narratives about the past and the impact this has on water management and legislation both historically and in the present.

2.1.3. Natural law and laws about nature

In “After Nature”, Escobar suggests that his framework of steps towards an antiessentialist political ecology stemmed from “*the need for a dialogue between those who study meanings and those who study “natural law”*” (1999, 3). Coming from the field of Legal Studies in my Ba background where I focused on U.S. constitutional law and having further studied water and resource law in this thesis, I strongly concur with Escobar. The need for this dialogue is perhaps nowhere as evident as in the confusion of laws that purportedly govern nature in California and the greater United States.

Environmental law, the field of law dedicated to protecting the environment and regulating resource use, is relatively new in the U.S. Environmental law was only established at a federal level in the early 1970s (in fact, the scope of the judicial power of environmental laws, particularly at the federal level, are still being determined). Prior to the establishment of a federal environmental legislation in the late 20th century, states could pass laws to protect or regulate resources as a part of their constitutionally delegated police powers⁵ (Alonso 1978). As long as a state law did not violate the commerce clause⁶ by interfering with interstate commerce, federal legislation was unconcerned with environmental issues (Alonso 1978). The impetus for change came when pollutants of the air and water ways reached critical levels, and it became clear that these pollutants did not adhere to state borders – the first substantive federal law regulating the environment was the Clean Air Act of 1970 (Lazarus 2001). Perhaps unsurprisingly then, the laws passed at the state level prior to the development of federal environmental laws were often not litigated out of concern for the environment but rather as issues of property rights or tort doctrines (Lazarus 2001). Much of the legal precedent regarding nature and natural resources was therefore determined by regarding nature solely based on the value it provided as a form of property to be used for capital accumulation (see De Soto 2000, p 47). In the case of groundwater protection in California, this meant that early laws to ‘protect’ the resource were passed at the behest of those who owned rights to the groundwater and sought to protect their own interests as stakeholders as I will discuss in Chapters 4 and 5.

Observing the recent efforts to calculate the monetary value of ecosystem services and to commodify nature in order to better preserve it, one may think that nature valuation is a modern condition caused by capitalism, but in fact it is rooted in religious, moral and legal theory. Thomas Aquinas, a Catholic monk who lived during the 11th century, was the first to develop the deontological theory of natural law that espoused that the supremacy of man over nature was God’s will (McInerney and O’Callaghan 2018; Binde 2001).⁷ However, meditations of this theory would become the basis for the divine mandate that proponents used to justify Manifest Destiny in the United States (Dion 1957). Manifest Destiny, the deeply held belief

⁵ ‘Police powers’ are ascribed to state governments to “establish and enforce laws protecting the welfare, safety and health of the public”, per the 10th Amendment of the United States’ Constitution (Cornell Legal Information Institute 2020).

⁶ “To regulate commerce with foreign nations, and among the several states, and with the Indian tribes” United States Constitution, Article I, Section 8, Clause 3. A violation of the commerce clause would in turn also be a violation of the supremacy clause (Article VI, Clause 2) which states that federal law supersedes state law and state law therefore cannot contradict or impinge upon federal law.

⁷ In *Summa Theologica*, Aquinas did not separate humans from nature in the manner that is commonly done today and which I have problematized here, but he did believe that in the hierarchy of nature in which man and animals and plants existed, “the life of animals and plants is preserved not for themselves but for man” (McInerney and O’Callaghan 2018). Aquinas’ theory of natural law does not actually focus significantly on the relationship between man and nature; rather, natural law theory is both a moral and legal theory that prescribes what man’s behavior (what ‘nature’ references here) should be.

that the (white) American people were chosen by God to go forth across the continent and settle it, pervaded society during the 1800's. A similar belief of divine supremacy can be seen in the efforts by European powers to colonize the world, but in the United States, Manifest Destiny grew from myth-like justification into legal policy. It was a particular source of inspiration for Thomas Jefferson, one of the Founding Fathers and the third President of the United States, whose Jeffersonian ideals were significant in developing American political ideology (this will be further discussed in Chapter 5). After visiting Europe, Jefferson remarked on the 'superiority' of America in a 1785 letter, writing that "*It will make you adore your own country, its soil, its climate, its equality, liberty, laws, people and manners. My God! How little do my countrymen know what precious blessings they are in possession of*" (Dion 1957). In this quote, which suggests that the landscape of America was not just something to be possessed but a blessing bestowed upon white American people, there are echoes here of Aquinas' much earlier thoughts on natural law. Elements of nature, plants and animals and soil and climate, were only as valuable as the profit or pleasure they provided to mankind.

I have chosen to include this brief summary of legal theory to demonstrate how deeply embedded law is in society, and therefore in the environment. As I will show in the coming chapters this aspect of legal theory pertains also to the California groundwater law. Laws define many of the parameters of nature abided by today, which environmental historians' now study, thereby ascribing meaning to nature reflective of the society that writes the law.

2.2. Methods

The history of water in California, due to national and global interests, has been written about extensively over the course of the state's 170-year history. As such, the sheer amount of information available was overwhelming as I began my preliminary research. In order to delimit and refine my research focus and to make sure I would add to the debate with new information, I chose to limit my main primary and secondary sources to a select few sources that I felt would provide me a wide breadth of material on the politics of water in the state but at the same time contribute with new information. Specifically, I selected primary documents from three different government agencies, and from two secondary sources to build out the historical section of the thesis. The source material was analyzed for discussions or depictions of California water and agriculture, and these sections were then included in a qualitative content analysis.

2.2.1. Foucauldian discourse analyses of primary sources

It is nearly impossible to discuss political debates and discourse without drawing upon Michel Foucault's body of work. As mentioned in section 2.1.2., the framework laid out by Escobar for assessing regimes of nature is theoretically similar to Michel Foucault's regimes of truth; therefore, I have chosen to apply Foucauldian discourse analysis to my primary sources using Kendall and Wickham's (1999) outline for conducting Foucauldian discourse analysis. Kendall and Wickham (1999) define discourse as a systematically organized body of statements. The core of 'the discourse' in this thesis is water and agriculture and water politics, which has guided my selection of primary sources.

The texts selected for analysis represent a transition over time in the forms discourse and different positioning around groundwater and agricultural production by the government. The documents I chose include: the decennial agricultural reports that were written in conjunction with the federal census by the Bureau of the Census; the four editions of Bulletin 118, produced by the California Department of Water Resources (DWR); and the annual California

Agricultural Statistics Report that has been released by the state Department of Food and Agriculture (CDFA) since 2012. These documents together provide a detailed historical record of the perceptions of both California's agricultural abilities and its water constraints over time and from multiple perspectives.

The decennial agricultural reports were commissioned in conjunction with the federal census, beginning in 1840; California first appears in the 1850 census, the year it entered statehood. Subsequent agricultural reports were released at the start of each new decade (1860, 1870, etc.) until 1925, when the first mid-decennial report was commissioned by Congress in order to account for and record the rapid transformation of the agricultural sector. From 1925 until 1950, reports were released every fifth year; I have chosen to include the 14 reports covering the period between 1850 and 1950. Of these 14 reports, the sections included in my review were limited to introductions that covers the entirety of the United States and chapters focused on California; additional sections or letters referencing the state were also reviewed if the state name was included in the title/heading. The purpose of the review is to assess how the state's agricultural production capacity was discussed over time, and to what extent water and/or irrigation was viewed as a constraint; as such, data from charts and tables and more general discussions of agricultural production are largely not covered here.

Bulletin 118 is considered to be the foremost authoritative document on the topic of groundwater; it is from Bulletin 118 that the current accepted maps of groundwater basins are derived. Produced by the DWR, the first edition "Evaluation of Ground Water Resources: Livermore and Sunol Valleys" was published in 1966. Early editions specifically discussed the groundwater resources in certain areas of the state, but in 1975 the seventh edition of the bulletin was released, assessing the entire state, titled "California's Ground Water". In 1980, the sixteenth edition "Ground Water Basins in California" was published, and 23 years later the most recent available edition was published in 2003, also called "California's Ground Water". These latter three editions are included in their entirety in the analysis for the technical discussions they provide of groundwater conditions.

In addition, six editions of the state Agricultural Report, produced by the CDFA, are included in the content analysis. The first report was published in 2013 and reviewed the 2012 agricultural year, and a report has been written for every year since with the exception of 2015 - no general report was written this year, only an export report. These reports are reviewed for their discussions of the climate and drought in the introductions. Collectively, these primary sources cover discussions of water and agriculture in California from its admission to the union in 1850 through 2017.

In Chapter 4, I analyze these sources based on how statements are created; what is written and what is not; and how statements are contextualized, focusing both on the material and discursive practices in the documents (see Kendall and Wickham 1999).

2.2.2. Secondary sources and narrative analyses

As mentioned previously, there is an abundant amount of scholastic and literary text about the state of California and its' water and agricultural history. These also present different genres and stories about the water issue in California as discussed in Chapter 2. Two texts were selected for the purpose of broadening the background of the history of California. Supplemental to my primary sources (which do not cover the breadth of pertinent historical events that contributed to shaping California water discourse) and valuable sources in their own rights, I utilize what are arguably the two most eminent books in the canon of California water history: *Cadillac Desert* and *The Great Thirst*.

Author and environmentalist Marc Reisner's 1986 book *Cadillac Desert* (full title: *Cadillac Desert - The American West and its disappearing water*) tells an exciting story of greed and American exceptionalism in the race to irrigate the American West, and California in particular. Building his narrative around the moral misgivings of the monopolists and the government programs that supported them, Reisner focuses on the individuals whose decisions brought water and wealth to California at any cost.

The Great Thirst (full title: *The Great Thirst – Californians and Water: A History*) was published 15 years later by academic and historian Norris Hundley Jr. Many of the same events brought up by Reisner are also covered in Hundley's book, but with more specific focus on the relevance to California history. It is a detailed study of the court cases and policies that shaped California water law over the course of two centuries. Generally, Hundley gives less attention to individuals, examining instead the institutions that they inhabit; as a result, his analysis and conclusions often differ from those of Reisner.

The relevance of these texts to the field cannot be overstated—to discuss water issues in California and not include these volumes would be to ignore some of the most critical voices shaping the discourse, particularly among laypeople. But more interesting for the sake of this thesis is that, given similar source material, these two books present decisively different narratives around the historical state of California water policy. For this reason, I chose to conduct a comparative narrative analysis on these books in Chapter 5, a methodology drawn from Cronon's analysis of Dust Bowl literature. Both books were read in their entirety and are used as references throughout this thesis, but for the sake of analysis I sketch a brief outline of each book to illustrate their general divergences. I then compare specific sections from each book that cover the same key events in California water history, including, for instance the water wars, for narrative structure, tone, and conclusions. By including these books along with primary source materials, I will be better equipped to demonstrate the nuances of history-making.

2.2.3. Critical discourse analysis of the legislation

The Sustainable Management Act is comprised of three separate bills: SB 1168, SB 1319, and AB 1739. Before being chaptered into state law, the bills were reviewed and amended by the Senate and Assembly members multiple times, and as a result the final version of the bills were considerably different than what was initially introduced. Further still, following the passage of SGMA in September 2014, the law was amended and updated the next year. I chose to focus on this most updated version of SGMA in Chapter 6, examining the lexical choices of the law in order to ascertain how it defines and allocates power and agency. With regard to the legislation I am specifically interested in how powers and authority are allocated to the state and stakeholders within the discourse (cf. Kendall and Wickham 1999). Stakeholders include the farmers that use groundwater for irrigation; residents that rely on it for drinking water; environmental users; local government; protected Californian tribes. The support or opposition of these groups stems from their vested interests in water usage in the state, thereby affecting their perception of the validity of the law. Ascribing political and social meaning to the law in this way in turn impacts its' implementation. Using Foucauldian discourse analysis to assess power negotiations within the legislation regarding the enumeration of stakeholder powers can thus provide insight into the potential efficacy of SGMA.

Importantly, an accompanying white paper titled "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" was released following the passage of SGMA. The white paper specifically addresses the necessity of stakeholder engagement in successful implementation of the law, and therefore is included in the review.

2.2.4. Spatial analysis of critical groundwater basins

In Chapter 3, GIS (geographic information systems) is used to develop a visual spatial analysis of the locations of critically overdrafted groundwater basins in the state of California, as well as for mapping and assessing other relevant ecological factors including rainfall levels and distribution, topography and watersheds, and land use patterns. The visual spatial analysis is used to enhance the points being made through content and narrative analysis, especially for readers that may be unfamiliar with the climate and topography of California. In addition, the visual representation creates a politicized map that demonstrates the correlation between groundwater overdraft and politics and economy in an explicit way and provides a starting point for new conversations on usage of water and also justice.

Data from the United States Geological Survey (USGS) was compiled to determine the total amount of million gallons per day of water used per county in 2015, as well as the amount of million gallons per day of water used per county for agricultural irrigation; the total percentage of million gallons per day of water used for agriculture for each county was then determined, and filtered according to which counties used 50% or more of their total daily water for agriculture and which counties used 85% or more of their total daily water for agriculture (see Appendix 1). Vector layers were created from this data to visualize where these counties lay in relation to one another (see Figure 7). Information from the California Department of Food and Agriculture was then used to create a third vector layer displaying the top ten most agriculturally productive counties for the 2016-2017 season (see Figure 8). Data from the California Department of Water Resources (DWR) depicting the groundwater basins that have been categorized as medium, high, or critical priority was then input (see Figure 2 and Figure 8). Using the intersection tool, I was able to identify exactly which areas of the state lie atop of critical groundwater basins; are part of the top ten most agriculturally productive counties; and have also used 85% or more of their daily water withdrawal to support agriculture in the area (see Figure 9). Finally, an additional map was created using data on the hydrologic basins of the state to show which areas of the state received the most seasonal rainfall during drought years 2014, 2015, and 2016 (see Appendix 2); a hillshade layer from ArcMap was added and overlaid with the vector layer showing the locations of critical basins (see Figure 10).

3. The California Waterscape

There is cropland where once was a swampy marsh, manmade lakes where there once was desert, and even desert where there once was cropland. Some rivers have been completely dried up, some rivers flow through mountains into other river's beds, and some rivers even flow backwards at times. California, arguably, is the most hydrologically-altered landmass on the planet.⁸

When discussing the present conditions of the environment and groundwater resources in California, it is important to keep in mind the relative youth of the state, and also of the United States as a nation. California became a part of the United States on September 9, 1850. This thesis mainly covers the development of groundwater policy over the 170 years since then, but to explain the connection between groundwater, drought and agriculture in California, it is necessary to first briefly sketch out a history of the state's waterscape and specific landscape features, as well as its' climate and hydrology. This chapter describes the aspects of the environment and land-use history of California that are most important to the larger discussion.

3.1. California's human history

Water has always defined human history in the Californian landscape. Prior to its admission to the union, California had been occupied by indigenous groups (referred to hereafter as California Indians) for millennia. Collectively, California Indians were the largest tribe in North America outside of Mexico, but they lived in small 'tribelets', positioning themselves near sources of freshwater and organizing their lifestyles around naturally available and seasonal resources. Swidden agriculture was practiced by some tribelets, thereby creating the meadowlands that Europeans later encountered and believed to be the 'natural' conditions of the landscape. Ditch irrigation was also likely practiced by the Paiute Indians whom originally occupied the area of Owens Valley. However, unlike the more famous indigenous tribes of the American Southwest that transformed landscapes through the construction of canals and reservoirs, California Indians mostly adapted their needs to the offerings of nature. (Hundley Jr. 2001).

Spain's entrance to the region from the south in 1542 marked the beginning of European colonization and the mission system (as well as centuries of marginalization of the California Indians in their own native lands). The mission system reshaped the landscape and established a system of water use practices that emphasized communal water rights. This system remained in place following Mexico's rise to power in 1821 when the former Spanish colony gained independence. Mexico was soon after ousted from the area during the Mexican-American War, officially ceding the region to the United State on February 4, 1848 with the signing of the Treaty of Guadalupe Hidalgo. Gold had been discovered on the western slopes of the Sierra Nevada mountain range just a week earlier, initiating the 'gold rush' and a rapid increase of population. Though scarcity of water was recognized even in the earliest policy

⁸ Austin 2015.

documents of the state (see Chapter 4), the image of California that was promoted in the early 20th century was of an agricultural El Dorado. (Hundley Jr. 2001).

Over the next 100 years California was transformed by human management, driven by the belief that water scarcity in the area was the unnatural issue to be remedied. Concerns about stunted agricultural and economic growth inspired both state and federal government to invest in a decades-long infrastructure project with the singular goal of securing more water (see Chapter 5). Through the construction of massive dams and thousands of miles of aqueduct, the state's waterscape was remade.

3.2. The landscape of California

California spans more than 800 miles along the Western coast of the continental United States and extending inland over 250 miles. Formed atop the San Andreas Faultline, and with 11 active volcanoes in its' borders, the topography of the state is characterized by peaks and valleys. The result of the mountainous terrain is multiple microclimates with distinct precipitation patterns that cause areas of extreme conditions throughout the state, particularly water constraints in the central and southern basins. The effect of topography and climate patterns on precipitation, particularly in watershed areas, plays a significant role in determining what areas are likely to be most affected by future droughts, and therefore is important for successful regional planning and environmental policy.⁹ (WRCC 2020).

3.2.1. Topography

Along the western border of California, the Coast Ranges rise and fall, creating small basins and streams of runoff to either side (Teilmann 1963). Acting as the boundary between the west coast and the low-lying inland valley on the eastern side, the mountains of the Coast Ranges create an orographic effect, forcing cloud formations developed over the ocean to drop precipitation in order to elevate and move inland; in turn, this causes a rain shadow effect on the eastern side of the Coast Ranges, where the warmer and now drier air settles over the Central Valley (Carpenter 2018).

The eastern border of California is dominated by the Sierra Nevada Range, California's primary watershed. Home to the renowned Yosemite Valley and Mount Whitney, the highest point in the continental U.S., the Sierra Nevada Range is a critical water source as the snow-pack developed there during winter months acts as a natural reservoir for the state. The melt runoff captured from the Sierra Nevada is redirected to all major urban centers in the state via the Central Valley Project and the State Water Project, further discussed in Chapter 5 (Sierra Nevada Conservancy 2019).

Near the northern border, approaching Oregon, the Coast Ranges and Sierra Nevada meet at the Klamath mountains, part of the greater Cascade Range that extends up through Oregon and Washington. The lakes and tributaries of the lower Klamath basin, the portion located in California, are fed by runoff from the upper Klamath basin on the Oregon side. Many of the rivers were dammed up beginning in 1905 for irrigation projects; but, as these tributaries make up a critically important ecological niche for salmon and many other endemic species, a decision passed in 2016 approved the removal of four of the dams of the Klamath River. The

⁹ The relationship between topography and climate variation is increasingly important as the changing global climate severely impacts local climates.

prospected water restoration project was the largest dam removal project in U.S. history (Klamath County Museum 2010; Gilman 2016). As the dam removal project is slated to begin in 2020, it is unknown what the full impact will be on the Klamath watershed.

The Tehachapi Mountains, of the Transverse Range, located in Southern California, completely encloses the Central Valley located to the north (Teilmann 1963). The Tehachapi Mountains are largely a desert landscape, but these mountains also cause a rain shadow effect—south of the lies Antelope Valley and the Mojave Desert, the hottest and driest desert in North America and the lowest point in the contiguous U.S. (National Park Service). Snowpack that does develop in the Tehachapi mountains can provide runoff through the spring months on the northern slope, towards the Central Valley (Bauer 1930).

Nestled among the mountains, the Central Valley was likely a sea at one point, but over time filled with loamy earth as the water slowly eroded the surrounding rock walls (Teilmann 1963). Due to the mineral rich deposits left behind, the soil of the Central Valley was a nearly ideal soil type, rich with clay and sands (Hundley Jr. 2001).

Along the Southeastern border of the state, east of the Sierra Nevada, the Mojave Desert extends into neighboring Nevada; further south still, approaching the U.S.-Mexico border, spreads the desert-like Imperial Valley; with the exception of the coastal areas, the southern region of California is dominated by desert valleys.

3.2.2. Climate

The unique Californian topography, combined with its latitudinal orientation and coastal location, means that there is no single climate type which can be ascribed to the state. Rather, California is comprised of five major climate types—Desert, Cool Interior, Highland, Steppe, and Mediterranean—and variations within these climate types create unique climate compositions within the state (Kauffman, 2003). To the west of the Coast Ranges and through the northern part of the Central Valley is a largely Mediterranean/maritime climate, with cool winters and summers, and most of the precipitation occurring during the winter (Kauffman 2003). This climate type is what makes the Central Valley so agriculturally productive, and it is one of the most unique in the world, otherwise occurring only in the Mediterranean Basin itself, central Chile, parts of south and southwestern Australia and parts of South Africa (Esler *et al.* 2018). The southern parts of the Valley can be characterized as having the Steppe climate, which is hotter than the Mediterranean climate but with sufficient precipitation levels to support a wide array of vegetation types (Kauffman 2003). The southeast of the state is dominated by the Desert climate of the Mojave and Imperial deserts, where the steep shifts in elevation have led to exceptional biodiversity in the region and unique endemic species such as the Joshua Trees that have evolved (Kauffman 2003). At higher elevations in the northern part of the state and along the Sierra Nevada range, the Highland and Cool Interior climates are found, depending upon elevation levels and slope orientation; it is in these areas that winter precipitation develops into snowpack that feeds the state throughout the year (Kauffman 2003).

California lies between 30° and 42°. At the 30th parallel, cold dry air of the upper atmosphere descends bringing a high-pressure system with little rainfall. This high-pressure system over the northern Pacific Ocean, known as ‘the Pacific High’, pushes northward in the summer, driving storms away and maintaining dry, hot summers. However, during the winter months, the Pacific High retreats all the way down to Southern California and beyond, bringing a much-needed reprieve and winter storms. Additionally, air flows from the northeast along the west coast, which causes an upwelling of cool water from the deeper ocean layers during the summer. This causes warm, moist air to hover over the cold water of the ocean, thus forming

fog banks, which tends to keep temperatures low along the coastline, but pushes drier and warmer air higher into the atmosphere and over the interior of the state. (WRCC 2020).

Climatic variation often causes extremes between the mountainous, elevated regions of the northern parts of the state and the low-lying deserts of the south; recorded annual temperatures range from minus 45°F (minus 42°C) to 134°F (56°C), and annual precipitation levels can vary from 161 inches (408.9 centimeters) to near unmeasurable trace amounts (WRCC 2020).

Given the natural water constraints on the state, and as was discussed in the introduction, California has been significantly impacted by the effects of climate change. Based on data collected and analyzed by the NOAA (NIDIS 2019), the droughts in California have worsened in severity by -0.13/decade since 1895, per the Palmer Drought Severity Index¹⁰. In 2000, the U.S. Drought Monitor informational mapping system was developed, which categorizes drought periods by severity (see Table 1). Drought conditions worsened considerably in 2014, when 60% of the state was categorized as experiencing an ‘Exceptional Drought’ (D4) level, the most severe category of drought conditions (NIDIS 2019). Drought conditions have occurred nearly every year between 2000 and 2019. Generally, only about 30% of the state has been affected by drought conditions categorized as D2 or worse, but by mid-2013, 90% of the state was experiencing a D2 category drought, and by 2014 100% of the state had reached D2 levels of drought (NIDIS 2019) (Figure 3 and 4).

Table 1. Classification of drought conditions per the Palmer Drought Severity Index. Source: NIDIS 2019.

D0	Abnormally Dry	Short-term dryness slowing planting, growth of crops Some lingering water deficits Pastures or crops not fully recovered
D1	Moderate Drought	Some damage to crops, pastures Some water shortages developing Voluntary water-use restrictions requested
D2	Severe Drought	Crop or pasture loss likely Water shortages common Water restrictions imposed
D3	Extreme Drought	Major crop/pasture losses Widespread water shortages or restriction
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses Shortages of water creating water emergencies

¹⁰ The Palmer Drought Severity Index is a measurement of dryness, used for prediction and assessments of drought (Dai *et al.* 2019).

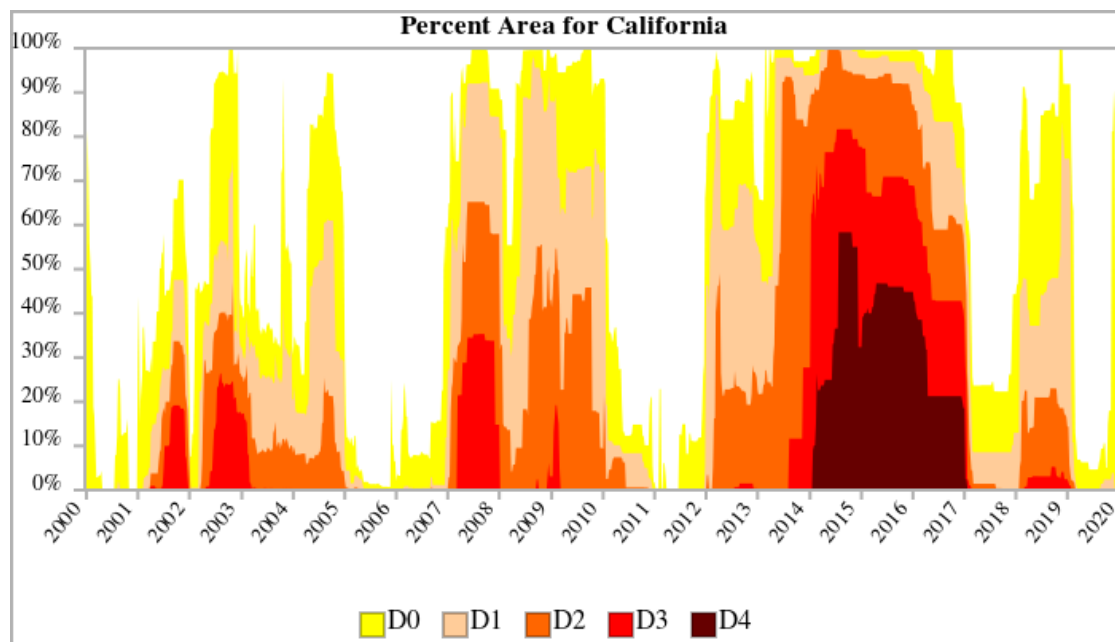


Figure 3. Time series graph showing the % of California experiencing drought conditions from 2000-2019, according to Palmer Index. Source: National Drought Mitigation Center (2019).

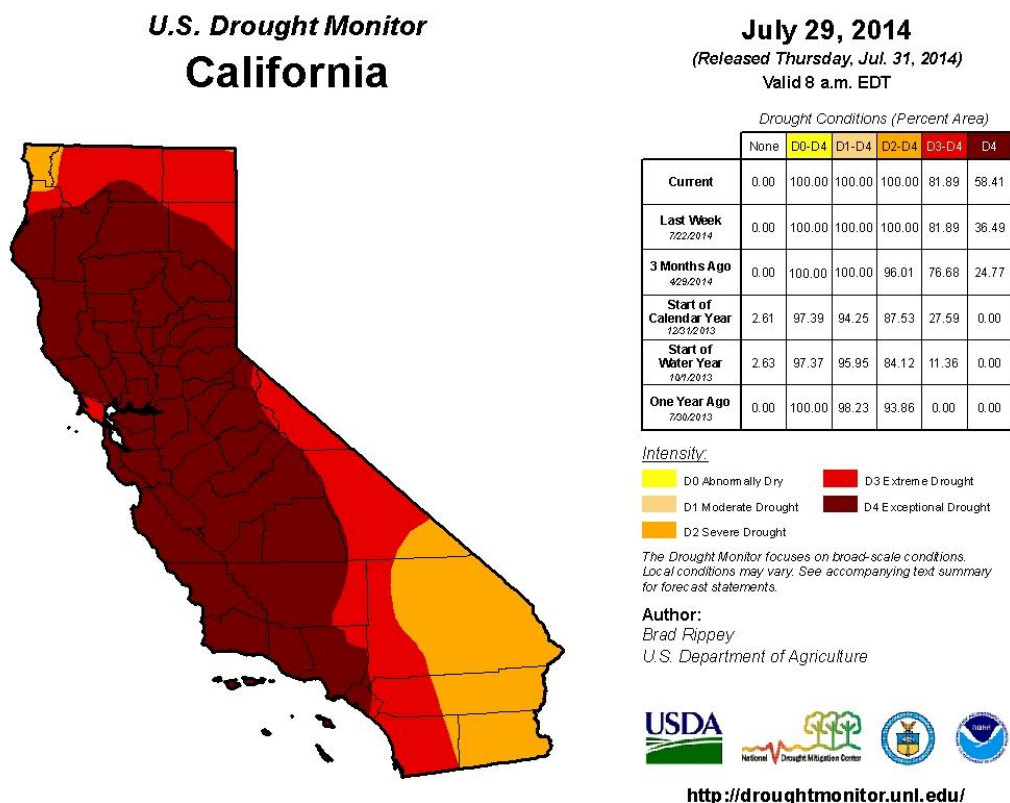


Figure 4. Density map of California drought conditions July 2014. Source: Rippey 2014, U.S. Drought Monitor.

3.3. The agriculture of California

With an average annual temperature of 18° C (US Weather Service 2020) and almost 10 sun-light hours per day (Weather Atlas 2020), the growing conditions in California are nearly perfect, except for the lack of available and reliable water. Still, the state remains the primary producer of some of the most popular foods consumed around the world, including almonds, grapes, and dairy products. Much of the industrialization of the agricultural sector seen today occurred during the post-Depression era; as wealthy farmers were able to buy out the land of their struggling contemporaries and increase their farm sizes, they became eligible for federal subsidies that had been introduced to encourage producers to meet quotas for certain crops (see Chapter 4 and 5). Similar circumstances occurred following the 2008 Great Recession: per the 2017-2018 California Agricultural Report, the total number of farms in California has decreased between 2008 and 2017, even as both the number and acreage of wealthier farms (those whose profits exceed \$100,000 annually) increased (see Figure 5 and 6).¹¹ In Figure 5, we see that there is a decrease in the total number of farms from 2012 through 2017. Much of the overall decrease comes from a decrease in small-scale farms. In fact, the percentage of total number of large-scale farms actually increases slightly after 2012. In Figure 6, we see that the percentage of farm acres in small-scale farms decreased by nearly the same amount that the percentage of farm acres in large-scale farms increased.

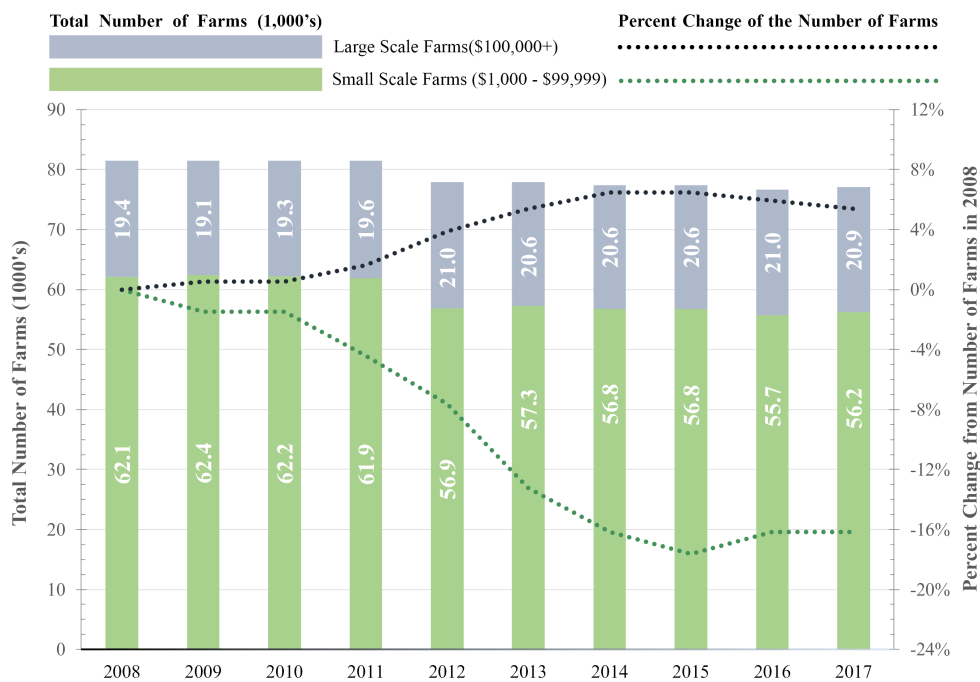


Figure 5. The bar graph shows the total number of small- (green) and large-scale (grey) farms between 2008 and 2017. The number of farms in each category is written within the bar (rounded to the nearest thousand farms). The relative percent change of the number of small and large-scale farms with regards to the initial 2008 data is represented by the dotted lines (dark green and dark grey respectively).

¹¹ The total overall decrease of 4,400 farms comes from decreases in the number of farms that fall into lower economic sales classes (\$1000 to \$99,999), which declined by 5,900; the total number of farms in higher economic sales classes (\$100,000+) actually rose by 1,500. During those same years, the total amount of farm acreage decreased by 100,000 acres, but the average size of farm acreage increased by 16,000. Once again, farms in the lower economic sales classes experienced the greatest actual decrease of 1,100,000 acres, with farms in the median economic sales classes (\$100,000 to \$499,999) also decreasing by 700,000 acres; only farms in the highest economic sales class of \$500,000+ experienced an increase of 1700,000 acres of land in these farms.

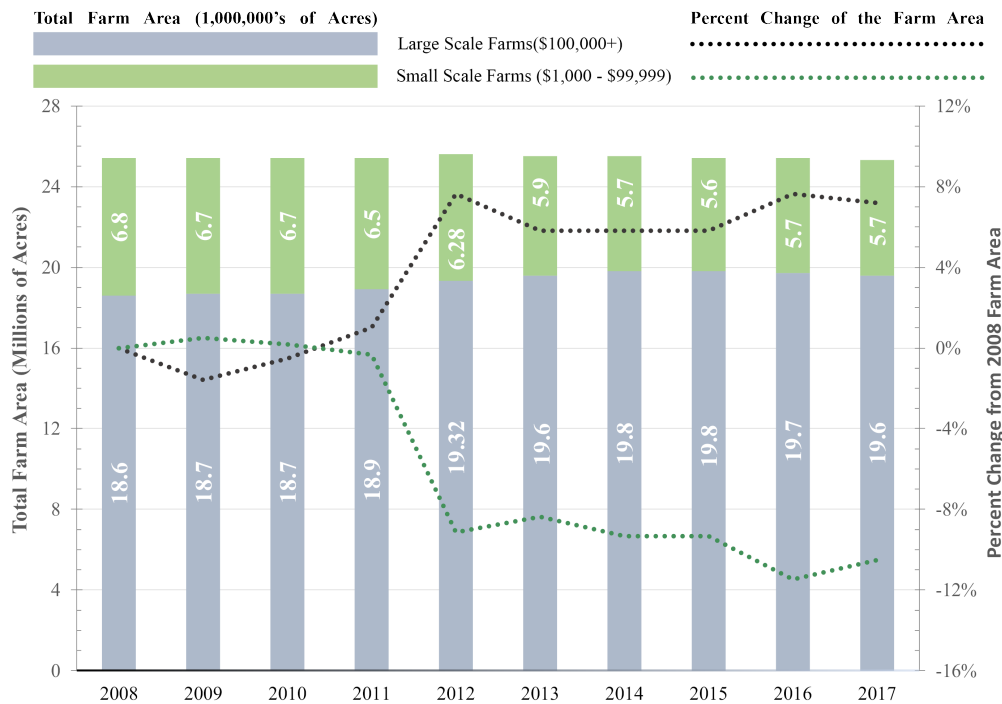


Figure 6. This bar graph shows total farm acres in small- (green) and large-scale (grey) farms between 2008 and 2017, while the line graph depicts the percent change in total farm acres for both farm types (from 2008).

This data indicates that the smaller farms that disappeared during these years were absorbed by larger farms. Given that this period directly follows the Great Recession and coincides with the 2011-2017 drought, one can speculate that the abandonment of medium and small size farms is due to the imbalance between the expensive costs of inputs and the lower price points in the market for agricultural products. Federal agricultural policies in the United States can make it difficult for farmers to be successful if they do not subscribe to the size standards asked of them by the government—for example, subsidies are designated for farms that meet production quotas for specific crops such as cereals (Mann 2018). In order to grow enough crops to be able to apply for subsidies, large amounts of land must be devoted to monocropping. Small scale farmers or farmers that focus on growing a variety of crops are therefore often forced to sell their products at a higher cost in order to remain profitable.

3.4. The distribution of groundwater basins in California

Due to the dominance of the agricultural industry in California, agriculture is responsible for nearly 80% of the state's water usage (CDFA 2018). In order to analyze the relationship between groundwater usage and agricultural production in California, QGIS was used to allow the visualization of the spatial relationship between the groundwater basins and agriculture. Here I have focused on areas with groundwater basins identified as being in states of critical overdraft and counties with high agricultural output levels. In addition, QGIS was used to analyze the spatial relationship between hydrologic basins and the critical groundwater basins, by mapping the seasonal rainfall distribution of each hydrologic basin during drought years 2014, 2015, and 2016. Finally, an intersection of vector layers was created to indicate which critical groundwater basins were located in counties that use greater than 85% of their total daily water withdrawals for agriculture and that are also among the top ten most agriculturally productive counties.

As can be seen in Figures 7, 8 and 9, the basins that are categorized by the DWR as “critical priority” due to the state of overdraft are concentrated in the Central Valley, specifically in counties where more than 50% of the total water used goes towards agriculture. Further, as Figure 3 shows, also concentrated in the same region are many of the top ten most agriculturally productive counties. This indicates that there is strong correlation between the locations of critically over-drafted groundwater basins and agricultural production levels.

Table 2. Leading commodities produced in California’s top ten agricultural counties for the years 2015 and 2016. Source: California Agricultural Statistics Review 2016-2017.

Top 10 Agricultural Counties					
County	Total Value and Rank				Leading Commodities
	2015	\$1,000	2016		
Kern	6,880,495	2	7,187,938	1	Almonds, Grapes (Table), Milk, Pistachios
Tulare	6,980,772	1	6,369,926	2	Milk, Cattle & Calves, Oranges, Grapes (Table)
Fresno	6,680,287	3	6,182,541	3	Almonds, Poultry, Grapes (Raisin), Milk
Monterey	4,705,143	4	4,256,073	4	Strawberries, Lettuce, Broccoli, Cauliflower
Merced	3,589,900	6	3,447,830	5	Milk, Almonds, Chickens, Cattle & Calves
Stanislaus	3,879,333	5	3,261,412	6	Almonds, Milk, Chickens, Walnuts
San Joaquin	2,732,900	7	2,337,899	7	Almonds, Milk, Grapes (Wine), Walnuts
Ventura	2,198,555	8	2,110,187	8	Strawberries, Lemons, Raspberries, Celery
Imperial	1,875,158	11	2,063,215	9	Cattle & Calves, Lettuce, Hay (Alfalfa), Broccoli
Kings	2,021,052	9	2,002,192	10	Milk, Cattle & Calves, Almonds, Cotton (Pima)

Table 2 shows the crops grown in each of these top ten producing counties, wherein the most common crop produced is almonds, with the second most common being dairy (CFDA 2017). As California is the primary producer of almonds for the global market, it is a significant cash crop for the area, but almonds are not a drought-tolerant crop, a condition which likely has pushed farmers to become increasingly reliant upon groundwater for irrigation during drought periods (Fulton *et al.* 2019). The state’s dairy and cattle farms also require significant amounts of water to maintain due to the associated farming of alfalfa, a water-intensive crop used to feed the livestock (Cooley 2015).

Figure 10 shows where the critical groundwater basins lay within the topography of the state, as well as where the greatest amounts of rainfall occurred during the growing seasons of 2014, 2015, and 2016. As can be seen, the critical groundwater basins that are concentrated within the Central Valley lay within a large topographical basin—on all sides of the Central Valley there are mountain ranges that limit the amount of direct rainfall in that area. Further, the greatest amounts of rainfall during those years took place in the northern half of the state, while the greatest amounts of agricultural production occurred in counties in the southern portion of the state. Based on the topography of the state, it is unlikely that there was much natural recharge of the groundwater basins in the Central Valley during these years, because in order for natural recharge to happen, there must be a significant amount of rainfall (there was not) and that rainfall must have been allowed to permeate the topsoil and not be used for irrigation, which would have been highly unlikely.

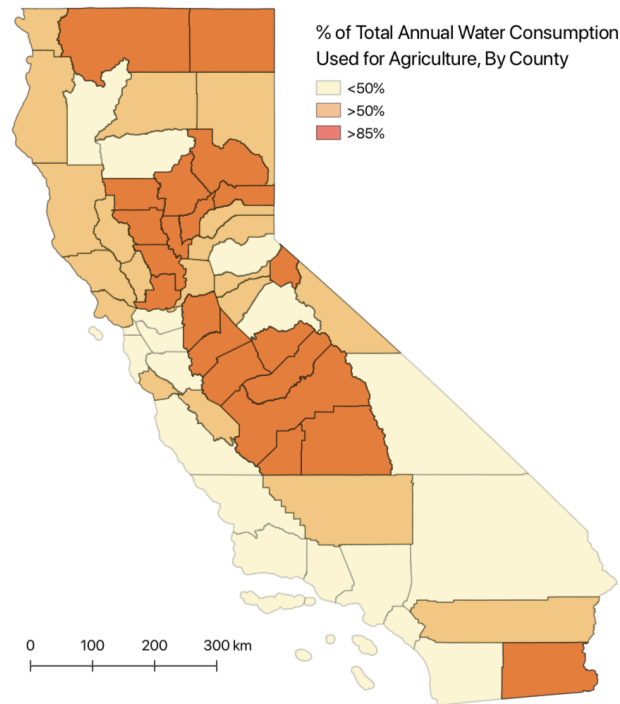


Figure 7. Map of California counties categorized by percent of total daily water withdrawal (in millions of gallons per day) used for agricultural irrigation in 2015. Map produced by the author (2019).

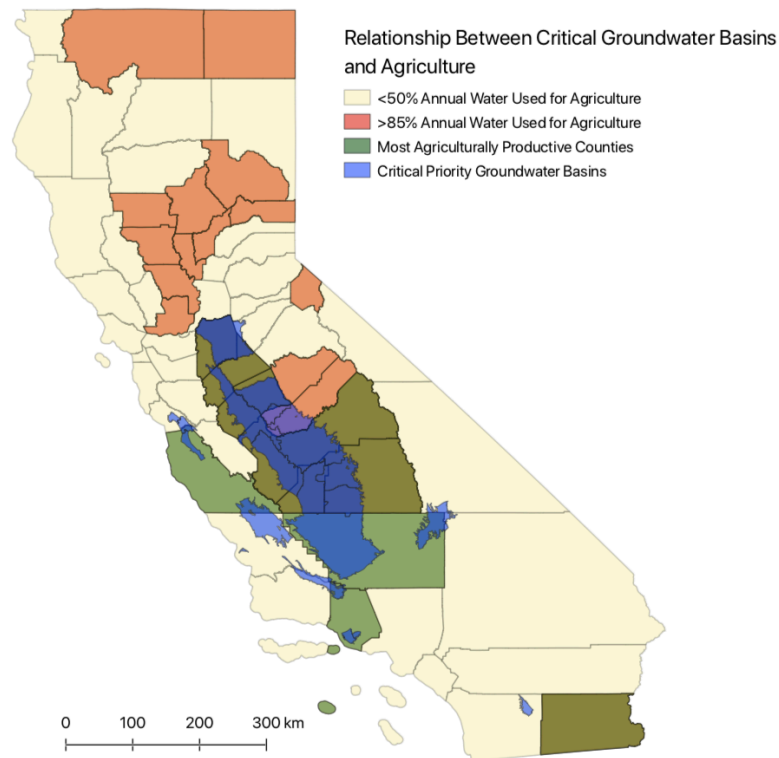


Figure 8. Map of California depicting the relationship between the counties which used 85% or more of their total daily water withdrawal (in millions of gallons per day) for agriculture in 2015 and the ten most agriculturally productive counties that same year. Map produced by the author (2019).



Figure 9. Map of California showing the specific intersection between sections of critically overdrafted groundwater basins and sections of the state's most agriculturally productive counties that also used >85% of total daily water withdrawal for agriculture in 2015. Map produced by the author (2019).

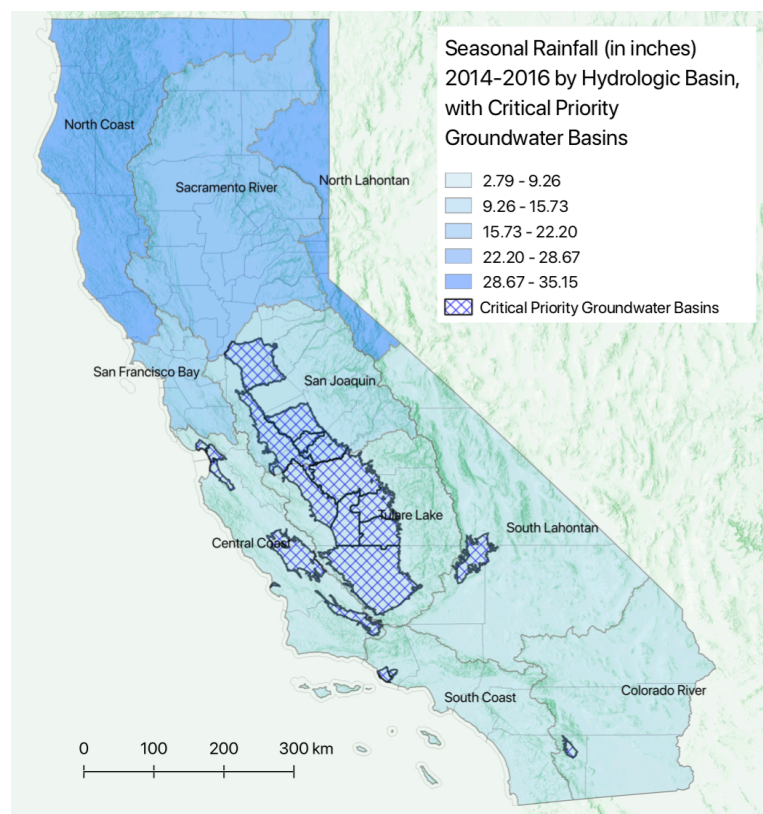


Figure 10. Map of California's hydrologic basins, showing amounts of seasonal rainfall (in inches) from drought years 2014, 2015 and 2016; hillshade from ArcMap included to illustrate topography. Map produced by the author (2019).

4. A Capital Regime of Water

Food grows where water flows.¹²

In defining what a capital regime is and has been, Escobar writes that “*The history of Man and of bourgeois perception is related to other factors such as the colonization of time, the development of maps and statistics, and the association of particular landscapes with national identities*” (1999, 6). The purpose of this chapter is to explicate how, through the historical process of colonization of land and time, the particular landscape of California became associated with an agricultural identity, and how this led to the imposition of a capital regime of nature upon the state’s waterscapes. I also explore the social and political negotiations at the early beginning of a technonature regime in the state.

As outlined in Chapter 2.2.1., to conduct this analysis I draw on Kendell and Wickham’s modification of Foucauldian discourse analyses, which looks into how statements are created and constrained - that is, if there are ‘rules’ of what can be said and not, and how or if there is an allowance for new statements to be made. Importantly, these statements are understood to also be reflected in the practices that stem from this discourse creation. Agricultural census reports were included here for their representation of California agriculture and water at the national level and over a whole century, between 1850 and 1950, which consistently downplayed the importance of irrigation to agriculture. The technical reports published by the DWR under Bulletin 118, from 1963 until 2003, provide insight into the conditions and understanding of groundwater, from an early technoscientific perspective as I will explain here. Finally, contemporary agriculture reports written by the California Department of Food and Agriculture during the years of the drought (2012 through 2018) are the basis of a discussion around agricultural production during that period and the embrace of technoscience.

4.1. Census reports from 1850-1900: The promise of growth

The 1850 national census was the first year California was included in the census report. The ‘European’, ‘Asian’ and ‘African’ population of the state was then approximately 91,300 and the population of California Indians was estimated at 100,000. Importantly, California was admitted to the Union as a free state, meaning that slaveholding was an illegal practice in the new state. As the state had only been incorporated in the United States for a mere 3 months, the text on the new state is not very developed¹³. The section that is devoted to California consists of sixteen tables that cover a range of statistics deemed important such as births and death, but also population by color and professions of males; there were 1,486 farmers.

¹² Hon. Doc Hastings, Committee on Natural Resources, U.S. House of Representatives 2015.

¹³ Of interest, though, is the ranking of California as 29th (of the 31 states and 4 territories) in Table XXV, “Relative Rank of the States and Territories with Regard to Each Class of Population, Total and Federal, and Rank in Square Miles”. It seems the determination of rank was decided by the percentage of white people compared to people of color, per square mile.

In the general report, on page XCII, there is a brief section that is interesting in terms of water. Under the heading “Meteorology of the United States”, the following comment is written regarding the inclusion of meteorological tables from the Smithsonian Institution¹⁴:

“The tables are very valuable, and are the most complete ever published of the kind. They embrace points within the Republic several thousand miles apart—from Vermont to Texas; from New Orleans to Santa Fe, California and Oregon—and condense the labors and observations of more than twenty scientific gentlemen. The brief space they occupy could not be better employed.” (USCB 1853, xcii).

The tables that follow show minimum and maximum temperatures (Fahrenheit), and rain and melted snow (by what unit is unclear) for each month of the year in various cities around the country, including Benecia, a city in lower part of the northern half of California. There, the mean temperatures for spring, summer, autumn and winter were 58.18°F, 66.96°F, 62.40°F, and 48.66°F, respectively. The mean temperature for the year 1851 was 59.05°F. The combined rain and snowmelt annual total came to 15.200, with no recorded rain or snowmelt in the summer, and the majority coming during spring and winter.

These tables were understood to be reasonably accurate climatic depictions of the nation and the first of their kind, albeit based on a very short time period. Furthermore, this information was backed by scientists, conferring upon it a degree of knowledge and power. It is not difficult to imagine that important decisions were made based on what was shown here. The data collected from Benecia implied that California had a relatively mild annual climate with seasonal rainfall and snowmelt; summer months were relatively warm, though not significantly more so than in other regions of the newly gotten West, and more rain fell in Benecia than in Santa Fe, Texas. For a farmer tired of struggling against the harsh winters of the Midwest, California likely sounded like a grower’s paradise.

The first separate agricultural report was commissioned for the 1860 census. In the decade since its admission to the nation, the population of California had reached 379,994, an increase of 316%. The report opens with a table depicting the acres of ‘improved’ and ‘unimproved’ land in farms and the cash value of farms for each state or territory; in this first report, improved land is used to refer to any land under cultivation, while unimproved land is that left uncultivated, whether ‘fertile’ or ‘waste’. Of the aggregate 163,110,720 improved acres of land in farms, California accounted for 2,468,034; the cash value of California farms was \$48,726,804¹⁵. Following the presentation of the table, the introduction explicates the potential of American agriculture. In sections that discuss cash crops in detail, California is often singled out for its’ contributions to production, with statements such as “*It is a noteworthy fact, that this young state produces more barley than any other state in the union*” (USCB 1864, lxx) or “*The production of butter, as of every other agricultural product, has advanced in California with astonishing rapidity*” (USCB 1864, lxxxiv). Regarding wine production in the United States, it is said that due to necessary climatic conditions “*In California alone...there are 5 millions of acres well adapted to grape culture. Here is something to reflect upon, and to give hope for the future*” (USCB 1864, clxi). Later in this section, the former governor of California is quoted at length about the state’s wine-making abilities, going so far as to compare the climate and irrigation practices of the state to the inexhaustible soils of the valley of the Nile.

¹⁴ The meteorological tables were prepared in 1851 by the Smithsonian Institution under the direction of a Professor Blodget.

¹⁵ Compare to older states such as New York and Ohio, for which cash values reached \$803,343,393 and \$678,132,991 respectively,

In fact, throughout the report, a considerable amount of space is given to ex-Governor Downey's commentary on the production capabilities of California; this is significant as no other current or former governors of any other state are quoted even once. It is within the former governor's commentary that an interesting and important characterization of the state develops. Let us examine two quotes from ex-Governor Downey, taken from different sections in the report:

"Thus far in our history the wheat crop is next in importance to our product of the precious metals¹⁶... From the bay of Monterey to the head of Russian river, an extent of 250 miles, is one vast wheat field... From the 10th of May until the 1st of November the farmer expects no rain. He therefore cuts, threshes and sacks on the same field, and houses in a sound and perfect condition, rendering it perfectly safe on the mill or the longest voyage" (USCB 1864, xlv)

The first quote comes relatively early in the report, is inset to draw attention to it, and is used as the concluding statement in a pages-long discussion of the capacity for wheat production throughout the nation. Downey likens the value of the state's wheat production to its gold mines and espouses what makes it so: an enormous amount of available land and a long, dry growing season. The quote conveys the sentiment that the climate and mileage of California is unmatched; the same discourse is prominent in the statements about the state's vineyards. Repeatedly throughout the 1860 agricultural report, California's arid condition is discussed as an asset to its' agricultural productivity.

In contrast, the second quote is found on the second to last page of the introduction, tucked into the middle of a section titled "Fruits, Vegetables, and Wool of California". It is preceded by a discussion of the state's growing citrus industry and followed by praise for the diversity and girth of vegetables produced:

"The capacity of this state for maintaining a large population in proportion to our entire superfiice, is not as great as our number of square miles would suggest. There is but a comparative small proportion that can be cultivated. This is not owing to any want of fertility, but to the absence of rains in the summer and the scarcity of water for irrigation on a large scale. Our commercial position on the continent, and our unsurpassed climate will always guarantee to California a respectably numerous, but we need never hope for a dense population" (USCB 1864, clxxi).

The second quote directly addresses the climate and mileage of the state, but here the tone is much different; rather than boastful, Downey is hesitant to overstate anything. While the previous quote is specific and colorful with locations and dates and 250 miles, here there is suggestions and comparisons, wants and needs and hope. Here, at the very end of the report, is the crucial admission that Downey is reticent to make elsewhere: there is not enough water. There is a certain limit to California's growth, but Downey remains hopeful that it will support a 'dense population'.

The agricultural report for 1870 is included within the larger census report "The Statistics of Wealth and Industry of the United States"¹⁷. Population growth in California has not increased as fast as in the previous period, now only by 47%, and the population is now at 560,247

¹⁶ He is referring here to the gold veins that drew settlers in 1849.

¹⁷ Full title "The Statistics of Wealth and Industry of the United States, Embracing the Tables of Wealth Taxation and Public Indebtedness; of Agriculture; Manufactures; Mining; And the Fisheries. With Which are Reproduced, From the Volume on Population, the Major Tables of Occupations."

individuals. The section “Statistics of Agriculture” is very brief, largely focusing on practicalities about census reporting. Of interest is the author’s¹⁸ rhetorical question “*What is the year covered by the report?*”; the answer is that there is no determinable ‘year’ which the report actually governs, and that the date of June 1 comes from a “*division made by law [that] is a purely artificial one and cuts the agricultural year in twain*” (USCB 1872, 71). The author points out that this is a limitation to the data - along with the lack of consistency in reporting of minor crops - which makes the report potentially inadequate in portraying accurate accounts of agriculture in states such as California. Importantly, the development of an arbitrary time scale - which bisects the natural growing cycle - per manmade law is a clear example of the colonization of time that Escobar suggests is indicative of the reign of a capitalist regime of nature.¹⁹

By 1880, the state population is 864,694. The agricultural report for this year’s census largely returns to form, with discussions of the present condition of all major cash crops alongside statistical tabulations. What is unique about the 1880 census is that it was compiled by two superintendents - Francis A. Walker, who had also overseen the 1870 census, but stepped away from the report before it’s completion. Walker is the author of the introductory remarks for the agriculture report, and at the end of the remarks he includes an article that he wrote for the *Princeton Review* (along with an addendum to said article which was written for the *Agricultural Review*). The purpose of the article is, in Walker’s words, “*to take a general view of the characteristics of American agricultural*” (USCB 1883, xxviii). Within the first paragraph, he states his belief that due to the rapid growth of the nation, the total arable land available is likely to be claimed entirely by 1883. Walker reasons that this is the result of government incentives to settle the new lands, specifically federal policies like the Homestead Act of 1862 that allowed each man the right to a 160-square acre allotment provided he cultivated it. Importantly, Walker sees the spread of man and agriculture as a testament to the superiority of the American system, and proceeds to recount additional successes of American agriculture thus far. Here, he writes of the “*vast farms, the wonders of the world, in Illinois and California, where 1000 or 5000 acres are sown as one field of wheat or corn*” (USCB 1883, xxviii). In the addendum, Walker imagines the future of American agriculture as an even greater global industry, buoyed by innovation and intensification, and writing that the possibilities “*certainly seem to me not only beyond the achievement, but beyond the power of any other race of men*” (USCB 1883, xxvii).

The language Walker uses in his article strongly reflects the political sentiments of the late 19th century, as well as “*the association of particular landscapes with national identities*” that Escobar believes to be indicative of a capitalist regime of nature. Ideas of American exceptionalism had long underscored Manifest Destiny, reinforcing that belief that Americans (of European descent) were ordained by God to bring the whole of the North American continent under their control due to their purported supremacy. This ideology, rooted in a potent combination of faith and faith in fortune, led to the expansion of the national frontier to the Pacific Coast thirty years earlier; here, Walker reinterprets the exceptionalism sentiment to advocate for the expansion of agriculture and American capital. Walker’s article, originally published in an academic journal, was copied in the report for an audience of farmers and settlers to read

¹⁸ Each report is officially ‘by’ the acting superintendent of the census; however, these reports were often written collaboratively, and therefore I have chosen to refer to each report as being penned by an unnamed ‘author’ unless the author is credited within the text and relevant to this discussion.

¹⁹ Finally, it is important to also note here that the American Civil War was fought between 1861 and 1865, culminating in the abolition of slavery. The despicable practice of slave-keeping was integral to developing and maintaining the powerful farms and plantations of the southern confederate states, and due to the outcome of the war, resentment towards northern free states and anti-black policies lingered in the region. Unfortunately, similar sentiments are still expressed in the region even today.

of the vast farms of California and their superior agricultural capabilities as a ‘race’ and continue putting their spades to the land for the sake of their American dream²⁰.

The 1890 census was written just before the close of the 19th century, and California’s population had then reached 1,208,130. In the agricultural report’s introduction, a density map (see Figure 11) shows that California, along with Texas, holds the greatest number of farms with

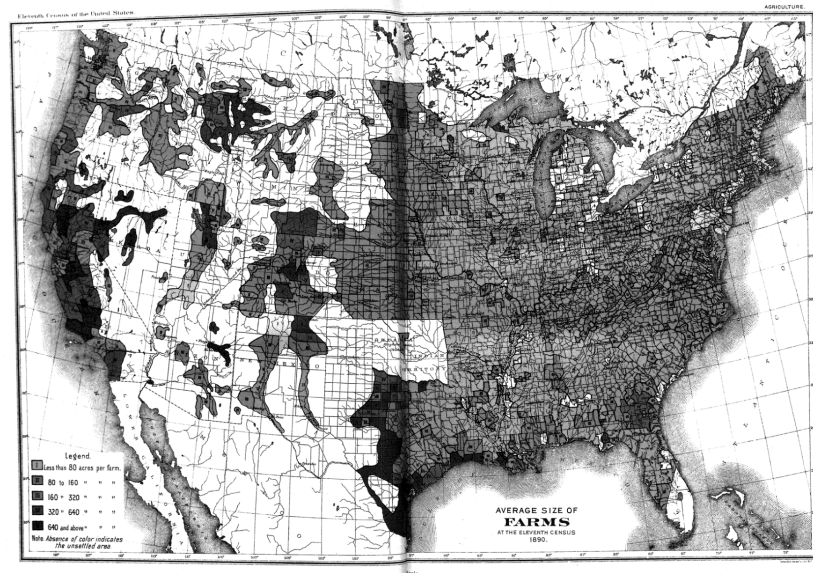


Figure 11. Density map showing the average size of farms by concentration throughout the United States in 1890. Map reprinted here from the 1890 Census agricultural report.

640 acres or more. The state also continues to be the number one producer of barley for the nation and second in wheat production. This inclusion of maps to illustrate regions of heightened productivity according to boundaries imposed on the land by humans is another example of a trait of the capital regime that Escobar cites (*“The history of Man and of bourgeois perception is related to other factors such as....the development of maps and statistics”* (1999)).

For the first time a comprehensive review of irrigation is included in the report, providing an assessment of irrigation throughout the United States. In the introduction to the irrigation section, a table shows the number of irrigators and acres under irrigation for each arid state and sub-humid region: of the total 3,631,381 acres irrigated in these regions, California alone accounts for 1,004,233 acres irrigated. A list of the most well-known reservoirs in the country shows that 4 of the top 5 are located in California. Regarding artesian wells, it is written that *“In California...cases are reported where wells have been flowing for 20 or even 30 years, the discharge not having decreased except through the interference of other wells”* (USCB 1895, 17). The California irrigation model had been implemented by many counties in other arid states, but typically with less sustained success. Over and over throughout the irrigation review, the California model is presented as a gold standard, even though high costs and specific topographical and climatic conditions are acknowledged in the same paragraph.

In addition to the general overview, each state is covered individually, with a breakdown of irrigation practices by county. California notably has the longest chapter. A discussion is now included relating to ‘ownership of water’ and pricing arrangements: for example, in Los Angeles county, it is costlier to use water during the day than at night, and \$5 if one lives outside

²⁰ Themes of agricultural exceptionalism are reiterated throughout the report in sections that were read but did not meet the standards for inclusion in the review. See the following quote: “Dangers to republican institutions come from cities and from aggregations of man in other vocations, and the stability of our own government is most intimately connected with it’s agriculture system.” (1883, 145).

of the city limit. Another important discussion on ownership of strong relevance to this thesis is the discussion of the canals and lands of the San Joaquin Valley, particularly Kern County:

“The greater part of the agricultural lands of this county are under the control of two large corporations or associations of capitalists. The first of these, the Kern County Land Company, owns the lands formerly known as the Haggin and Carr property, while the second, the San Joaquin and Kings River Canal and Irrigation Company, or Miller and Lux, controls the lands northerly from Buena Vista reservoir. There has been a long legal warfare between these companies over the use of the water of Kern river the matter finally being settled by agreement, all parties joining in works of river improvement and water storage in Buena Vista lake. Until within a few years nearly all of the lands held by these great owners were utilized if at all, or pasturage and for raising forage crops and the cereals, tracts of several thousand acres being flooded in a whole-sale manner... In the latter part of the last decade the owners began to see the advantages of cutting up these great holdings into small lots and selling these to colonists who would set them out in fruit, it being found that the climate was favorable for the profitable production of all the fruits for which California is famous.” (USCB 1895, 50)

The ‘legal warfare’ referred to in this passage is the twice-contested case *Lux v. Haggin*, first ruled on in 1881 and then appealed and decided by the Supreme Court of California in 1884. *Lux v. Haggin* is a historic decision as it enshrined in law a dual system of water rights, establishing riparian rights as supreme to appropriative rights. Riparian rights, those granted to whomever claims ownership of the land through which a river (or flow of water) crosses, were directly contradicted by the recognition of appropriative rights, which are based on claims of beneficial usage rather than physical relativity. The ruling broadened the scope of reasonable use and set a new precedent that is still a basis of confusion in California. That the author so nimbly recognizes that the ‘corporations’ are simply a new designation of the same few individuals that owned the land previously is very different from the modern practice of separating corporations from the people that operate them; this indicates that the rationale and ‘logics’ of capitalism in 1890 may not have been so culturally embedded as today. Even more to this point, the author of the report then remarks that the ‘capitalists’ have recently – given the timeline of the case, this was almost immediately following the court’s decision – opted to divide and sell their lots to colonists for fruit crops, which are more ‘favorable’ and ‘profitable’ given the climate. The decision to divide and sell the land was not made based on an increased understanding of the climate, however; the decision in *Lux v. Haggin* ultimately enabled both parties to become water barons in the area. By establishing themselves as irrigation corporations, Haggin and Carr, as well as Miller and Lux, were able to not only profit from one-time land sales but also from the continuous selling of water that their corporations legally owned, per the Supreme Court decision. The shift from landlord to waterlord can be seen as the beginning of a new rationalization of ownership in capitalism in the state as water, once a communal good, became a commodity. Within this short paragraph from the census report quoted here, the future of California water rights was unknowingly foretold.

4.2. Census reports from 1900-1950: The systemization of agriculture

In the first census for the 20th century (for the year 1900), California does not reflect significant levels of growth experienced in earlier decades. The population, now 1,485,053, only had a rate of increase of 22%. In its 5th iteration and at the turn of the century, the 1900 agricultural report includes – in addition to the usual statistics- a section titled “Agricultural Progress of

Fifty Years”. It is acknowledged that due to limitations and inaccuracies of reporting in earlier editions, there are discrepancies regarding the rate of growth of agriculture from decade to decade, but there are two significant factors that are noted as shifting the scale and scope of American agriculture: California, and global trade.

“Moreover, the discovery of gold in California and Australia, and the resulting vast increase in the production of that metal affected the whole scale of prices and became a factor in increasing farm values and in bringing to this country great numbers of immigrants... The same decade [1850 to 1860] witnessed a great development on the Pacific coast mainly due to the discovery of gold. The rapid settlement of California and the prosperity which followed stimulated the opening of new lands all along the Pacific coast” (USCB 1902, xvii).

The concentration of wealth in California and the continued globalization of trade and economic capital discussed here, would continue to perpetuate issues of water scarcity in the state up until and continuing into the 21st century. The value of Californian and its’ agriculture drew the railways west and brought settlers from around the globe, and created a market for American citrus and wine, all while relying on an ever-diminishing resource.

By 1910, California is listed as the 12th most populous state in the nation, as the population had nearly doubled to 2,377,549. This census report focuses on addressing the conditions of agriculture by state rather than collectively, which allows me to focus solely on California. In the California chapter, nearly half of the pages are given over to the topic of irrigation in the state. This suggests that the irrigation has become an increasingly important practice in agriculture, and from that we can assume that so has the value of water as a commodified resource. The chapter offers detailed tables showing the values and acreage of crops, as well as the costs of irrigating them, but I would like to draw attention to this statement, from the introduction to the chapter:

“The normal annual rainfall of the state ranges from 2 or 3 inches in the southeast corner to 60 inches in the northwest corner. Except in the southeastern part of the state there is sufficient rainfall for raising grain crops without irrigation, but irrigation is practiced to some extent throughout the state” (USCB 1913, 131)

This quote, though short, neatly summarizes that state of irrigation in California at this time. First, rainfall levels vary significantly between different parts of the state, with some areas receiving as little as 2 inches while other as much as 60 inches. Second, though rainfall provides adequate water for throughout much of the state, this is only necessarily true for one type of crop: grain. Third, and most importantly, it is recognized here that, regardless of rainfall levels, much of the state’s agriculture is irrigation dependent by this point. The popularity of irrigation may be best explained by Table 3, which compares the yields from irrigated and unirrigated land:

Following Table 3, the author warns against simply comparing the yields and arriving at the conclusion that irrigated fields are more productive; in fact, they reiterate that irrigation is only practiced as a necessity. Perhaps this is wishful thinking by authorities, as the content of the report seems to indicate otherwise; further, by looking at this table, it would likely be difficult to convince a business-minded farmer that irrigation was not the more productive option, and therefore more profitable practice to engage in as a grower in California. The discussion around this table reflects what can be understood as an effort to reduce the importance of

irrigation to agriculture by authorities, a theme consistent throughout these reports and others, as I will demonstrate in the following sections.

Table 3. Table showing the average yield per acre of leading crops in California, produced on unirrigated land versus irrigated land. With the exceptions of alfalfa seed, timothy and clover, all other crop types have a higher average yield per acre on irrigated land. Table reprinted here from the 1910 census agricultural report.

CROP.	AVERAGE YIELD PER ACRE.		
	On unirrigated land.	On irrigated land.	
		Amount.	Per cent of excess over yield on unirrigated land. ¹
Corn.....bushels..	22.9	27.6	20.5
Oats.....bushels..	21.1	34.9	65.4
Wheat.....bushels..	12.7	18.1	42.5
Barley.....bushels..	22.0	23.7	7.7
Alfalfa seed.....bushels..	2.9	2.3	-20.7
Dry edible beans.....bushels..	21.0	21.5	2.4
Timothy alone.....tons..	1.54	1.40	-9.1
Timothy and clover mixed.....tons..	1.51	1.04	8.6
Clover alone.....tons..	2.41	2.29	-5.0
Alfalfa.....tons..	3.06	3.49	14.1
Other tame or cultivated grasses.....tons..	1.30	1.64	26.2
Wild, salt, or prairie grasses.....tons..	0.92	1.24	34.8
Grains cut green.....tons..	1.25	1.44	15.2
Coarse forage.....tons..	2.27	2.52	11.0
Potatoes.....bushels..	132.9	158.2	19.0
Sugar beets.....tons..	10.48	11.70	11.6

¹ A minus sign (—) indicates that the yield on irrigated land is less than that on unirrigated land.

The population is continuing to grow steadily, reaching 3,426,861 by the 1920 census. At the same time, increased agricultural productivity at the national level has led to a push to have the census agricultural report published more frequently. In 1919 it is voted by Congress that following the 1920 report, a 1925 report will be issued along with subsequent reports every 10 years after, thus reports were now to be published every five years.

The 1920 census does not contain an introductory text or general analyses, but a full report on irrigation is included. It is here that we begin seeing a distribution of irrigation (as seen in Figure 12) that aligns closely with the current distribution of the critically depleted ground-water basins shown in Figure 2.

The 1920 census draws attention to the state's climatic conditions, which suggests a greater concern for the constraints of rainfall than before and awareness of the variability of rainfall levels within the state. In addition, the source of water supply for irrigation practices in each region is discussed at length, indicating a greater concern with water resources. In the case of the San Joaquin Valley, it is remarked that the wells in the area which have been dug in greater numbers and depth over the past decade, were unusually dry in the year 1919, again showing an emerging concern about water scarcity. Finally, a summary of the laws relating to water rights in the state is provided, with special attention given to a 1913 amendment seeking to "eliminate the conflict between riparian rights and right by appropriation by providing that owners of riparian lands must put water to use in order to retain their rights" (USCB 1922, 131). Likely not coincidentally, 1913 was also the year that the Los Angeles Aqueduct was completed, thereby cementing that city's water grab from the community of Owens Valley and signaling an end to the state's infamous water war (to be discussed further in Chapter 5).

The position that rights to water were determinable by the use of it was becoming increasingly enshrined in California water code. In time, it would become the underlying principle for the decision in *Pasadena v. Alhambra* (1949), the court case that incited unchecked pumping from already over drafted groundwater basins (see discussion below).

The first census agricultural report to be written independently of the decennial census, the

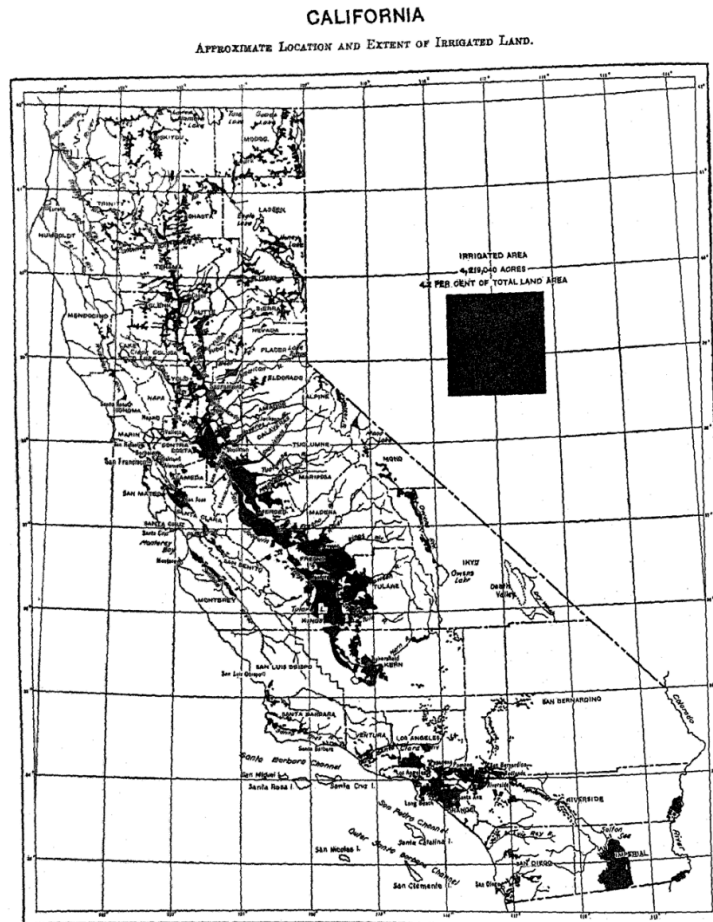


Figure 12. Map of California titled "Approximate location and extent of irrigated land"; the state's irrigated land is mostly concentrated in the Central Valley. Map reprinted here from the 1920 census agricultural report.

1925 census of agriculture contains no descriptive texts regarding the findings from the census or conditions of agriculture in the country. Though the agriculture census reports had focused on greater systematization since 1900, this report marks the beginning of a shift away from using the report as a space for discussion of the state of agriculture. It is possible that at this time there was beginning to be a greater number of reports being published by other government and non-government agencies, thereby rendering the discussions and problematization of data herein superfluous. The interdecadal reports (such as the following 1935 report and the decadal reports after 1930) are increasingly comprised entirely of statistical tables and charts, demonstrating the degree to which the report has become a tool of a capital nature regime.

The decadal reports are still more detailed and the 1930 agriculture report for the fifteenth decennial census divides the nation into three regions: Northern, Southern, and Western. The population of California is now 5,677,51. The Great Depression is underway, though the scope of devastation that ultimately occurs is still unknown at the time of print. However, symptoms of the economic depression and early signs of the urbanization that followed it are evident in the brief introduction to the report:

“Farm labor which was very difficult to secure and very expensive in 1920 had become fairly plentiful and reasonably cheap in 1930... Consolidation of farms...is closely related to the increased use of improved heavy farm machinery... The growth of cities required land formerly devoted to farms. With the development of the automobile and fine highways this factor has become of increasing importance” (USCB 1932, 11).

The impact of the Great Depression on American agriculture was significant in many ways, but importantly, it cemented California’s Central Valley as an agricultural center. Migrant workers from the dust-swept Great Plains arrived in the Pacific state, which, with its’ wealth and established infrastructure, was cushioned from the fallout, and it was here that they settled.

The reports after 1940s become increasingly instrumental and more difficult to analyze. By 1940, the population of California has grown to 6,907,387. Though there is a brief introduction to the general report that purportedly addresses the history of the census and updates to it, there is little discussed here aside from definitions and enumerations. The census agriculture report has effectively become a purely statistical report.²¹

Though the general and state reports in the year 1950 offer little material for analysis, included in the agriculture report is a separate report titled “Irrigation of Agricultural Lands”. The state population has swelled considerably to 10,586,223 by 1950. In the agriculture report, it is written that, “*for the country as a whole, a greater increase in the acreage of irrigated land occurred from 1939 to 1949 than for any previous decade*” (USCB 1952, 9). For California the groundwater development in the San Joaquin Valley is mentioned as the second largest site of increased irrigation in the whole country. As seen in Figure 13, the report presents a map which indicates the density of irrigation in the San Joaquin Valley at the time.

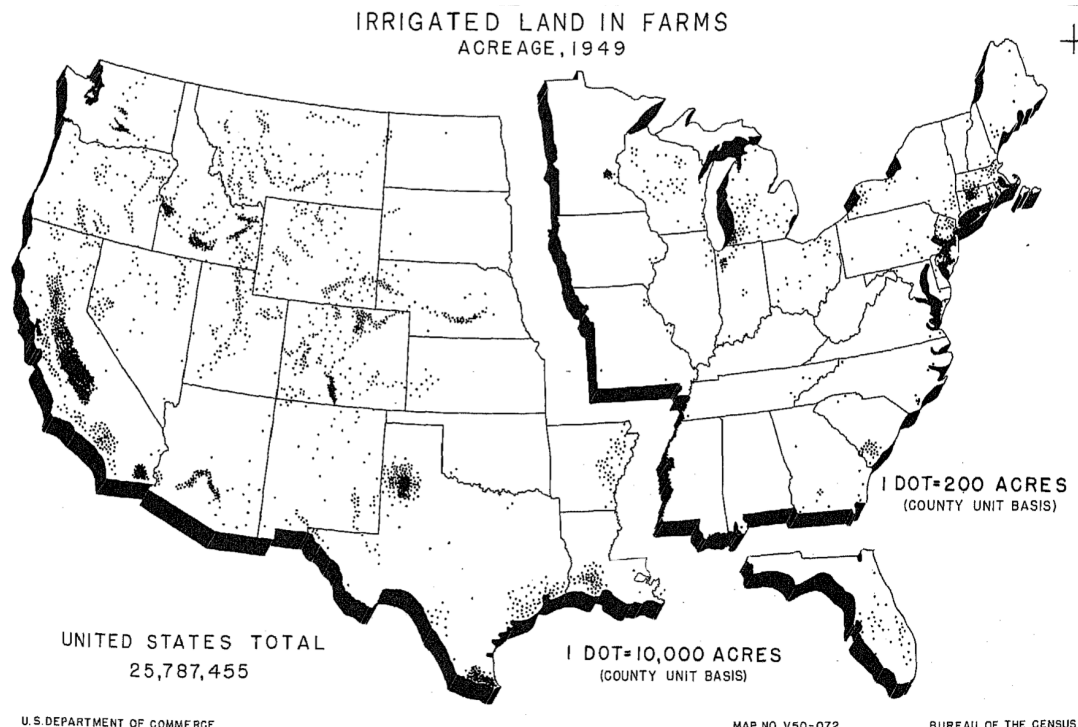


Figure 13. Map titled “Irrigated Land in Farms - Acreage, 1949”, showing that one of the most irrigated regions in the nation is California’s Central Valley. Map reprinted here from the 1950 census agricultural report.

²¹ For the 1945 census report, as was the case with the 1935 report, there were no sections suitable for analysis.

Nationally, the majority of newly pumped wells were in California. This intensity of wells is related to the *Pasadena v. Alhambra* court case that had been decided in the same year.²² The central issue in the case was an adjudicated groundwater basin; both the city of Pasadena and the city of Alhambra claimed rights to the Raymond Basin, and their conjunctive use of the resource was causing it to reach a state of overdraft (*Pasadena v. Alhambra*, 1975). Though much of the territory overlaying the groundwater basin belonged to Pasadena, Alhambra was able to successfully argue their rights to the basin as appropriators (*Pasadena v. Alhambra*, 1975). From the court's decision came the Doctrine of Mutual Prescription: prescribers, essentially unlawful appropriators who ignored established water rights to gain access to a water source, were recognized as having a lawful right to a proportional share of the basin (DWR 2003). Prescribers' rights were allotted based on demonstrated use over the past 5 years; hence, growers raced to use groundwater to ensure their claims (Hundley Jr. 2001). At this same time, the state was also the recipient of the greatest amount of federal investment, with approximately \$640 million being put towards projects to develop irrigation infrastructure. One hundred years after California made it into the census agriculture report, the agricultural values that ex-governor Downey had foreseen so clearly in 1860 were realized, but unfortunately his warnings of the scarcity of water had been ignored.

4.3. Bulletin 118: The technification of groundwater

Following the instrumentalization of the census agriculture report, it becomes necessary to look elsewhere for discussions of groundwater and agriculture in the state of California. I will now turn to selected editions of Bulletin 118, a series of technical documents produced by the California Department of Water Resources (DWR).

In 1966, the first edition of Bulletin 118 was published; it is an evaluation of the Livermore and Sunol Valleys groundwater basins. Originally published as an appendix to another report, a mere side note to an investigation into chemical quality and discharge of an Alameda watershed, the information regarding the depletion of groundwater basin levels was compelling enough that the report was printed independently under a new number, becoming Bulletin 118. The first edition of Bulletin 118 was based on geologic survey and also quite instrumental and limited in scope. Although the mere presence of the appendix does suggest an increasing concern there is no discussion on the matter in this first report. The subsequent editions of Bulletin 118 published in 1975, with an update in 1980, and in 2003, were statewide and more detailed. The 2003 update is currently the most recent edition of the Bulletin 118 report; the next edition is expected to be released in 2020.

The foreword to the 1975 report immediately defines the intended purpose, to “*summarize[s] the known technical information on ground water basins and the extent of their water supplies throughout the State*” and to “*discuss[es] the ways in which ground water basins have been used and misused in the past and suggest[s] better management mechanisms for the future*” (DWR 1975, iii). It is suggested that a better management practice would be that which maximizes the usage of both ground and surface waters, and a revised groundwater law is recommended as it will “*enable more effective use of existing groundwater resources*” (DWR 1975, iii). It is clear from these formulations that, despite the concerns of overdraft and contamination, the actual aim of the report is to determine how best to continue using the resource rather than to mitigate environmental damages or long-term costs.

²² The case had originally been brought before the court by the city of Pasadena in 1937; the decision in 1949 was based on an appeal by one of the parties.

In the first chapter the authors of the report opt to present their findings and recommendations from the study; among other points they stress that:

“Water from California’s ground water basins has been the most important single resource contributing to the present development of the State’s economy, because water was readily available with low incremental development costs” (DWR 1975, 3).

This statement is striking when compared to the emerging debate presented throughout the census reports, which consistently downplayed the importance of irrigation to agriculture. The statement is even more conspicuous given that this is a technical report produced by an agency that has not been tasked with speaking to the economic development of the state.

The 1975 Bulletin 118 report goes beyond its authority in other statements, as well. Chapter 2 of the report focuses on the resource – its’ origins, how it develops and cycles. Here, the presence of ‘man’ is described as a disruption to the natural balance of the basins:

“Until a basin is used by man, the amount of water that enters through any recharge area of the basin is equaled by the quantity of water discharged in some manner from the basin” (DWR 1975, 7).

This argument is continued later on, when the difference between native plants’ usage of groundwater is compared to irrigated crops and landscapes. The native plants require less water and can rely on rainfall alone, while agriculture drains basins and requires an (implied) unnatural system of artificial recharge dependent upon imported water sources. Yet, groundwater itself is recognized as a key factor in creating the system which now threatens it, as its’ availability allowed for settlers to occupy every part of the state and engage in agriculture even in areas that were it is otherwise dry for 6 straight months every summer. Ultimately, as the 118 report argues that groundwater enabled the growth of the state’s urban and agricultural economies.

The dangers of unchecked groundwater drafting, and even of merely poorly managed groundwater basins, is discussed in a section that places blame largely with the law. *Pasadena v. Alhambra* (1949) is mentioned as the legal precedent in cases of adjudicated basins; the ruling is criticized as based on lack of hydrological knowledge. The authors of the 118 report go on to say that the *Pasadena v. Alhambra* ruling created a harmful precedent of a “safe yield concept”²³ (DWR 1975, 124). The recently decided case of *Los Angeles v. San Fernando* (1975)²⁴ (referred to in the foreword) is anticipated as a remedy to *Pasadena*. The court’s decision in this case, brought by the city of Los Angeles against a number of neighboring cities that had claimed mutual prescription rights to groundwater derived from the Upper Los Angeles River Area (ULARA), drastically limited the rights of prescribers’ in ruling that the doctrine did not hold against public entities. The decision also established a ‘right to store and capture imported water that would best align with the management practice of conjunctive use that the report advocates for here. Still, the report notes that,

“The next important consideration is the need to establish a framework for more complete control and management of groundwater basins in conjunction with surface water supplies for the benefit not only of the local landowners but all the people of California” (DWR 1975, 126).

²³ As discussed earlier, *Pasadena v. Alhambra* led to increased groundwater pumping as it based ones’ right to the basin upon the amount that they used in a 5-year period; thus, the greater amount used, the greater claim, but what this caused was the rapid depletion of many adjudicated basins.

²⁴ The case was initially brought in 1955 by the city of Los Angeles; the decision in 1975 is based on an appeal.

More than 40 years later, such a framework still is yet to be established, but here we can see the early foundations for a transition to a technonature regime in the state. Under a capital regime of nature, groundwater has been valued only so much as it contributes to production. This report calls for a more nuanced understanding of the resource, ‘for the benefit of not only the local landowners’, i.e. those that can profit from groundwater usage, ‘but all the people of California’. This seems like a valuable shift in the discourse around the resource, the recognition that groundwater has a value other than what it offers as a means of production. However, it is suggested that this be done by establishing ‘a framework for more complete control and management of groundwater basins’; it is this line that suggests a move away from capital nature and towards technonature. The conditions of a technonature regime are not so easily definable or identifiable, and Escobar admits there may be many versions that emerge. But, technonature is likely what occurs once society is post-nature, once we no longer recognize an ‘essential’ state of nature. In this case, what groundwater was before the presence of man – its essential state – is no longer a point of importance here, as the discussion revolves around the resource only as it exists as the iteration we have created; it can only be further controlled.

Written only 5 years after the publication of the initial statewide Bulletin 118 report, the 1980 update came about as a response to the promulgation of Water Code Section 12924. The Water Code Section 12924 is an addition to the California Water Code that establishes need for the identification of the state’s ground water basins based on geological, hydrological and political boundaries (when practical). This codification of groundwater basin boundaries significantly reduced issues of adjudicated basins, as it made clear who held overlying rights to the basins, and it also allowed the DWR to identify what basins were most susceptible to overdraft and who could be held responsible in such cases. The findings, presented in the 1980 update, are largely the same basin boundaries that are used today. As the 1980 update came about as a response to the new Water Code it is extremely politicized in its discussion of the issues. Immediately, the foreword to the report opens with the following:

“Ground water management is a major issue in California. The Governor’s Commission to Review California Water Rights Law, in its December 1978 report, recommends a new ground water management law for California... to date the only related legislation enacted was SB 1505... which directed the Department to identify the groundwater basins of the State, including those subject to critical conditions of overdraft... Ground water management is an institutional and a political process.” (DWR 1980, iii)

The definition of ground water management as ‘institutional’ and ‘political’ is new in this context: the statement that environmental issues could be political, embedded in institutional and economic issues would not have been accepted in an official report even 20 years earlier. The first federal environmental law had only been passed a decade before, in 1970, and the early laws were relegated to factors which could not be controlled physically or owned, such as air – but in California, because of the old rulings water was first and foremost property. For the entirety of the state’s history it had been regulated minimally, and yet here in the 1980 update is a call for an institutional overhaul of the system.

This call is certainly important and political in an unprecedented way, perhaps even more influential in the 1980 update, because it offers the first definition of “subject to critical conditions of overdraft”. The 1980 update identified 11 basins that fit the critical overdraft conditions, thereby identifying and defining the problem which the new water law SGMA that will be discussed in Chapter 6, aims to solve. The definition of critical conditions of overdraft in the 1980 update is as follows:

“A basin is subject to critical conditions of overdraft when continuation of present water management practices would probably result in significant adverse

overdraft-related environmental, social, or economic impacts.” (DWR 1980, 11)

This definition was arrived at after an earlier suggested definition was presented in a public hearing and thereafter edited accordingly based on critical feedback that is documented herein. The newly defined and identified basins are then ran through, and the criterion for critical overdraft are applied. Here is an example:

“Natural recharge in Cuyama Valley falls far short of extraction, evapotranspiration, and outflow, and continual decline of groundwater levels is anticipated. Because of its remoteness, small population, and the consequent small financial base, so sound alternative for stemming this declining trend short of adjudication are apparent. Importation of water from distant sources for agricultural use appears to be beyond the payment capacity of crops currently raised or suitable to the area.” (DWR 1980, 30)

The situation described here perfectly illustrates the institutional and social aspects of ground water management in California, and why it has been so difficult to achieve adequate management practices under a capital regime of nature. Resources such as ground water that are relatively natural to the environment become commodified and sold in a market that fosters unsustainable practices such as growing cash crops for profit in areas unsuited to them.

In the 2003 update, the center of debate of the Bulletin report has changed significantly – now, it is accepted that groundwater is an important resource for the state, while that same idea was one of the key findings presented in the 1975 edition. The definition of ‘overdraft’ as discussed in the 1980 update is no longer a concern, but the looming threat of droughts and population growth is²⁵. The 2003 update opens as follows:

“Groundwater is one of California’s greatest natural resources. In an average year, groundwater meets about 30 percent of California’s urban and agricultural water demands. In drought years, this percentage increases to more than 40 percent. In 1995, an estimated 13 million Californians, nearly 43 percent of the State’s population, were served by groundwater. The demand on groundwater will increase significantly as California’s population grows to a projected 46 million by the year 2020. In many basins, our ability to optimally use groundwater is affected by overdraft and water quality impacts, or limited by a lack of data, management, and coordination between agencies.” (DWR 2003, iii)

The future for California that ex-Governor Downey warned against has unfortunately been realized by this point, and that this is now becoming a main concern is clear from the introduction of the report. By 2003, California is “*the largest food and agriculture economy in the nation and fifth largest overall economy in the world*” (DWR 2003, 20) due to continued reliance upon groundwater; it is a degree of “*economic success achieved in California [that] could not have been foreseen a century ago*” (DWR 2003, 24). Through the development of statewide irrigation infrastructure, water grabs from surrounding states, and an unregulated dependency upon groundwater, California has created an ‘agricultural empire’ so contingent upon the presence of water that its continued existence is now precarious. The report brings up the question of climate change as early as page 26 – citing the 2001 IPCC report confirming that climate change and global warming were real and happening. The 2013 update anticipates

²⁵ Though, it should be pointed out, in 2020 the population of California has not exceeded 40 million, far below the 46 million the report suggests.

that the state may experience flooding and increased snowmelt and runoff in the coming period; any likelihood of more frequent and severe drought periods is not mentioned.

In addition to terms like climate change and global warming, sustainability is also a discussion point in the 2003 report. After listing the unsustainable demands that will continue to be placed on the state's water system by increased growth in all sectors – industry, commercial, residential – the report concludes “*Perhaps surprising to many, California does not have a comprehensive monitoring network for evaluating the health of its groundwater resources*” (DWR 2003, 28). Given the long history of political and corporate interest in maintaining a strong agricultural sector in the state, this is actually not especially surprising. That the protection of groundwater would be treated as secondary to the protection of economic interests makes sense under a capital regime of nature, wherein nature is valued only as a means of production (see similar discussion in Escobar 1999).

To the extent that groundwater is ‘being managed’ in 2003, it can be summed up by a flowchart presented in the report (Figure 14) which indicates that the all groundwater management needs are carried out through local implementation efforts.

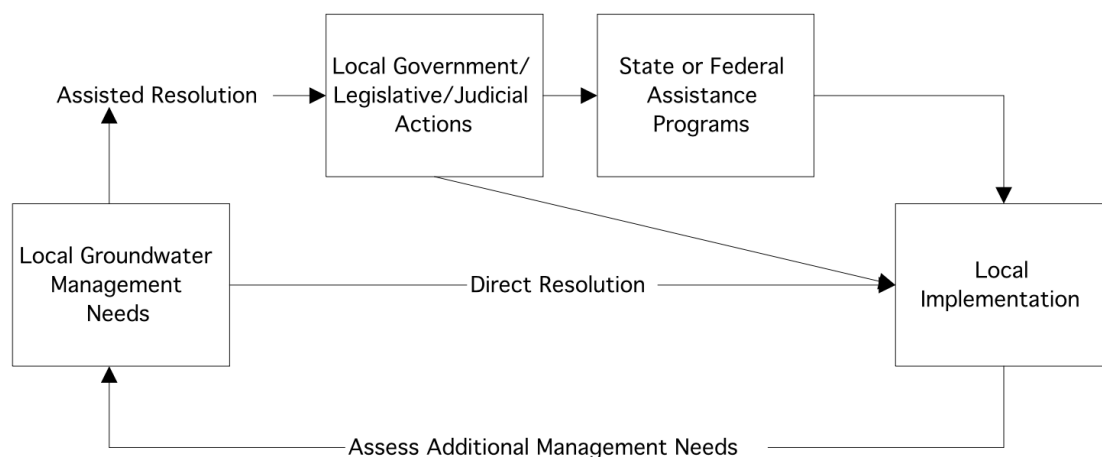


Figure 14. Flowchart presenting the process for addressing groundwater management needs in California in 2003. Figure reprinted here from Bulletin 118: 2003 Update.

For the most part, this is the same model which the SGMA later implements in 2014 (see discussion in Chapter 6), with the addition of loose requirements set by the state which are to be met by any agencies overseeing a critically overdrafted basin.

4.4. CDFA agricultural reports: The discourse during the drought period

In 2012, the California Department of Food and Agriculture (CDFA) began producing California Agricultural Statistics Overviews. These reports are very similar to the early editions of the census agriculture reports, and for that reason they were selected for review and analysis to provide an administrative perspective on the state of agriculture during the 2011-2019 drought period. The first report covers the 2011 agriculture season and it was at the end of 2011 that the drought officially began. Reports were then released for each year through 2017, with the exception of a report pertaining to the 2014 crop year. Here, I will focus specifically on the forewords and weather highlights as these are the sections most likely to reference the drought, though the reports were reviewed in their entirety.

The drought only started after the 2011 crop year was concluded, so the 2011 report can be read as a baseline for comparison between a non-drought year and drought years. In the foreword, the success of California agriculture is attributed to the “*industriousness and vision of*

a diverse set of people” who share “*a commitment as stewards of the land*” (CDFA 2013, 1). While the state’s Mediterranean climate is mentioned in relation to its role in the impressive agriculture industry, there is no mention of groundwater or water in general.

The weather patterns for the year are written about as being relatively typical, until December. This is the month that the drought begins, and the report reads:

“December began with a strong and cold but relatively dry, low pressure system... This pattern brought strong damaging winds to California, with Santa Ana conditions in Southern California. These down-sloped winds packed very dry air, and temperatures warmed under the sunny conditions. In fact, record-high temperatures were experienced in Sacramento as no precipitation was recorded. It also caused concern about wildfire hazards to the Southland.” (CDFA 2013, 7)

The foreword for the 2012 report, stands out in strong contrast. The report is written following a 13-month drought with significant effects on agriculture. Karen Ross, the CDFA Secretary who is the author of this and subsequent forewords, introduced the report as follows:

“As we present the finalized statistics for California Agriculture for 2012, what’s foremost in reader’s minds is the historic drought we’re facing for the coming year... Somewhat reassuring, though, is the important role the agricultural community has served in determining and shepherding a fair and effective state water policy. A previous generation of agricultural producers, along with other great visionaries deserves credit for developing a water collection, storage and conveyance system based on good stewardship principles that has allowed agriculture and the state’s economy to flourish... California agriculture adapts technology in ways that increase production while conserving resources. This demonstrates leadership in environmentally sustainable practices and lessens impact on precious resources.” (CDFA 2014, 1)

The quote from Ross is an important example of narrative creation. Here, she speaks of the ‘agricultural community’, conjuring an image of a collective of farmers working together for ‘a fair and effective state water policy’. In truth, the state’s agricultural sector is dominated by large-scale farm corporations that largely rely on lobbyists and political affiliations to ensure their continued rights to water. The ‘good stewardship principles’ that have benefitted the industry and economy did so at the expense of the environment and others’ welfare, arguably by the design of ‘great visionaries’ such as William Mulholland (engineer of the Los Angeles Aqueduct) (see further discussion in Chapter 5). Still, perhaps most tellingly is that in her praise of the state’s environmental leadership to ‘lessen impact on precious resources’ she does not say which resources those are; instead, she is purposefully vague as to what resources are being conserved.

Ultimately, the message conveyed here is how through human ingenuity and technology, nature can be beaten and the limits to growth strained further still. The weather highlights for the year detail the consistently dry conditions and higher-than-normal temperatures; however, these conditions are described as “*ideal for drying corn for grain and rapes for raisins*” (CDFA 2014, 6). When assessing this excerpt and the federally produced census agriculture reports and the DWR Bulletin 118 reports together, it is clear that these reports are produced very specifically for the Californian agricultural industry and its members. The census reports presented a national perspective on agriculture and so California was just one of many economically important regions; as such, its’ agricultural successes were often attributed to specific climatic qualities and resources, not the will of its’ people. Similarly, the DWR reported from the perspective of science and fact; the economic value of the state’s agriculture was

admittedly enormous, but it came at a dangerous cost to the environment and the future. In the CDFA report for 2012, as in the others reviewed here, it seems the goal is to develop and maintain a narrative of capital growth even in the midst of a historic drought.

The 2013 report is taken over by the National Agricultural Statistics Service; and there is no foreword included. Total sales values have increased by 4.6 percent from the 2012 crop year; the second most profitable commodity for the year is almonds²⁶. Per the weather highlights, rain systems that had developed in December 2012 continued to bring a small amount of precipitation through February 2013. However, by March conditions were generally dry, especially though Southern California. In May, fires broke out and continued burning throughout the state into July; sustained high temperatures “*caused an increase in irrigation for all crops*” even as “*There was growing concern over diminishing waterholes in the foothills of the Sierras*” (CDFA 2015, 5). That irrigation increased in the midst of a record-breaking drought, despite concerns about low water levels, seems somewhat contradictory to the claims of “good stewardship” that were discussed in the previous report.

There is no available report for the 2014 crop year, however the 2015 edition returns to the leadership of CDFA, and I find these quotes from the foreword to be most representative of the role of this agency in perpetuating a capitalist narrative:

“The 2015 Crop Year Statistics tell of triumphs and challenges for California agriculture set against a backdrop of a fourth consecutive year of drought. Farm cash receipts decreased for the year as did the state’s agricultural exports... But the numbers are part of a bigger picture of growth for the agricultural sector in the long run—which is positive news for our resilient state and nation, and our trading partners.” (CDFA 2016, 1)

In 2014, and again in 2015, the Governor of California declared a state of emergency due to the fires that swept across the state, caused by the devastating effects of the drought on the landscape. The 2015 report in no way alludes to the destruction brought about by the drought and instead suggests that there is growth in the long run, including dividends for trading partners. The complete lack of discussion of the negative effects of the drought and the potential long-term consequences of its presence is demonstrative of the capitalist narrative that drives these reports. The report focuses almost exclusively on production levels and domestic and global markets, thereby creating a narrative of a flourishing agricultural sector by purposefully excluding other factors from the discussion. It is during this time, following the passage of SGMA in late 2014, that the billboards along the 1-5 asking ‘Is growing food wasting water?’ began to appear.

Per the weather highlights, though there was more precipitation throughout the 2015 crop year than 2014, temperatures in multiple parts of the state and for numerous months were record-breaking. Finally, it is mentioned briefly in the last paragraph of weather highlights that “*The National Drought Mitigation Center’s Drought Monitor maps for December 29, 2015 depicted 69.07% of the state as categorized as experiencing exceptional to extreme drought conditions*” (CDFA 2016, 7). There is nothing more said about this matter throughout the remainder of the report.

The drought is conspicuously absent in the foreword for the 2016 report. Instead it is reported how agricultural value and exports have increased again, and attention is turned to the industry which “*both leads and serves in finding and implementing solutions to the challenges we confront—from resource allocation to climate change, and feeding a growing population*”

²⁶ Almonds are reportedly an extremely water-intensive crop, and much was written about the decision to farm them in California during a historic drought. However, California is the primary producer of almonds for the global market.

(CDFA 2017, 1). The drought is also mostly ignored throughout the weather highlights, aside from the very last lines which read: *“The state’s five-year drought was significantly mitigated in the North State by the heavy October and December rains. The southern portion of the state continued to be parched as 2016 drew to a close”* (CDAF 2017, 6). The hidden significance of this quote must be understood in relation to that a significant portion of the state’s agriculture is concentrated in the central and southern regions of the state.

Though the state was not out of the drought by 2017 - and in fact the worst year of wildfires was yet to come in 2018 - the 2017 report conveys a sense of hopeful relief as conditions improved slightly from 2014 and 2015. California agricultural values and exports continued to increase, unsurprisingly unaffected by the lingering drought. This sets the tone of the foreword, wherein it is written that *“a worldwide demand for food...is growing rapidly, and a corresponding demand for California-grown products that will bring tremendous opportunity for producers able to maintain sustainability in the face of climate change”* (CDFA 2018, 1). Here it seems that sustainability is used as little more than a token buzzword, given the idea proposed in this sentence fails to mention or problematize that ‘sustainable’ and ‘growth’ in California may over the long run be incompatible. The weather highlights are similarly disingenuous, as the drought is not mentioned once even though it is written in the 2018 that in December, *“dry conditions prevailed in the state. Santa Ana winds in southern California drove several fires to grow rapidly, including the Thomas Fire in Ventura and Santa Barbara counties. This fire eventually became the largest fire in state history”* (CDFA 2018, 6).

That the critical depletion of groundwater basins caused by increased pumping during a catastrophic drought goes unmentioned here is conspicuous. The lack of attention given to the state’s environmental conditions during this year is undoubtedly purposeful, as it would likely be source of unease for speculators to learn or be reminded of the environmental precarity of the nation’s most profitable croplands. The inclusion of terms like ‘sustainability’ reads like an attempt at green-washing the agricultural industry, as these corporatized buzzwords are offered in place of any practical commitments to resource conservation or degrowth efforts. All of this is demonstrative of the degree to which the state and industry still operates within a capital regime of nature. Even the technological solutions for issues ‘from resource allocation to climate change’ ultimately aim to circumvent the limits of nature for the sake of sustained capital growth rather than sustained environmental health. Still, that the CDFA reports would choose to focus on economic security over environmental stability even during a drought should be expected. While these reports contribute, harmfully, to the continued narrative of agricultural exceptionalism in California, they are ultimately a symptom of the system of capital nature, not the cause. To better understand what led to the development of the capital nature regime, we must examine what was happening beyond the discussions allowed here in these government documents.

5. Stories of Water and Politics

Central to this story...is the appearance of a new kind of social imperialist whose goal was to acquire the water of others and prosper at their expense.²⁷

How have the narratives around California water and groundwater emerged outside of the purview of government structures and scientific reports? The previous chapter outlined the rise of the capital regime of nature in California and how this shaped the discourse around groundwater through reports that operated as tools of that regime. Generally, these reports are not read by the public at large, however there is often a degree of intertextuality here in official discourse and popularized historical accounts. As discussed in section 2.2.2., the publications of the water conflicts in California are too numerous to fully cover here. I have instead decided to present two books - each widely regarded as a seminal perspective on the topic of water in California - that have offered two very different stories. *Cadillac Desert: The American West and It's Disappearing Water*, was first published in 1986 by environmentalist Marc Reisner, with a revised version following in 1993 and an updated afterword being added in 2017. The second book, *The Great Thirst: Californians and Water, A History*, was originally published in 1992 and revised in 2001 by author, historian and academic Norris Hundley Jr.

In comparing these books, it is important to consider the narrative choices that each author makes. As an environmentalist, Reisner intended *Cadillac Desert* to be read both as a historical account of water governance in the American West and an expose of the federal profiteering that created the system. Hundley Jr., an academic, took care in crafting a comprehensive and objective history of water law and policy within California. The result is that, even as these books cover many of the same events, they ultimately tell two different stories. The two narratives reflect the wide scholarship on water politics in California and similar sentiments that have been brought up in the earlier chapters of this thesis. To explore the tension – both historical and narrative – that surrounds California groundwater, I build this chapter by contrasting the two authors representation of key events in the water politics of California, drawing inspiration from William Cronon's comparative analysis of historical narratives.

5.1. The Homestead Act and the Swampland Act

The United States national ideology of much of the 19th century (and arguably, the 20th and 21st centuries) was shaped by the presidency of Thomas Jefferson, Founding Father of the United States and its elected leader between 1801 and 1809. Jefferson believed in the superiority of an agrarian society, and for decades after his tenure, this ideal continued to inflect policies set forth by the federal government as the nation's borders expanded towards the West coast. This ideological foundation is raised by both Reisner and Hundley Jr. in their discussion of the policies which came to define – both literally and figuratively – the landscape of California. However, the authors have somewhat different views on how and to what extent national policy came to shape water management in California.

²⁷ Hundley Jr. 2001.

According to Reisner, the ‘160 acres’ defined by the Homestead Act of 1862²⁸ represented “*the ideal acreage for a Jeffersonian utopia of small farmers*” (1993, 41), but ultimately resulted in the failed land policies of the American West. Penned by government officials from the Eastern U.S., the Homestead Act and its incarnations – such as the Swamplands Act of 1861 – were based on a flawed understanding of the land and waterscapes of the West. While in the East 160 acres was enough to sustain a profitable farm, in states like California and Utah, land was only profitable if it was irrigable. Due to the reigning doctrine of riparian rights (another policy imported from the East), irrigation was effectively controlled by those that owned the land adjacent to the rivers. Thus, the few that were able to irrigate their holdings did, and with the profit they earned from their farms bought the land from struggling neighbors and expanded their irrigation systems and agricultural empires. In Reisner’s argument, the 160 acres principle constituted a structural flaw in federal policy which was then adopted by states, thereby deepening the problem of allotting land parcels that could only be farmed using irrigation.

Meanwhile, Hundley Jr. recognizes how state policies such as the Reclamation and Swamp-land Act of 1861, designed with “*the Jeffersonian emphasis on laissez-faire and localism*” (2001, 79) was meant to address specific Californian environmental challenges, which, at that time, was primarily focused on the problem of flooding rather than droughts. As we have seen from the previous chapter, though the need for irrigation was discussed as early as the 1890 census report, the problem of droughts was rarely brought up in any of the census reports. Hundley Jr. links the early efforts to mitigate flood damages in California to Jeffersonian policy, arguing that they “*reveal[s] how public policy-making in California resonated with decisions made in Washington*” (Hundley Jr. 2001, 79). In California, this generally translated to a resistance towards statewide infrastructure and planning (this argument should be seen against the background that prior to the passage of the Homestead Act or the Swamplands Act, there was a general distrust in centralized power in America, as the memory of monarchical control and the Revolutionary War was still fresh for many). However, following the outbreak of the Civil War, as the need for centralized planning became apparent, there was a softening of sentiments towards what Hundley Jr. calls “activist” government - meaning one which works to promote general welfare – which led to the passage of the Swamp-land Act (Hundley Jr. 2001, 81). The goal of the act was to develop a plan for large-scale flood prevention infrastructure designed according to the specific topography of the region, an important topic at the time as the 1860s saw a number of extreme flood events.²⁹ The plan was to be decided by the Board of Swamp-land Commissioners, the first independent state agency in California. In an effort to ‘decentralize’ and accommodate lingering fears about central powers, the actual funding and construction of said plans was to be carried out by local swamp-land districts, comprised of at least 1/3 of landholders in a given region that petitioned their right to reclaim the land. Ultimately, however, the effort failed, not for lack of trying but for lack of adequate information and planning; it was reversed and replaced with the Green Act of 1868, a political return to the individualized ideals of a Jeffersonian society. Over time, the

²⁸ The Homestead Act of 1862 was an initiative designed to encourage Western migration. Enacted by President Abraham Lincoln, the Homestead Act allotted settlers 160 acres of public land for a small fee and an agreement that after 5 years of residence, they would be granted ownership; alternatively, the land could be purchased for \$1.25 per acre after 6 months (Library of Congress, 2018),

²⁹ Between December 1861 and January 1862, it rained for 43 days; the resulting flood was referred to as the “Noachian Deluge of California”. (Ingram 2013)

emphasis on individualization propagated the monopolization of land and resources throughout the state. By 1871, “a total of some 430,000 acres of swampland, or an average of approximately 16,300 acres apiece” was the property of a mere thirty landowners.

Whatever the underlying mechanisms for the large-scale acquisitions of land, both authors agree that the monopolistic acquisitions that came to dominate the Californian landscape developed as the result of buyouts and outright fraud. In discussing this, the two authors recount the same rumor of wealthy landowners hitching boats to horses to lay their claim to land (the requisite level of proof to acquire an allotment under the Swamplands Act was that a boat could be sailed across the flooded region; what constituted ‘sailing’ was often loosely defined). From Reisner we are given more background to this story - he attributes it to the water baron Henry Miller, of the Miller and Lux Corporation, beneficiary of the 1884 court decision in *Lux v. Haggin* (see Chapter 4).

5.2. The Water War

This next chapter in California’s water history has been written about, discussed, and mythologized extensively. The water wars, a series of escalating political conflicts between the city of Los Angeles and the residents of Owens Valley, are perhaps the best-known period of the state’s water history as they offer a vivid encapsulation of the aggression and corruption by which powerful actors in the state sought to bring water under their control. Yet, though the ecological and economic fallout from the events had very real and lasting effects, there is some debate as to how much attention the water wars should be given in the grand scheme of the state’s long history of water grabs. Hundley Jr. devotes just over 20 pages to recounting the events, as a smaller part of a greater discussion of the state’s “urban imperialism” (2001, 121); in comparison, Reisner spends an entire 48-page chapter (titled “The Red Queen”) detailing the situation (1993, 52).

William Mulholland, the superintendent of the Los Angeles municipal water system is a main character in both narratives. In Hundley Jr.’s version he is by and large the only actor in the plan to divert water from Owens River. Here we meet a Mulholland who, through his own ingenuity and shrewdness, effectively created the city’s municipal water system, shoring it up as the population grew and earning the status of “*the highest-paid public official not only in the city but also in the state*” (Hundley Jr. 2001, 144). This, Hundley adds is perhaps the “*surest measure of water’s importance to Los Angeles*” (Hundley Jr. 2001, 144). In Hundley’s narrative as the growth rate of the city began to outpace the water sources Mulholland began planning for an aqueduct that would not only provide water but would bring a continuous flow to the city for decades to come. Here, Hundley Jr. skims over the involvement of the characters that caused the most scandal at the time – Joseph Lippincott, an engineer with the Bureau of Reclamation with a side job in the private sector, and Fred Eaton, former mayor and water engineer with financial interests vested in the diversion of Owens River. By excluding these characters Hundley also misses to mention insider trading and syndicates in favor of a narrative of an opportune and efficient Mulholland – a single hero in a functionally adapted and necessitated response to an emerging water crisis.

While Hundley Jr. focused on Mulholland, Reisner begins his history with a summary of the events that brought Harrison Gray Otis to Los Angeles in 1881, where he would work his way up through the ranks of one of the city’s newspapers. Reisner then profiles Harry Chandler, a rival paperman turned son-in-law of Otis, before turning his attention to Mulholland and Eaton and Lippincott. These men, we will come to learn, are the villains of the story. We are then introduced to Joseph Clausen, an employee of the Bureau of Reclamation under Lippincott who distrusts his superior’s double-dealings, and Wilfred and Mark Watterson, brothers and

president and treasurer of Inyo County Bank, the primary bank for Owens Valley residents. *“The Wattersons rarely refused a loan and often stretched out debts; they displayed a strong interest in the valley’s survival”* and along with Clausen and Congressman Sylvester Smith, they are the heroes of this story Reisner writes (1993, 66).

The difference in narrative is in part explained from the different focus in the two books. The focus of Hundley Jr. here is on the growth of the city of Los Angeles; thus, the insider trading and syndicates involved is less important in his version of the story. Mulholland’s exploitative efforts to acquire more water were never due to a need to sustain the city of Los Angeles, but rather to enable its growth. Yet, even though Hundley Jr. brings up the ruination of Owens Valley’s residents due to the building of the Los Angeles Aqueduct - including the remaining Paiute tribe members who has lived in the area for an unknown number of centuries – Mulholland in Hundley Jr.’s story remains a hero, albeit with a tragic ending³⁰. Hundley Jr. describe Mulholland’s as a *“Progressive expert...much admired for his ability to meet the complex challenges of modern urban America”* (2001, 169). Reisner, however, having laid out the cast of characters, and tells the story of how a group of wealthy men with connections to the President of the U.S. wielded their political power to disenfranchise a small town of mostly good people who did their best to survive but were ultimately no match against the wealthy with political influence.³¹

Still, perhaps the greatest impact of Mulholland on the state of California was to grow Los Angeles beyond expectations, and even beyond desire. As Hundley Jr. notes, the sprawl of that urban metropolis through the Southern California desert was ominous enough to make the state legislature, inspired by a mix of fear and disgust with the political power grab, to *“enact a county-of-origin law (a statute authorizing a county to retain within its borders water originating there and required to meet future needs)”* in 1931 (2001, 171). Reisner ultimately arrives at a conclusion similar to Hundley Jr.: the growth of Los Angeles, and the means by which that end was achieved, should be equally considered cause for concern as much as admiration.

5.3. The Central Valley Project

Before discussing the policies and politics that preempted the reconstruction of California’s waterscape during the twentieth century, each author pauses briefly to reflect on the state’s landscape. Reisner opens the chapter (titled “Chinatown”, a nod to the 1974 Hollywood film) by exposing what he considers to be the truth about California: *“California, which fools visitors into believing it is “lush”, is a beautiful fraud”* (1993, 332). Reisner focuses on what he calls *“the fraud...perpetrated by man”*; that is, the total reconstruction of the state’s waterscape to create an environment and industries, none of which would be *“remotely conceivable within the preexisting natural order”* (1993, 333).³² Reisner immediately identifies the responsible party in the fraud; the agricultural industry, who uses 81 percent of the state’s water, and is one of the state’s most powerful industries³³. This is the thesis of Reisner’s argument to come: the agricultural industry, through its’ accumulation of economic and social capital, has created

³⁰ Hundley Jr. goes so far as to call Mulholland one of the “most tragic victims” of the events (2001, 167). Tainted by the true tragedy of a collapsed dam that killed more than 400 people, Mulholland was forced to resign from his posts.

³¹ Reisner uses the word ‘water’ often in this chapter, but by the end of it there is still less known about how the Los Angeles Aqueduct changed water policy in Southern California than about the conversation that occurred between Wilfred Watterson and a man named Leland (1993).

³² Reisner actually does make the point that *“More than any other thing, the Pacific high has written the social and economic history of California”* (1993, 333); despite making this dramatic statement, the role of the Pacific high is not mentioned again.

³³ *“Silicon Valley notwithstanding”* (Reisner 1993, 333).

a natural and political environment designed to serve its' needs, "*one of the country's foremost examples of socialism for the rich*" (Reisner 1993, 334). Reisner's account thus echoes my own analyses of California's capital regimes of nature, as discussed in the previous chapter where I have shown how census and agricultural reports often promoted the state's agricultural industry and disregarded the detrimental effects on the groundwater supply.

In contrast, Hundley Jr. begins by acknowledging that there had been plans to irrigate the state's Central Valley since the settlement of the state in the 1850's, but that "*experts had concluded that sustained productivity in the valley would require major manipulation of the state's waterscape*" (Hundley Jr. 2001, 235). Hundley, as he is wont to do, builds into his argument much more slowly, which focuses on the influence of national politics on the state during this time. He begins by laying out the conditions which Californians were faced with in the 1920's: the failure of the Reclamation Act to protect against land monopolies, and a rapidly declining water table following the introduction of the centrifugal pump. The pump was popularized in the years after World War I and led to the irrigation of millions of more acres of land, but quickly resulted in the "*unwanted side effects*" of land subsidence and increased irrigation costs (Hundley Jr. 2001, 239). Growers, large and small, came to the agreement that a comprehensive water plan was needed, but the first attempt at a substantive proposal in 1919 failed to gain traction due to nationwide agricultural surpluses. However, additional barriers to a state water plan, such as the supremacy of riparian law (see Chapter 4) and the state's inability to acquire and hold water rights, fell away by force or by fate over the next decade. By 1933, in the wake of the Great Depression, a comprehensive water plan was the popular choice. Here, Hundley Jr. establishes his thesis: shifts in the greater American political climate created the necessary conditions for the building of the Central Valley Project.

Reisner traces the beginning of the "*valley's obsession with bringing the rivers under control*" (1993, 335) to the unusually precipitous wet season in 1862 (see above); as the northern end of the valley was ruined by the collapse of mountainsides into the valley bed, individuals such as Henry Miller capitalized on the high waters in the southern end, claiming flooded lands per the Swampland Act (see above). While monopolistic landowners such as Miller could afford to build levees and canals to protect their lands, small farms struggled to irrigate their lands until the arrival of the centrifugal pump, which then only provided a decade or so of relief. The collective interest in a comprehensive water plan and the passage of the Central Valley Project Act in 1933 was not a decision made out of awareness for the needs of all, but the result of "*heavy lobbying from growers – who had become the biggest source of campaign contributions*" (Reisner 1993, 336). These same growers opposed the federal government's involvement in the project, thus the takeover of the project by the Bureau of Reclamation³⁴ occurred despite their best efforts, according to Reisner.

Hundley Jr., spends a significant amount of time detailing the political realignment that occurred in the United States after the Depression, writing that "*the crisis had profound consequences for American political culture generally as well as water policy and projects both nationally and throughout the West*" (2001, 247). It was at this time that the current divergent ideologies became entrenched in each political party; as Republicans embraced economic growth and social normativity through deregulation and restriction of immigration, Democrats became "*champions of centralized planning and a strong, activist government*" and eschewed corporate influence (Hundley Jr. 2001, 349). Still, the effects of the Depression on the economy were unifying for voters who wanted and needed relief and felt that an activist government would provide that. Growers in California were less enthusiastic about the political shift,

³⁴ Due to lack of funding options post-Depression, the state was forced to sell the bonds financing the project to the federal government, thereby making it a public work and the water a public good.

though; while they accepted the need for centralized planning for the purpose of a comprehensive water system, they were loath to submit to the federal regulations that conflicted with their business interests. Ultimately, however, the issue was decided when the federal government under Franklin D. Roosevelt refused to aid the state in the project unless it was conducted and remained under public power. The Bureau of Reclamation began work on the CVP in 1937; water arrived in the San Joaquin Valley in 1951, via a canal that had cost “*nearly half a billion federal dollars*” (Hundley Jr. 2001, 258).

When the federal government agreed to finance the CVP, the project became a public work, subject to federal provisions. This meant that any farmer with landholdings greater than the amount allotted by the Reclamation Act – 160 acres or 320 acres for a married couple – would have to forfeit their additional acreage in order to utilize CVP water (at least, as Reisner states, “*in theory*”) (1993, 337). After all, the purpose of the Reclamation Act - in the spirit of Jefferson - had been to encourage and support subsistence farmers, not agribusinesses for the wealthy. In reality, rather than creating new farms, the CVP primarily served large corporate landholdings, including those owned by DiGiorno, a Florida conglomerate; Southern Pacific (the railroad); and per a 1946 Senate report, Standard Oil, Belridge Oil Company, and Tildwater Associated Oil Company (Reisner 1993, 337). Rather than capitulate to the law, these growers parceled their land off into trusts and shares that they could control or fought implementation efforts in court in protracted legal battles that were often dismissed. The Reclamation Act was reduced to a hollow threat until, during the Carter administration, there began to be talk of enforcing the Act again; in 1982, the year after Carter left office, “*growers managed to lobby through the most extensive and...least justifiable revision of the law in its eighty-years*” (Reisner 1993, 340). The acre limit was increased from 160 to 960, and all additional restrictions were eliminated. With that, the Reclamation Act was fully defanged, and the power of the Central Valley growers’ unchecked.

In his discussion of the breakdown of the Reclamation Act, Hundley Jr. does not rush so far into the future timeline; he notes that enforcement of the reclamation laws was rare until 1943. It was around this time that Secretary of the Interior Harold Ickes was struck by “*the contrast between the miserable plight of migratory farmworkers and the success of agribusiness so vividly described in 1939 in John Steinbeck’s Grapes of Wrath and Carey McWilliam’s Factories in the Field*” (Hundley Jr. 2001, 263).³⁵ At Ickes’ suggestion of reclamation law being enforced, “*growers reacted instantly and bitterly*” (Hundley Jr. 2001, 265). Breaking from the theory of federal policy shaping California water projects, in this one example Hundley Jr. does credit California with determining the direction of policy. Following the death of FDR, under the Truman and Eisenhower administrations, capitalist ideals expanded to farms nationwide, and “*the traditional dream of government-fostered small farming, to aid social health, was dying*” (2001, 268). This was most evident in a ‘compromise’ introduced by the Reclamation Commissioner referred to as “*technical compliance*”; the Bureau would outwardly defend the law, but in California, it would allow and even inform growers of the most legally acceptable way to circumvent the restrictions of the law. California agribusiness leaders had successfully poisoned the well with regard to the Reclamation Act and its Jeffersonian ideals.

5.4. The State Water Project

³⁵ That literature can have an outsized effect on policy is not new or particularly special – often, literature is a prime method of bringing attention to topics otherwise deemed uninteresting – but for the purpose of this thesis it is thrilling to note that narratives constructed outside of the purview of government played a role in shaping government actions.

The Central Valley Project, even as it was being built, was not enough. The same businessmen that helmed the agribusiness corporations of the Central Valley and had just pushed a federal agency to the brink of corruption wasted no time in putting in place the foundations of the State Water Project. The SWP would serve two primary purposes: 1) being a state project, it would free growers from any remaining or resurfacing restrictions of the Reclamation Act, and 2) it would serve as a message to the Bureau of Reclamation to “*think twice before invoking reclamation law against those now benefitting from the technical compliance loopholes*” (Hundley Jr. 2001, 276).

There were additional reasons, as laid out by Reisner (Hundley Jr. mentions them as well). Some of the largest farms in the southern and western reaches of the valley lay outside of the region that the CVP served, and therefore were interested in an expansion or new development. But more importantly, the CVP, which had been touted as a solution to the issue of water scarcity and groundwater depletion, had in fact intensified the problem. An early influx of surface water in the area had temporarily caused some artificial recharge, but due to the lack of compliance with reclamation law, much of the water from the CVP was being used in the development of new lands, while groundwater was used both to irrigate old farms and supplement these new lands. This was a particular issue in the southern half of the San Joaquin Valley, which was also home to four of the nation’s six wealthiest and most agriculturally productive counties. In these counties, “*the farmers were like addicts, oblivious to their self-destructive ways; they were making so much money they wouldn’t think of groundwater legislation, and any politician who so much as uttered the phrase was instantly marked as a threat. (A hand-picked Fresno legislator named Ken Maddy once referred to groundwater regulations as “World War III”)*” (Reisner 1993, 342).

The farmers willing to wage this war over groundwater regulation had the resources to win; Hundley Jr. points out that one of the largest landowners in the region that would be served by the SWP was the Kern County Land Company, a “*direct descendant of the giant corporation created by James Ben Ali Haggin of Lux v. Haggin fame*” (2001, 277; see Table 4).

Table 4. Acres owned by companies in the region in 1959. Adapted from Hundley Jr., 2001.

Name of corporation	Acres owned in the region (% irrigable)
Standard Oil	89,810 (94%)
Kern County Land Company	223,534 (99%)
Buena Vista Associates	25,254 (100%)
Belridge Oil	24,627 (100%)
Tidewater Oil	23,009 (99%)
General Petroleum	16,619 (99%)
Shell Oil	15,353 (99%)
Occidental Land and Development Company	14,462 (98%)
E.M. and E.C. Still	13,039 (98%)
Richfield Oil	12,395 (98%)
Southern Pacific Company	11,605 (100%)
Southern Pacific Land Company	15,060 (100%)
Allison Honer Company	10,240 (100%)
Tejon Ranch	88,680 (96%)

Of the 14 companies favored by the SWP (see Table 2) only two seem to belong in agriculture, but Hundley Jr. is careful to note that the principal stakeholder for Tejon Ranch owned the Times Mirror Company, publisher of the Los Angeles Times. These agribusinesses were the primary users of groundwater in the region, which was being “*pumped at a rate acknowledged by both state and federal experts as “far in excess of replenishment”*” (Hundley Jr. 2001, 278). Some aquifers had been so severely depleted that they had compacted and could no longer be recharged, naturally or artificially. The justification for such excessive pumping was that one should “*make profits while you can, and when you cannot, persuade the government to intervene. As for the ecological damage, the less said (little was really said) the better*” (Hundley Jr. 2001, 278). Here, Hundley Jr.’s argument approaches Reisner’s original statement that the SWP exemplified a system of ‘socialism for the wealthy’ in California.

Still, in spite of the economic and sociopolitical capital these growers possessed, they required additional support and financial backing for the project. But, as Reisner points out, California in the 1940s was a much different state than it had been only twenty years earlier—urbanization had coalesced voters’ interests into a new configuration that was generally less attracted to subsidizing the cost of water infrastructure for the Central Valley. There was, however, one city always thirsty for more water. Los Angeles, since its’ acquisition of Owens River, had continued to develop its’ water rights around the West. Though the Owens River Aqueduct supplied the metropolis with enough water to meet its needs, the city had also established rights to a portion of the Colorado River and was encroaching upon the waters of Mono Basin as well; at the time that the SWP was being discussed, the city’s Metropolitan Water District (MWD) was attempting to procure a second aqueduct to the Colorado River. The abundance of water that the city had secured made it a less than certain partner to back the SWP, especially as the topography of the state made getting water over the Tehachapi Range to Los Angeles particularly expensive.

In 1945, “*the state legislature, responding to concerns about groundwater usage, acreage limitations, population growth and rapid urbanization took a major step towards creation of a state project*” (Hundley Jr. 2001, 279), approving the State Water Resources Act and thereby creating the Water Resources Board. By 1951, the board produced a report stating that the single greatest issue concerning the state’s waterscape was the need to redistribute water. That year, the California Water Plan was introduced by state engineer A.D. Edmonston, who had selected the Feather River for damming. Both Hundley Jr. and Reisner depict the process of approval as happening very quickly.³⁶ Any concern about the costs associated with the ambitious plan were quieted not with a plan but with paternalism.³⁷

The ideology, of water at any cost, was championed by no one as loudly and passionately as it was by Edmund G. “Pat” Brown, former attorney general of the state and in 1958, the new Governor. Pat Brown was a proponent of activist governing, and prior to his gubernatorial campaign he was approached by Edmonston, who successfully convinced Brown that “water was worth developing at any cost” (Reisner 1993, 348). It became his primary issue upon taking office, and both authors quote Brown directly: “*I was absolutely determined that I was going to pass this California Water Project. I wanted this to be a monument to me*” (Hundley Jr. 2001, 282; Reisner 1993, 349. Emphasis included in original). Brown’s determination paid

³⁶ Hundley Jr. writes that “the legislature advanced Edmonston’s plan with three major actions” (2001, 280) which included creating the DWR and appropriating certain funds, while Reisner’s description is that “no sooner was the California Water Plan released than a new agency, the Department of Water Resources, was created out of a jumble of fifty-two agencies that had previously dealt with water, and given administrative power to match” (1993, 346).

³⁷ From Edmonston’s report “*the water necessary for greatly expanded irrigation development will be provided, at whatever cost may be required*” (Reisner 1993, 346, emphasis in the original), and in the words of the DWR Director Harvey Banks, “We must build now, and ask questions later” (Reisner 1993, 347).

off; what little resistance he received from the MWD was ultimately a non-issue, as Los Angeles and Southern California did, in fact, agree to subsidize the cost of the project, and through his political ties he was lucky enough to secure a not insignificant amount of funds in the form of an annual interest-free loan of \$25 million, repayable "...*whenever*" (Reisner 1993, 353). This turned out to be an excellent deal for the Governor, who publicly stated that the cost of the project would be \$1.75 billion despite knowing that the cost was expected to be \$3 billion.³⁸ The source of the funding also stood to benefit another entity previously mentioned here, Tidelands Oil Company. Reisner provides this backstory: as A.G., Brown had nullified a signed contract that the city of Long Beach held which would allow them to absorb profit from a Tidelands Oil Company contract. This nullification instead allowed the state to acquire said revenue, which eventually became the \$25 annual loan, but Tidelands Oil company was also one of the corporate land holdings poised to benefit from the SWP. Thus, Brown was able to fund his monument to himself while Tidelands Oil Company profited off both the contract that funded the SWP and the water provided by the SWP.

At this point, the authors stories diverge. Hundley Jr. reflects on the minimal reporting done on the associated costs of the project³⁹ and outlines the myriad ways in which the growers of Kern County, including the Kern County Land Company, managed to subsidize the costs of the SWP water they received.⁴⁰ Hundley Jr.'s concluding thoughts on the rebuilding of California's waterscape are best captured here: "*The advocates of California's great hydraulic projects cared little about agricultural working conditions and less about studies pointing out the nature, extent and inequities of subsidized water for farmers. They preferred instead to emphasize what they and their predecessors had traditionally stressed: the state's enormous population and economic growth*" (2001, 301).

Reisner opts to travel forward in the historical timeline to 1974, when the DWR is once again worrying that a water crisis is eminent. Pat Brown's successor, Ronald Reagan, was a Republican and had purposefully stalled any efforts to further develop the SWP, but the new Governor is more amenable to the idea. Edmund G. "Jerry" Brown, Pat Brown's son, took up his father's old position and old project, though Jerry Brown embraced environmentalism in a way his father did not. His efforts were ultimately unsuccessful, with both growers and environmental advocacy groups rejecting the proposal, and voters' seemingly unconcerned about water scarcity in 1981 despite the recent 1976-1977 drought. Agribusinesses continue to monopolize the Central Valley; Reisner cites a 1981 report by the California Institute for Rural Studies, which examines property ownership in five water districts that receive water from the SWP. The majority of farms – 291 of 479 – qualified as small, with 160 acres or less, while 9 out of 10 farms were smaller than 1,281 acres. However, two-thirds of the total land, amounting to 227,545 acres, was owned by just eight companies (Table 5).

³⁸ Adjusted for inflation, that would be \$26.6 billion today.

³⁹ After two independent reports confirmed that the secured funds would be barely adequate to cover the stated costs, the *Los Angeles Times* ran a headline reading "GETS SOUND RATTING IN TWO REPORTS" while the *San Francisco Chronicle* reported "STATE WATER PLAN CALLED IMPOSSIBLE"; Hundley Jr. merely writes "So much for unbiased reporting" (2001, 287).

⁴⁰ Subsidies totaled nearly \$25 million per year, in part by purchasing surplus water from the MWD at a discounted rate on the condition that it would be used only "to replenish groundwater basins" (Hundley Jr. 2001, 297); in truth, the surplus water was used to develop new lands, and by the late 1970s groundwater aquifers below the Southern San Joaquin Valley had been overdrafted by an additional 7 million acre-feet.

Table 5. Acres owned by companies in the region in 1980. Adapted from Reisner 1993.

Name of corporation	Acres owned in the region
Chevron (subsidiary of Standard Oil)	37,793
Tejon Ranch	35,897
Getty	35,384
Shell	31,995
Prudential	25,105
Blackwell	24,663
Tenneco	20,180
Southern Pacific	16,528

These landholdings were equivalent of 16 x 38 times a good size farm in a state like Illinois (see comparison in Reisner 1993, 373). The concentration of land and linked irrigation had severe effect, per a 1985 state report on groundwater pumping that described “*the overdraft as “potentially critical” in eleven subregions of the Central Valley, most of which were in the service area of the SWP*” (Reisner 1993, 375).

To summarize this chapter, I have here discussed the contentions and debates around water regulations while also exemplifying the ways in which these very debates are contested in different narratives. This discussion should be connected with the policy documents analyzed in Chapter 4 and there are strong elements of intertextuality here between the policy documents and how these debates were being reported at the time. Yet, as I have shown here and in the previous chapter, regardless of how one narrates this history, water regulations in California have overwhelmingly resulted in contrary outcomes and ultimately have favored large corporate landholdings. In the following chapter, I will examine how SGMA has been developed and debated, and what the state’s long history of adverse regulatory effects may mean for the first groundwater law.

6. The Sustainable Groundwater Management Act

This is a big deal. It's been known about for decades that underground water
has to be managed and regulated.⁴¹

Here we come to the crux of this thesis, the Sustainable Groundwater Management Act. In the previous chapters I have presented several conflicts and contestations relating to relating to groundwater management. I have taken you through the historical records and exemplified through two very different historical narratives both some key points in the social, legal and political confluences of water management and how they have been narrated. In this chapter, I return to where this thesis began: the present debate surrounding the Sustainable Groundwater Management Act itself. The purpose of this chapter is to examine the act directly, as a political and legal document, and as the purported solution to a problem more than a century in the making. In my analysis of the legislation, I will focus primarily on the standards of 'sustainability' and 'management' as they are defined in the act and how responsibility is defined and assigned by the act. In addition, I will evaluate powers of implementation as they are defined by the bills, including the role of stakeholders and local governance, and how early responses to the passage of SGMA have negotiated responsibility and sustainable use.

6.1. The law itself

The Sustainable Groundwater Management Act is comprised of three bills that were introduced in April of 2014— Assembly Bill (AB) 1739, primarily authored by State Assemblymember Roger Dickinson; and Senate Bill (SB) 1319 and SB 1168, primarily authored by State Senator Fran Pavley. Assemblymember Dickinson, a Democrat, represented the state's 7th State Assembly District which encompasses much of the state capital city Sacramento and its suburbs. State Senator Pavley, also a member of the Democratic Party, was the representative of the 27th Senate District, comprised of parts of the San Fernando and Santa Clarita Valleys, and the entirety of Conejo Valley. State Senator Pavley, in particular, was known for her efforts in pushing for environmental reforms during her two terms (Rosenhall, 2015). The three-bill package was signed into law in September 2014 by ex-Governor Jerry Brown, also a Democrat⁴², who had urged the state legislature to develop a plan for groundwater management earlier that year, in January. As we saw in Chapter 5 the need of a new legislation has been discussed in policy documents seriously since 1980. Thus, the new legislation was seen by many as long overdue and there was strong political support for the bill, though there was strong disagreements as to its contents. The agricultural industry and farmers saw a threat towards the industry with the new legislation (see Chapter 1). In the weeks between the legislature's affirmative vote to pass the bill-package in August and ex-Governor Brown's signing

⁴¹ Jerry Brown on signing SGMA into law (Siders 2014).

⁴² Edmund G. "Jerry" Brown Jr. is the son of Edmund Gerald "Pat" Brown Sr., the California Governor who supported and oversaw the construction of the State Water Project. The passage of SGMA occurred during Jerry Brown's second tenure as Governor (he served in the position from 1975 to 1983, and 2011 to 2019).

of the act on September 16, the debate around the polarizing law made its way onto billboards along the I-5 as I discussed in very introduction of this thesis.

The final content of the Sustainable Groundwater Management Act can be found in the California Water Code (WAT), under Division 6. (“Conservation, Development, and Utilization of State Water Resources [10000 – 12999]”), Part 2.74. (“Sustainable Groundwater Management [10720. – 10737.8.]”). The legislation consists of twelve chapters, many of which are further divided into subsections.

The first chapter of SGMA (“General Provisions [10720. – 10720.9.]”) lays out the intent of the legislature in § 10720.1., which is reprinted here:

- (a) To provide for the sustainable management of groundwater basins.
- (b) To enhance local management of groundwater consistent with rights to use or store groundwater and Section 2 of Article X of the California Constitution. It is the intent of the Legislature to preserve the security of water rights in the state to the greatest extent possible consistent with the sustainable management of groundwater.
- (c) To establish minimum standards for sustainable groundwater management.
- (d) To provide local groundwater agencies with the authority and the technical and financial assistance necessary to sustainably manage groundwater.
- (e) To avoid or minimize subsidence.
- (f) To improve data collection and understanding about groundwater.
- (g) To increase groundwater storage and remove impediments to recharge.
- (h) To manage groundwater basins through the actions of local governmental agencies to the greatest extent feasible, while minimizing state intervention to only when necessary to ensure that local agencies manage groundwater in a sustainable manner.
- (i) To provide a more efficient and cost-effective groundwater adjudication process that protects water rights, ensures due process, prevents unnecessary delay, and furthers the objectives of this part.

These nine points establish the framework for the rest of the act; everything that follows is to be read and understood in context of what has been laid out here. As such, this section is relatively straightforward, but there are a few points that merit additional attention. First, § 10720.1. (b) states that the Legislature intends “*to preserve the security of water rights in the state to the greatest extent possible consistent with the sustainable management of groundwater*”; this is an emphatic clarification that it is not the intention of state to utilize SGMA as legal ground for revoking or appropriating water rights. This sentiment, that water rights will be preserved, is reiterated in § 10720.1. (i). It is also supported in § 10720.1. (d) and (h), which affirms that local groundwater agencies will act as the primary authority, as the state does not intend to enforce or implement sustainability measures except ‘when necessary’; the circumstances which would warrant intervention are defined later on in the legislation.

The remainder of the first chapter of SGMA states which basins are covered by the legislation (all), and by what dates the California Department of Water Resources (DWR) expects to receive groundwater sustainability plans (January 31, 2020 for those designated as being high- or medium-priority basins in a state of critical overdraft by Bulletin 118, January 31, 2022 for those designated as being a high- or medium-priority basin). Finally, 29 adjudicated basins are identified as being exempt from the conditions of the legislation, regardless of designation, until basin rights are determined per an adjudication action (the definition of which is given in the next subchapter).

Chapter 2 provides definitions for all important terms used throughout the legislation, both those that are specific to the act and those that are necessary to explain within context of the act. For example, per §10721. (a) “Adjudication action” refers to “*an action filed in the superior or federal district court to determine the rights to extract groundwater from a basin or store water within a basin, including, but not limited to, actions to quiet title respecting rights to extract or store groundwater or an action brought to impose a physical solution on a basin*”. More importantly for this thesis, though, are the definitions regarding ‘sustainability’, explicated in §10721. (u) (“Sustainability goal”); §10721. (v) (“Sustainable groundwater management”); §10721. (w) (“Sustainable yield”); and relatedly, §10721. (x) (“Undesirable result”). Though the definitions laid out here are quite detailed, for the purpose of concision, they can be summarized as such: sustainability goals, and therefore, sustainable groundwater management are determined relative to each basin’s calculated sustainable yield, in terms of the amount of water that can be withdrawn before undesirable results occur. Per § 10721. (x), “Undesirable results” are defined as “*(1) Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. Overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and groundwater recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods*”.⁴³ The “planning and implementation horizon” referred to in § 10721. (x) (1) is the period of 50 years over which a groundwater sustainability agency (GSA) is expected to develop a groundwater sustainability plan (GSP) for (§ 10721. (r)). Interestingly, this definition of an ‘undesirable result’ applies only if the overdraft occurs over this defined time period as its explicitly stated; groundwater overdraft which occurs during a drought period does not constitute an undesirable result. One problem here is that it is impossible to predict exactly when or if drought periods will occur, despite the best efforts of scientific climate models. Given this, how would a GSA sustainably manage groundwater if any time a drought strikes and overdraft occurs, as the GSP is no longer relevant in those conditions? As the definitions of ‘undesirable results’ implies, if the implementation powers of the GSA are tied to specific conditions being met, then during periods of drought such as the one the state just endured the power to implement SGMA would be limited. While this makes sense to a point, as the state relies on groundwater more heavily to supplement both urban and agricultural needs during droughts, it seems ineffective to not include the specific conditions that apply during drought periods and to then further limit powers during periods when conservation is most critical. The power and authority vested in GSA’s is further detailed in Chapters 4 and 5, but this issue of how they apply during drought periods is not addressed there either. This implies that within SGMA, drought periods are treated as anomalies rather than frequent and severe events.

Chapter 4 (“Establishing Groundwater Sustainability Agencies”) explains how GSA’s should be formed and outline the expectations for them. A GSA may be formed from an already existing agency or agencies that are inclined to oversee groundwater management, or a GSA may be a newly formed entity comprised of interested persons. Any one or more local agencies that oversee a basin that chooses to become a GSA must meet certain requirements and submit to holding a public hearing in the overlying county to affirm the decision. In situations where a high- to medium-priority basin lacks a GSA, the responsibility to develop a GSP is given to the overlying county (§10724. (a)). Per §10723.2., GSA’s “*shall consider the interests of all beneficial uses and users of groundwater*” in developing a GSP; an inexhaustive yet still

⁴³ Also: “(2) Significant and unreasonable reduction of groundwater storage ... (5) Significant and unreasonable land subsidence that substantially interferes with surface land uses; (6) Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.” (California Water Code § 10721. (x)).

lengthy catalogue of relevant uses and users is provided, where agricultural users are listed first, and disadvantaged communities are listed last.

Chapter 5 (“Powers and Authorities”) outlines the powers and authorities of GSA’s and the state under SGMA. At a glance, it reads as though GSA’s have a fair amount of investigative power, to determine the need for groundwater management and to prepare a GSP accordingly. The GSA’s may require a groundwater extraction facility to register with them, to utilize a water-measuring device, and to submit annual statements detailing the amount of water extracted in the previous year (§ 10725.8.). In the interest of achieving sustainable groundwater levels, GSA’s can also buy land or water rights (§ 10726.2. (a)); appropriate and acquire surface or groundwater rights (§ 10726.2. (b)); and even regulate, limit or suspend groundwater extractions (§ 10726.4. (a)(2)). Yet, even as these powers are defined, there are caveats alongside them, one example is this comment: *“A limitation on extractions by a groundwater sustainability agency shall not be construed to be a final determination of rights to extract groundwater from the basin or any portion of the basin”* (§ 10726.4. (a)(2)). Caps such as this ultimately risk reducing the authority of the SGMA and make it ineffective, which may in turn render SGMA ineffective and unable to accomplish sustainable groundwater management in the long term. Much of the enforcement power of the GSA’s is effectively relegated to imposing fees; both Chapter 8 (“Financial Authority”) and Chapter 9 (“Groundwater Sustainability Agency Enforcement Powers”) explain this in greater depth. That these specifications are placed in individual chapters is important, as it distances the discussion from that of the power and authorities laid out in Chapter 5. In effect, these limitations undermine the presumption of powers described in Chapter 5, but in a discreet manner.

Following the explication of the powers and authority of GSA’s, the role of the state is defined in Chapter 10 (“State Evaluation and Assessment”) and Chapter 11 (“State Intervention”). However, rather than providing additional supporting powers to GSA’s, the state is generally limited by the same restrictions as the GSA’s. The only expansion of powers given to the state is the ability to step in and assume responsibility for a basin if there is not GSA or country available or capable of doing so. For example, *“The board, after notice and a public hearing, may designate a high- or medium-priority basin as a probationary basin, if the board finds one or more of the following applies to the basin, After January 31, 2022, both of the following have occurred: (i) The department, in consultation with the board, determines that a groundwater sustainability plan is inadequate or that the groundwater sustainability plan is not being implemented in a manner that will likely achieve the sustainability goal. (ii) The board determines that the basin is in a condition of long-term overdraft”* (§ 10735.2. (a); § 10735.2. (a)(5)(A)). From this quote, it is clear that the state is not expected to take an active role in the implementation of SGMA, given the numerous conditions that must be met and restrictions to be overcome before it is allowed for the state to assume responsibility for a critically overdrafted basin. This creates an unfortunate gap both in terms of implementation, as well as monitoring and control.

The implementation gaps of the SGMA is only made more apparent throughout the rest of the legislation. In Chapter 6 (“Groundwater Sustainability Plans”), the requirements for GSP’s are detailed, and it is in § 10727.2. (b)(1) that it is finally stated that a GSP is required to include *“Measurable objectives...to achieve the sustainability goal in the basin within 20 years of the implementation of the plan”*. This means that, for example, the GSP for a high-to medium-priority basin that is already in a state of critical overdraft is to be applied by January 31, 2020. Then, between January 2020 and January 2040, there must be certain targets which the GSA will report to the DWR, indicating the success (or failures) of the GSP. This indicates that GSA’s are not required to have achieved full sustainable management of their basin for another twenty years. That the bills which make up SGMA were only introduced and passed during the state’s worst drought in historic record was unfortunate. In addition,

the way the act is formulated means that there will be no discernible effect from the legislation for another twenty years which would likely be too late for many of the depleted basins presented in Chapter 2.

6.2. A framework for implementation

To support the act, a supplementary white paper detailing the strategy for successful implementation of the legislation was published in July 2015, after the release of the original draft of SGMA, but prior to its codification. The purpose of the report was to demonstrate the importance of stakeholder engagement in the effective implementation of SGMA and offer guidance as to how this can be achieved. The authors of the report⁴⁴, all of whom were involved in the drafting of SGMA, aim to provide insight into the collective benefits of stakeholder engagement for all involved parties—the legislature, the local agencies, and the stakeholders. Specifically, the white paper suggests that through early collaboration in the planning process there will be less conflict and more effective implementation later on, and that this is a key part of the legislation (Dobbin *et al.* 2015).

The first section of the report (“Understanding Stakeholder Engagement”) raises Garrett Hardin’s theory of resource exploitation to suggest that the state’s groundwater supply is at risk of becoming a ‘tragedy of the commons’; the tragedy being the overexploitation of a shared resource due to individual user’s tendency to prioritize their own interests over that of the collective good (Hardin 1968). Crucial to preventing this tragedy from occurring, the report argues, is consistent collaboration between government and stakeholders. Referring to shared resources (like groundwater) the report states that “*Precisely because such resources are not confined by traditional political, managerial, or proprietary boundaries, not only can their management affect distinct and diverse stakeholders, but also this management requires collective action if irreparable harm is to be avoided*” (Dobbin *et al.* 2015, 3). This assertion draws upon Hardin’s primary argument, which is that large-scale, lasting change cannot and will not be successful unless collective social behavior changes first. However, while Hardin ultimately landed on privatized control as the key to protecting vulnerable resources, this report instead emphasizes the importance of input from interested actors and stakeholders in resource management policy. Conversely, the exclusion of these perspectives during the policy development process will result in directives that are unpopular with the public and therefore less likely to be abided by, which can result in delayed results if the policy then requires restructuring. The report then highlights the significance of public participation early on in the discussions and decision-making process to allow competing needs and interests are realized early on in the process so that they can be dealt with before moving forward, thereby avoiding potential conflicts (Dobbin *et al.* 2015).

“SGMA Requirements for Stakeholder Engagement”, the second section of the report, outlines the methods by which the law creates space for stakeholder input and collaboration. This is primarily achieved through regular public notice requirements at all stages of the process: GSA development, GSP development, and throughout the implementation period (Dobbin, Clary, Firestone, and Christian-Smith 2015). According to the report, SGMA’s success at a local level will be contingent upon inclusion of residents and stakeholders in creating a plan (GSP) that accounts for their needs and interests. A failure to include these actors during the

⁴⁴ The authors of the white paper were Kristin Dobbin, the Regional Water Management Coordinator of the Community Water Center; Jennifer Clary, the Water Program Manager of the Clean Water Fund; Laurel Firestone, the Co-Founder and Co-Director of the Community Water Center; and Juliet Christian-Smith, a climate scientist with the Union of Concerned Scientists

planning process will likely make them more resistant to regulations, thereby hindering implementation efforts.

The final section of the report is titled “Roadmap for Stakeholder Engagement in SGMA Implementation” (Dobbin et al. 2015). This section goes through the various opportunities for stakeholder engagement as they are defined by the act; an example they use is § 10727.8(a) of SGMA, which states “*The groundwater sustainability agency shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the groundwater basin*”. In this section, the report identifies the process of GSA formation as the critical period for effective stakeholder engagement; during this period, communication standards and relationships are developed that will be beneficial in building a strong base for a GSA (Dobbin et al. 2015). If there is trust among members of the GSA and the public, then the GSA will be more effective during the development of the GSP and the implementation of mitigation project (Dobbin et al. 2015). The report concludes by reiterating the importance of ongoing stakeholder engagement in the successful management of groundwater in California.

6.3. Reactions to the law

As I have mentioned previously, the debate around SGMA has been very polarized; here, I will provide some examples of how the act has been discussed, primarily drawing from the period directly before the act was signed into law.



Figure 15. Screenshot of headline from a 2018 article published by Water Deeply expressing support for SGMA.

Environmental organizations were strong supporters of the act, with many praising its’ passage as a historic moment that would promote a better future for the state. These organizations, such as The Nature Conservancy – one of the largest environmental non-profits in the United States – pointed to the empowerment of local agencies as an integral part of the law, and described SGMA as a step towards “*a future where the water needs of California’s farms, communities and wildlife are met today without compromising the future*” (Austin 2014). Lester Snow, the founding director of the California Water Foundation, also lauded SGMA for its’ success as a bipartisan bill that “*provides the tools and authority for local agencies to protect this precious resource for future generations of Californians*” (Austin, 2014). The Association of California Water Agencies (ACWA), whose 430 members are responsible for nearly 90% of the state’s water deliveries, joined these groups in support of SGMA, calling the legislation one of “*the most important developments in California water history*” (Austin 2014). In each of these statements, specific regard was given to SGMA’s bottom-up approach to policy that the GSA’s will provide, and how this would be beneficiary to the needs of the agriculture community. Support for the act in the media also often referenced the environmental gains that SGMA is expected to bring in regards to the sustainable management of groundwater; an example of this is an article published in *Water Deeply* (Lohan 2018), with a heading stating that the environment was the ‘big winner’ in the new law (see figure 15).

In stark contrast, agricultural advocacy groups roundly condemned the act (Austin 2014). Examples of newspaper headings were “we can’t grow anything” and the “groundwater woes” for the agricultural industry (see figure 16). The President of the California Farm Federation Bureau, Paul Wenger, considered SGMA to be a direct threat to the farming communities of the Central Valley, and suggested that the act would bring about monopolies on groundwater harmful to farmers and urban users alike. This sentiment seems to disregard the historical experience of the state (see Chapters 3 and 5) which indicates that monopolies on groundwater already exist and are controlled by the corporate landholdings in the Central Valley.



Figure 16. Examples of headlines that depict how farmers and agriculture advocates reacted to SGMA, from a 2020 article published by *The Guardian* and a 2016 article published by *Water Deeply*.

While he conceded that there was legitimate need for discussion about groundwater usage in the state, Wenger believed that “*Most importantly, California must improve its surface water supplies. All the fees and fines in the world won’t heal our aquifers unless California builds additional storage and improves management of surface water in order to reduce demand on groundwater*” (Austin 2014). This belief, that the better solution to groundwater overdraft is additional surface water supplies, strongly echoes the arguments I presented in the previous chapter, made by the supporters of both the Central Valley Project and State Water Project. Newspaper headlines also echo concerns that had been voiced in earlier historical debates, namely the threat that groundwater regulation posed for small farms. However, as discussed in Chapter 5, the parties that stand to lose the most from groundwater regulations are in fact the state’s large landholders, who have lobbied state officials for more than a century to ensure deregulation and subsidized water sources for themselves. The intent of SGMA is to amend the damages this has caused to groundwater basins and to support the interests of small farmers as equally as large landholders, hence the emphasis on local governance. Therefore, while it is understandable for small farms to be concerned about the impact of SGMA, historically the unchecked power of the state’s agribusinesses has been far more detrimental than any state law or policy (see Chapters 4 and 5).

Within the legislature, opinions about the act were equally divided, generally along party lines. As I mentioned earlier, the three bills were authored by Democrat’s and the bill-package was signed into law by a Democratic governor, so it is unsurprising that the state’s Democratic representatives generally supported the act while Republican representatives mostly opposed it. The political and ideological divide over the issue is perhaps best exemplified in a letter that was cosigned by thirty-five House and Senate Representatives and sent to Governor Brown prior to his passage of the law. In the letter, these representatives urge the governor to veto the bill-package, which they argue was passed in spite of the “*virtually unanimous opposition of the agriculture community to these proposals*” and will “*infringe upon the right to groundwater, at a time when available water supplies are getting tighter*” (Austin 2014). They suggest instead that a Special Session of the Legislature be held to discuss and craft “*a narrower, more effective measure, focused on basins where real problems exist*” (Austin 2014). It is important to note that of the thirty-five representatives to sign this letter, thirty-one are Republicans and the four Democrats that signed on all represented districts that overlay parts of the Central Valley. The debate around water politics in California continues to be defined by the ideological divide inherent in American politics (see Chapter 5.3), and history

appears to be repeating itself as the Republican Party once again chooses to reject regulatory efforts for the sake of protecting business interests, while the Democratic Party embraces strong ‘activist’ government and policies that benefit the collective good.

7. The Politics of Groundwater

Politics and science do not lend themselves to easy articulation.⁴⁵

At the start of this thesis I reflected upon a question that I once saw plastered across a billboard on the side of California Interstate 5. That question – is growing food wasting water? – has motivated my research and writing on the topic of water politics, not because I believe I can answer it – though I would venture to say ‘yes’ – but because I desired to understand the context whereby such an absurd question was formed. I consider the question absurd because, in the midst of a historical drought, the state’s agriculture industry who is most dependent upon maintaining a supply of groundwater, found water conservation to be a debatable topic and actively lobbied against the proposed regulations. Thus, I was left to contemplate: from what historical and political situation could such a conflictual situation emerge? Throughout this thesis I have attempted to present and understand the history of groundwater politics in California, particularly how the debate over groundwater management has been shaped by and around the state’s Central Valley. In this final chapter, I expand upon what lessons can be drawn from a deeper understanding of this environmental history, how future debates around groundwater might be changed, and what a potentially post-capital regime of water may look like in California.

7.1. Towards an environmental history of groundwater

Of his fellow environmental historians William Cronon asked that we form (new) narratives about stories about nature, because stories are what motivate and determine our behaviors in the world; therefore, as we retell the past, we are simultaneously shaping the future. Over the course of this thesis I have attempted respond to Cronon’s call, thereby creating a new narrative about the politics of groundwater in California, one which encompasses both the stories of villains and heroes and at the same time allows the physicality of water itself to shape the narrative. In Chapter 3, I examined the role of climate and topography and land-use in creating the state’s waterscapes, the result of which is neither wholly natural nor unnatural, but rather a landscape ‘after nature’, to borrow Escobar’s term. The human impact upon the state’s water sources has been significant: rivers have been dammed and diverted, lakes have been drained and dug, and thousands of years of collected groundwater has been depleted over the course of one century. Groundwater aquifers have dried out and compacted, causing the landscape to sink. At the same time the climate, already arid, is changing, with drought periods and storms becoming more frequent and intense, though this too can be attributed in part to the anthropogenic warming of the planet.⁴⁶ Through the combined effects of human land-use and climate change, groundwater basins throughout the Central Valley, which is dominated by intensely cultivated croplands, have become critically depleted, unable to recharge naturally or artificially as I showed in Chapter 3.

⁴⁵ Escobar 1999.

⁴⁶ New research from Williams *et al.* (2020) suggests that the area has been in a ‘mega-drought’ since 2000.

In Chapter 4, ‘A Capital Regime of Water’, I demonstrated how the narrative around ground-water and agriculture in California has been shaped by federal and state government reports over the past 170 years. Though it was known as early as the 1850’s that the region was water-scarce, California was promoted as a modern El Dorado of gold but also of agricultural riches, drawing settlers from around the world who sought to earn their fortune as a miner or a farmer. Census reports from 1850 to 1950 document the growth of the state’s population and agricultural productivity but fail to mention the decline in the water tables. Although the constraints of groundwater were recognized already in 1850s groundwater isn’t thoroughly discussed in an agency report until 1975, when the first edition of Bulletin 118 is published by the DWR, outlining the conditions of groundwater basins in the state. Over the next 20 years, these technical reports present the issue of groundwater overdraft as a political and legal issue as much as an environmental one, detailing the cubic feet of water in each basin as well as the legal decisions that have determined their conditions. Through the census reports and the multiple editions of Bulletin 118, we learn of the key court cases that have shaped California groundwater and to the decision in *Lux v. Haggin* (1884) which enshrined in law a dual system of claimant’s rights, an attempt to appease both riparians and appropriators but which satisfied no one. Groundwater laws remained underdeveloped in the state even when the matter came before the courts, and the 1949 decision in *City of Pasadena v. City of Alhambra* in fact only seemed to worsen the problem, as growers rushed to pump more and more groundwater and stake their claim on the finite resource. The 1975 decision in *City of Los Angeles v. City of San Fernando* (see Chapter 4) attempted to rectify some of the damage caused by earlier laws and policies, but drought periods in 1976 – 1977, 1987 – 1992, 2007 – 2009 and 2011 – 2019 have proven the inefficiency of case law in solving what is both an environmental and political problem. Still, and in spite of the ongoing crises, the authors of the California Agricultural Statistics Overview reports glossed over the issue of groundwater overdraft, choosing instead to continue to promote the state’s agricultural wealth.

Chapter 5, ‘Stories About Water and Politics’, focuses on the representation of water politics in California in two of the most well-known and widely read books on the topic. Authors Marc Reisner and Norris Hundley Jr. differ in their approach to retelling the water history of the state, but ultimately arrive at similar conclusions: the corporate interests that control much of the state’s agricultural lands have successfully created a welfare system of water subsidies for themselves at the expense of others. This is demonstrated throughout the historical narratives they weave, beginning with the inherent flaw in the Homestead Act – the arbitrary allotment of 160 acres of land – that aimed to create a society of small farmers but inadvertently produced land and water monopolies in California. From there, we are shown how the practice of social imperialism was used to aggregate water rights and holdings among the wealthy, first through sometimes violent and potentially illegal means (see 5.2. ‘The Water War’) but then through political lobbying and legal maneuvering. The result was the complete rebuilding of the state’s waterscape via construction of the Central Valley Project and the State Water Project for the benefit of the very corporate landholders who had drained the valley’s groundwater basins in the first place; Noam Chomsky, activist and scholar, in commenting on United States’ history and present, identified this phenomena as a principle of modern state capitalism “[wherein] costs and risks are socialized to the extent possible, while profit is privatized” (2010, 219). Reisner, in a similar vein, simply refers to the historical water policy of California as “socialism for the rich” (1993, 334).

Finally, in Chapter 6, I showed how the historical debates on water politics that I have exemplified throughout the previous chapters are echoed in the current debate around the Sustainable Groundwater Management Act. While this new law makes significantly more specific proclamations in support of groundwater management, the actual implementation of the law

will be dependent upon local stakeholders and agencies developing and adhering to the minimal standards defined in the act. As I have demonstrated in this thesis, historical precedent in California shows that when laws have intended to promote the management of groundwater by treating it as a community resource, the impact of the law has turned out quite differently. Even if under SGMA groundwater is recognized and treated as a regulated resource, per the act the most critically overdrafted basins in the state are not required to reach ‘sustainable levels’ until the year 2040; this alone is cause for concern that SGMA in effect will be nothing more than another *Alhambra* decision, inspiring a run to the pumps by those that see more value in profit today than a plan for tomorrow.

7.2. Towards a new water discourse

As shown in this thesis, as well as in other works on water history of California state, there is strong core of water discourses in the state which revolves around agribusiness that both sets the boundaries of the discourse and defines the terms of the discourse. The success of these California agribusinesses can be attributed to the unique climate of the Central Valley, as was discussed in Chapter 3, that makes it ideal for growing specialty crops, which are valued at a higher price and therefore allow landowners to earn higher profits and continue lobbying efforts and continue pumping groundwater. This is the cycle we now recognize in California today: groundwater is converted to agricultural products and developments, which are then converted into capital, which is then used to pump more groundwater. Eventually, once enough capital is accumulated, it is converted into further expansions of cultivation, which requires more water, which brings us back to the pumping of groundwater, only now even more is needed. At a large scale, it is this cycle which led first to the Los Angeles Aqueduct, and later to the Central Valley Project and State Water Project.

The idea that agriculture is a capitalistic industry as it begets wealth, which begets power, and therefore again begets wealth, was already summarized by Joseph C. G. Kennedy, Superintendent of the Census of 1860: “*The importance of agriculture as a recourse for wealth, and as supplying the means of subsistence to all classes of community, is so well understood, and its relation to manufactures, so many of the products whereof it consumes, and which it supplies with so many of its most important elements, is so generally appreciated, as to render superfluous any argument to prove its value*” (USBC 1860, iii). It is because of this idea that capitalism through agriculture has not only created the particular discourse around water in California, but also maintained it, due to the pervasiveness of the capital nature regime in the economic development of the state.

The Sustainable Groundwater Management Act, whether or not it is successful in bringing about the sustainable management of groundwater, represents the beginning of a shift towards a new discourse in water politics. Already, the debate around water politics has become dominated by the idea of ‘sustainability’, though it remains to be seen if this concept is to become a new core in the water discourse of the state. However, it has already been incorporated within SGMA itself as well as in discussions in the CDFA agriculture reports that highlight the state’s innovation in technology that allows for both the conservation of resources and the expansion of production. The importance of local stakeholder involvement and cooperation in groundwater management is directly discussed in the white paper “Collaborating for Success”, which could be instrumental in opening up the discourse to include the perspectives of smaller landholders in the state who have often been ignored or excluded from the debate historically. With a new discourse that decenters capitalism, it is likely that the reign of the capital regime of nature will also shift into something new.

7.3. Towards a post-capital regime of water

In the preface of *The Great Thirst*, Norris Hundley Jr. suggests that the most obvious theme in the story of water in California is “*the dynamic interplay between human values and what human beings do to the waterscape*” (2001, xviii). Humans built the systems which brought large-scale agriculture to California, not just through the manufacturing of waterways, but through the creation of social contracts that have since been upheld by our legal and political discourses. The privatization of land by legal means is one of the tenets of capitalism in the West; as recognized by De Soto, it is what allowed the capitalist system to ‘triumph’ (2000, 160). But in California, and throughout the rest of the United States, the idea of ownership was expanded upon and applied not just to land but also to water, both above and below ground. In no small part this form of ownership is due to the Western world’s ability to expand the scale of social contracts from local to national through the institution of law and the tools it provides, as “*Law is the instrument that fixes and realizes capital*” (De Soto 2000, 164).

Yet, as Reisner and Hundley Jr. each concluded, what could be regarded as a triumph of capitalism has in fact been an abject failure for California. Just as the Homestead Act failed to protect small farmers from the monopolizing power of wealthy agribusinesses, the privatization of water through the creation of water rights, once imagined to be an equalizer among farmers, instead resulted in a subsidized water system that mainly serves corporate landholders. This is best exemplified by a quote from ex-Governor Pat Brown, who had championed the construction of the State Water Project. In an interview conducted in the years after his son Jerry Brown had christened the California Aqueduct “The Governor Edmund G. Brown California Aqueduct” (their shared name), Brown remarked, “I was never convinced that the small farmer could succeed or would be good for the economy of the state” (Reisner 1993, 378). Perhaps more than anything, this admission by the ex-Governor whose driving motivation as a politician was to build a monument to themselves (see Chapter 5.3), signifies the values and (unofficial) policy that for so long determined what was done to the California waterscape.

However, while decisions made a century ago have been instrumental in shaping both the state’s waterscapes and pervasive debates, the acuteness of current conditions may be changing our values and worldviews. It is beginning to be recognized that capitalism should no longer be seen as the solution to our problem but the root of our problem – in this case, who has access and ownership of water and why. As discussed above, I do believe the discourse around water politics in California is shifting, and I believe and hope that at the same time we are beginning to move toward a new regime of nature. Our human values have moved towards prioritizing and protecting our landscape and waterscapes and the passage of SGMA proves this; however, it is only in time that we will see how this is reflected in what we do in the waterscape. With that being said, it is impossible to know what the next regime of water might be, or even whether there will be a new regime. But, if and when there is, it will be in large part due to the success of the Sustainable Groundwater Management Act in challenging old paradigms and systems of capitalism and bringing about a new water politics discourse, wherein questions like ‘is growing food wasting water?’ are no longer asked.

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Appendix 1

Total Million Gallons of Water used per day by Counties in California:

County	Total Million Gallon/Day	Million Gallons/Day for Irrigation	Gallons/Day Used for Agriculture (%)	> 50% of Total Water/Day Used for Agriculture	> 85% of Total Water/Day Used for Agriculture
Del Norte	19.6	16.4	0.837	Yes	No
Siskiyou	230	201	0.874	Yes	Yes
Modoc	174	171	0.983	Yes	Yes
Humboldt	74.6	60	0.804	Yes	No
Trinity	22.4	10.7	0.478	No	No
Shasta	245	161	0.657	Yes	No
Lassen	112	88.7	0.792	Yes	No
Mendocino	83.3	68.7	0.825	Yes	No
Tehama	539	269	0.499	No	No
Plumas	107	103	0.963	Yes	Yes
Glenn	667	661	0.991	Yes	Yes
Butte	812	753	0.927	Yes	Yes
Sierra	24.3	23.4	0.963	Yes	Yes
Lake	62.7	52.8	0.842	Yes	No
Colusa	699	695	0.994	Yes	Yes
Sutter	660	636	0.964	Yes	Yes
Yuba	327	315	0.963	Yes	Yes
Nevada	63.6	48.4	0.761	Yes	No
Sonoma	317	210	0.662	Yes	No
Napa	127	103	0.811	Yes	No
Yolo	602	572	0.950	Yes	Yes
Placer	196	133	0.679	Yes	No
Marin	70.8	41	0.579	Yes	No
Solano	457	396	0.867	Yes	Yes
Sacramento	874	442	0.506	Yes	No
El Dorado	58.5	26.8	0.458	No	No
Contra Costa	257	87.1	0.339	No	No
San Joaquin	1340	1190	0.888	Yes	Yes
Amador	40.7	20.8	0.511	Yes	No
Alpine	9.85	9.69	0.984	Yes	Yes
Calaveras	17	8.8	0.518	Yes	No
Alameda	184	9.51	0.052	No	No
San Mateo	93	23.1	0.248	No	No

Toulumne	26.8	3.15	0.118	No	No
Santa Cruz	58.6	31.3	0.534	Yes	No
Santa Clara	218	8.1	0.037	No	No
Stanislaus	1150	1030	0.896	Yes	Yes
Mono	71	58.5	0.824	Yes	No
Monterey	380	169	0.445	No	No
San Benito	26	15.1	0.581	Yes	No
Merced	1090	971	0.891	Yes	Yes
Mariposa	19.7	17.4	0.883	Yes	Yes
Madera	802	772	0.963	Yes	Yes
Fresno	1820	1620	0.890	Yes	Yes
Kings	685	637	0.930	Yes	Yes
Tulare	1530	1400	0.915	Yes	Yes
Inyo	62	17.5	0.282	No	No
San Luis Obispo	2100	79	0.038	No	No
Kern	1920	1620	0.844	Yes	No
San Berna- dino	457	33.3	0.073	No	No
Santa Bar- bara	121	56	0.463	No	No
Ventura	313	85.1	0.272	No	No
Los Angeles	1940	34.6	0.018	No	No
Orange	564	11.9	0.021	No	No
Riverside	1220	742	0.608	Yes	No
San Diego	618	118	0.191	No	No
Imperial	1920	1850	0.964	Yes	Yes

Source: NIDIS 2019.

Appendix 2

Average Precipitation (in inches) per Hydrologic Basin for 2014 – 2016

City	Hydrologic Basin	Precip. 2014-2015	Precip. 2015-2016	Average	Average by Hydrologic Basin
Eureka	North Coast	31.52	46.9	39.21	35.14875
Ukiah	North Coast	26.3	37.01	31.655	
Mount Shasta	North Coast	37.61	47.29	42.45	
Santa Rosa	North Coast	23.81	30.75	27.28	
Napa	San Francisco Bay	21.06	24.87	22.965	17.82
San Francisco	San Francisco Bay	15.83	18.58	17.205	
San Jose	San Francisco Bay	11.67	14.91	13.29	
Salinas	Central Coast	9.61	13.78	11.695	9.198
King City	Central Coast	7.91	10.1	9.005	
Santa Maria	Central Coast	4.57	9.1	6.835	
Santa Barbara	Central Coast	7.47	11.79	9.63	
Paso Robles	Central Coast	8.39	9.26	8.825	
Redding	Sacramento River	26.5	44.53	35.515	22.50583333
Red Bluff	Sacramento River	23.88	27.87	25.875	
Willows	Sacramento River	20.28	17.6	18.94	
Oroville	Sacramento River	18.14	21.55	19.845	
Marysville	Sacramento River	15.25	21.97	18.61	
Sacramento	Sacramento River	14.2	18.3	16.25	
Stockton	San Joaquin River	9.89	19	14.445	14.641
Modesto	San Joaquin River	8.27	15.2	11.735	
Merced	San Joaquin River	7.18	14.66	10.92	
Yosemite	San joaquin River	14.51	38.38	26.445	

Madera	San Joaquin River	6.02	13.3	9.66	
Fresno	Tulare Lake	6.41	14.79	10.6	
Lemoore	Tulare Lake	4.59	6.82	5.705	7.375
Visalia	Tulare Lake	6.54	9.08	7.81	
Bakersfield	Tulare Lake	5.34	5.43	5.385	
Alturas	North Lahontan	10.65	15.85	13.25	33.635
Blue Canyon	North Lahontan	35.4	72.64	54.02	
Thermal	Colorado River	1.29	2.86	2.075	
Blythe	Colorado River	3.03	1.86	2.445	3.49875
Imperial	Colorado River	3.4	1.09	2.245	
Riverside	Colorado River	5.23	9.23	7.23	
Bishop	South Lahontan	2.11	4.12	3.115	2.7875
Daggett	South Lahontan	1.99	2.93	2.46	
San Diego	South Coast	7.77	10.54	9.155	
Los Angeles	South Coast	5.97	10.84	8.405	7.80125
Oxnard	South Coast	6.8	8.98	7.89	
Lancaster	South Coast	4.68	6.83	5.755	

Source: PSL 2019; NIDIS 2019.