Nature's Second Course: Water Culture in the Mormon Communities of Cache Valley, Utah, 1860-1916

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NATURE'S SECOND COURSE: WATER CULTURE IN THE MORMON COMMUNITIES OF CACHE VALLEY, UTAH, 1860-1916

KATHRYN T. MORSE

1992
NATURE'S SECOND COURSE: WATER CULTURE
IN THE MORMON COMMUNITIES OF
CACHE VALLEY, UTAH, 1860-1916

by

Kathryn T. Morse

A thesis submitted in partial fulfillment
of the requirements for the degree

of

MASTER OF ARTS

in

History

Approved:

Major Professor

Committee Member

Committee Member

Dean of Graduate Studies

UTAH STATE UNIVERSITY
Logan, Utah

1992
Everyone who contributed to this project displayed impressive tact, patience, and good humor in awaiting its belated completion. Thanks go to Prof. Chas Peterson, who introduced me to the study of Mormon community, helped to define, and then re-define the topic, and provided a crucial reading of the first draft. Prof. Carol O'Connor assisted with my struggles to re-define the topic as well. Prof. Clyde Milner not only gave the thesis its title, but also provided skillful advice and encouragement at all stages. In the context of another project, Prof. Len Rosenband helped me grapple with 19th-century Mormon diaries, a skill which proved crucial to this thesis. Prof. Tom Lyon served on my thesis committee and helped with a careful reading of the first draft. Carolyn Fullmer and everyone at the Utah State History Department helped with the final details. Prof. Bill Cronon of Yale University chipped in a long conversation on various aspects of the thesis topic on the bus ride from Tacoma to Mt. Rainier and back at the 1989 WHA conference. My formal intellectual debts to Prof. Cronon are evident in the text. Profs. Richard White and John Findlay of the University of Washington kindly and tactfully encouraged me to finish this project, and supported my efforts to do so long distance. I am grateful to all.
A. J. Simmonds, Brad Cole, and the staff of Special Collections at the Merrill Library graciously allowed me free run of their collections and helped me locate important documents, for which I thank them. All of the documents in this work come from their impressive archive, and my work would have been impossible without their support. Utah State University provided financial assistance for my studies through its support of the Western History Association editorial fellowship program, a Seeley-Hinckley scholarship in 1989, and through a summer thesis completion scholarship in 1990.

All of my friends in Logan, including Prof. Anne Butler, Jay Butler, Lisa Godfrey, L. J. Godfrey, Catherine Milner, Charlie Milner, Clyde Milner, Chris Mitchell, Carol O'Connor, Grace Ott, Ross Peterson, Jane Reilly, Renée Sentilles, Ona Siporin, and Barbara Stewart provided advice, support, and love throughout this project, as well as recreational diversions and plenty of free meals. I thank them all. I am grateful to my parents, Steve and Deanne Morse, and my housemates, Jerri Hoskyn and Cindy Cresap, for day-to-day and week-to-week encouragement.

My personal connection to the stretch of Cache Valley watered by the irrigation systems discussed here grows out of hikes and bike rides around the valley, and from bike rides from my various homes in Logan to the various homes
of my good friends Lisa and L.J. Godfrey in North Logan
and Smithfield. It was in passing through that irrigated,
beautiful landscape, in all seasons, at all hours, to join
them for barbecues and movie-fests, that I first grasped
the powerful sense of place that Mormon communities
created in Cache Valley through the practice of irrigated
agriculture. I thank Lisa and L. J. for sharing that
place with me.

Kathryn Morse
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ABSTRACT

Nature's Second Course: Water Culture
in the Mormon Communities of
Cache Valley, Utah, 1860-1916

by

Kathryn T. Morse, Master of Arts
Utah State University, 1992

Major Professor: Dr. Clyde A. Milner II
Department: History

Nineteenth-century Mormon settlers in Utah combined a
unique set of religious beliefs with a fervent agrarianism
and a strong sense of community. They encountered a
specific arid environment along the Wasatch Front. A
distinctive cultural set of irrigation institutions and
practices developed out of the complex interchanges
between nature and culture in Cache Valley, Utah, between
1860 and 1916. The structure of water flow, and conflicts
over water rights and responsibilities, reflected the
fundamental tensions within Mormon communities between
individual gain and collective progress; it also reflected
the patriarchal essence of Mormon culture.

The season-to-season workings of irrigation
institutions that distributed water from the Logan River,
whether large irrigation districts or neighborhood canal
cooperatives, showed how Mormon communities developed systems of exchange for water that allowed each individual irrigator to take water in direct proportion to the amount of labor, cash, or crops he contributed to the group's collective construction and upkeep of canals. The democratic nature of these exchanges, however, were tempered by natural hierarchies inherent in the geography of water canals, and by community hierarchies of power. A small group of elite town fathers held most of the responsibility for irrigation administration, and used their influence in disputes over water. Those town fathers also tended to own more land than other irrigators. They often owned valuable land in proximity to the canals themselves.

Between settlement in 1860 and the Call Decree in 1916, Logan River irrigators worked together to formulate a water distribution system that allowed for both the growth of local communities and for continued adherence to the basic religious principles on which the communities were founded. They also struggled to follow seasonal cycles of water use that fit within the natural cycles of the rise and fall of the water level in the river.

Whether at the level of the high-line canal, the city block, or the family garden, Mormon water systems constituted an interesting example of the ways in which
culture and the environment come together to shape natural resource use, especially in the arid regions of the American West.
"I had my garden spot surveyed this day[.] Agnes was very sick."¹ So wrote Mormon settler and diarist John Borrowman on Tuesday, May 28, 1850. As of that date, Borrowman, a Scottish immigrant, had lived in Salt Lake City for just over a year and a half, and had been married for sixteen months. Given the crushing load of labor involved in establishing a home, clearing, fencing, plowing, and watering his land, and contributing to community projects, it is no wonder that Borrowman kept his journal entries short. His brief words revealed much about his world, however. They spoke particularly to the crucial place of irrigation water in that world.

Borrowman summed up the following day with equal brevity: "I watered my land this morning[;] William Park was born at a quarter to three o'clock in the morning."² The order of his comments is telling. Though his wife had been in labor the previous day and most of the night, and had given birth to his first child, William Park Borrowman,

² Borrowman Journal, 29 May 1850.
early that morning, he noted first that he had irrigated his farmland.

John Borrowman's conflation of those two events, the birth of his son and the watering of his land, spoke to the importance of irrigation water in his family's life, and in the life of early Mormon communities in Utah. Not only did the watering of land merit frequent mention in daily records of individual and collective activities, but any work involving water and water ditches got top billing over young William Borrowman's tersely heralded arrival. The contrasting of these two events in a simple record of a single day pointed as well to the complementary nature of the two acts. In bringing a child into the world of Salt Lake City in 1850, and in bringing water to their newly acquired farm plot, John and Agnes Borrowman took two closely linked steps toward the fulfillment of their earthly mission. That mission was to create a Mormon civilization in the valleys at the foot of the Wasatch Mountains. They had to people what seemed an endless wilderness with like-minded servants of God, and they had to support their families with the resources that God had provided them in this new Zion.

To give the watering of land and a birth equal weight, then, was no outlandish literary act. Water held a crucial place in the Mormon physical and spiritual
world. It symbolized the baptism of new members into the spiritual community, and it made food production possible. Folklorist Barre Toelken, in his work on the folklore of water in Mormon Utah, notes that as in the irrigation of an arid land, "so in baptism is water a mediator between life and death, a concept richly dramatized in many Mormon legends."³

Water held great meaning and power in 19th- and early 20th-century Mormon communities, as it does in the present. The structure of water flow in those communities reflected the fundamental tensions between individual gain and collective progress, both spiritual and material, that underlay Mormon culture. It reflected as well the patriarchal essence of that culture. Those two components of the Mormon world, the constant struggle for balance between the individual and the community, and the rule of the fathers, in family, community, and religion, were as evident in the social mechanisms of water use as in any other aspect of community life.

The management of irrigation water by local canal companies provided a forum for expressions of the purpose and meaning of Mormon community, and of the place of that community in both the physical environment and the

spiritual universe. Water and its management were crucial not only to the material survival and prosperity of the town, but also to the residents' understanding of their individual and collective roles in the fulfillment of the Mormon mission. This thesis will explore the connections between water, religion, community, and nature along the Logan River in Cache Valley, Utah, from settlement in 1860 through the 1916 community-wide adjudication of water rights [see Figure 1]. The events of those years are informed by both earlier and later stages of Mormon settlement, as evident in John Borrowman's journal, and thus I consider examples of water use from widely varying moments of Utah's settlement. Though the management and infrastructure of water use changed over this 1860-1916 time-span, and continued to change thereafter, the Logan irrigators' tenacious commitment to traditional practices and institutions during this period indicated the cultural importance of a uniquely Mormon way of distributing water.

In claiming that water held "cultural importance" in Mormon Utah, that water use was itself "cultural," I seek more than historical proof of the obvious. I investigate rather the detailed and subtle ways in which culture--the ever-shifting mixture of religious belief, social and economic structure, material subsistence, family and community life, divisions of labor, written and oral
Figure 1. Erwin Raisz, Map of Cache Valley, Utah-Idaho, from The History of a Valley: Cache Valley, Utah-Idaho, ed. Joel E. Ricks (Logan, UT, 1956).
traditions, and worldview—shaped the use of natural resources. All natural resource use is cultural, but the connections between nature and culture, and the ways in which culture mediates between human communities and the natural environment, vary widely, even within a single region or state. A detailed consideration of these connections from a cultural standpoint, as a case study of the interactions between nature and culture, is justified by the unique world of Mormon water use.

Over the last few decades, growing numbers of historians have turned their attention to the place of water in the American West, and in the Mormon West as well. Donald Worster's 1985 book, *Rivers of Empire: Water, Aridity and the Growth of the American West*, is perhaps the most provocative of these recent works. It is

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in part a moral condemnation of the destruction that the hydraulic society of the modern West has visited upon rivers that were once natural systems, and upon communities that once felt some connection to those rivers. Worster defines three modes of societal water control: the local subsistence mode; the agrarian state mode; and the one currently operating in most western communities, the capitalist state mode. Worster characterizes the early Mormon subsistence mode as an admirable monument to religious zeal, as an example of a good fit between ideology and environment, and as evidence of an underlying, dictatorial church hierarchy. Mormon water systems were certainly all of those things, but they were much more as well. Worster only skims the surface of what is to be learned from a close examination of the local subsistence mode of water control in Utah. This is not surprising, as neither Utah nor subsistence water use are his main topic in Rivers of Empire. His discussion of the capitalist state mode of water development, however, by providing a contrast to local subsistence water systems, underlines much that is important about water in Mormon communities.

The West's hydraulic society, according to Worster,

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is built on "a sharply alienating, intensely managerial relationship with nature."\(^6\) That relationship with nature is evident in the infrastructure of dams, canals, and aqueducts, monolithic concrete fortresses which proclaim humankind's domination of, and separation from, the natural resources that support their consumer-oriented, socially divided culture. Water in these canals and behind these dams is not part of a natural system, but rather, in Worster's words, "simplified, abstracted water, rigidly separated from the earth and firmly directed to raise food, fill pipes, and make money."\(^7\) In evoking the profound alienation he perceives between the human community and water, Worster describes the Friant-Kern Canal, which waters the agribusiness empire of California's Central Valley:

Along the Friant-Kern Canal, as along many others like it, tall chain-link fences run on either side, sealing the ditch off from stray dogs, children, fishermen (there are no fish anyway), solitary thinkers, lovers, swimmers, loping hungry coyotes, migrating turtles, indeed from all of nature and human life....\(^8\)

At its core, then, Rivers of Empire asserts that the way in which any community in an arid environment controls its distribution of water reflects its social and

\(^6\) Worster, Rivers of Empire, 5.

\(^7\) Worster, Rivers of Empire, 5.

\(^8\) Worster, Rivers of Empire, 5.
political structure, and the fundamental tenets of its attitudes toward nature. In Worster's words, "the social order, the shape of western community...is reflected in the waters of the ditch." That assertion, and those reflections, are nowhere more evident than in the Logan River communities of Cache Valley between 1860 and 1916. The following chapters will explore the social order reflected in the workings of village ditches, first from the wide-angled perspective of the Mormon spiritual worldview, then from the nearer vantage of the season-to-season workings of two major canal companies, and finally from a close-up look at water use on village house lots and in gardens.

While Mormon water use was a thoroughly cultural activity, it involved nature as well. The development of irrigation institutions and distributions systems that met the agricultural demands of the villages involved a constant struggle to fit those demands into the limits of the water supplied by the Logan River. The Euro-American settlers who first diverted the waters of the Logan River alienated and abstracted that river from its "first" or original "state of nature," just as other westerners wrought havoc on the Sacramento, San Joaquin, Columbia, and Colorado.

9 Worster, River of Empire, 5.
Cache Valley Mormons also "commoditized" irrigation water, bringing it within a system of economic exchange that defined and re-defined its value by different, and changing, criteria. The Utahns turned the river into networks of canals, and attempted to alter the annual cycles of natural water flow to match the cycles of agricultural demand and community water use. In Logan, Utah, however, this creation of a "second" nature, a second cycle of water flow, took place on a much less disruptive scale than elsewhere in the West. Mormon culture and the Cache Valley environment were different from other western cultures and places. The Mormon system of re-distributing river flow across time and space was thus distinctive. Water in small Mormon communities was not "rigidly separated" from the human communities through which it ran by artificial cycles of dam-released flow, by steel and concrete, or by intellectual constructs of water as commodity or as capital. The system of exchange worked out by Logan water users—what and when they traded amongst themselves for water—proved less rigid, less cash-based, less technologically complex, than those of other, and later, western communities. Mormons certainly foisted intellectual constructs onto their water supply, and certainly altered its cycles of flow, but they were constructs and cycles of a different kind, based on their
drive for material success within the boundaries of community tenets. Far from alienating water from its own "nature" or from human society, Mormon settlers welcomed irrigation water into their communities, where it flowed in open streams down ditches and gutters, through yards and parks, providing long corridors of green vegetation, and lofting islands of cool air into the summer heat. The Latter-day Saints filled their towns with the sound of running water.

Water, at least in some Utah communities, had a meaning far different from that of water in other parts of the American West. This much is clear in the contrast between village canals and the hydraulic nightmare Worster describes in California. Where Rivers of Empire tells the story of Big Twentieth-Century Water, this thesis examines a smaller, more obscure and out-of-the-way genre of western water history, one of small communities using a small river to small ends. Water formed crucial, dynamic connections between members of those communities, and between the community and the natural environment. Those connections to water grew out of the unique culture that the Latter-day Saints developed in reaction to a specific western environment. Water joined them to nature and to each other in ways which evidenced not a timeless harmony between "man" and "nature," but rather the disjunctions
and tensions inherent in every attempt to shape nature to human designs, as well as the tensions within human communities created by such shapings. This discussion of Mormon water-use, then, is at its base a cultural study, an attempt to sketch the ways in which culture is both shaped by and reflected in the use of natural resources, and the ways in which culture can in turn influence social decisions concerning nature as a resource.
CHAPTER II

NATURE AND WATER IN MORMON UTAH

In the villages of Cache Valley, Utah, water was part both of a natural system—the river—and a social, religious, and even spiritual system—Mormon culture. That culture combined elements of Jeffersonian agrarianism with a peculiar brand of millennial fervor. To find the place of water in this spiritual universe, one must follow its flow into and out of Mormon agrarianism.

As the vanguard of Euro-American settlement in the Great Basin, the Utah migrants of the 1840s, '50s, and '60s brought with them the basic tenets of the American agrarian myth. Like other Americans, they held that the Biblical injunction to "replenish the earth, and subdue it" could best be fulfilled though agriculture. Through farming, God's true servants could remake the New World into a second garden of Eden. In his late eighteenth- and early nineteenth-century writings, Thomas Jefferson combined Biblical agrarianism with the Enlightenment-inspired conviction that only the yeoman farmer, dependent solely on the soil and his own initiative, could properly participate in a democratic society. Jefferson wrote that "[t]hose who labor in the earth are the chosen people of
God, if ever He had a chosen people, whose breasts He has made His peculiar deposit for substantial and genuine virtue...."¹

This agrarian myth prevailed throughout America in the 19th century. It had particular power in regard to the American West, as established by Henry Nash Smith in his classic work Virgin Land: The American West as Symbol and Myth. Smith expanded Jefferson's general agrarian myth to include the "myth of the garden," the idea that the transformation of the continent should result in a settled pastoral landscape. "The master symbol of the garden," Smith wrote, "embraced a cluster of metaphors expressing fecundity, growth, increase, and blissful labor in the earth, all centering about the heroic figure of the idealized frontier farmer armed with that supreme agrarian weapon, the sacred plow."² The Latter-day Saints adhered to this garden-myth with a tenacity unmatched by any other group of Euro-American settlers.³ They focused on the canonization and fulfillment of agriculture ideals with

¹ As quoted in Donald Henriques Dyal, "The Agrarian Values of Mormonism: A Touch of the Mountain Sod" (Ph.D. diss., Texas A & M University, 1980), 3.

² Henry Nash Smith, Virgin Land: The American West as Symbol and Myth (Cambridge, MA, 1950), 123.

³ See Dyal, "The Agrarian Values of Mormonism," 136, on the Mormon affinity for the "controlling images" of the agrarian myth.
unprecedented energy. Generic American agrarianism deteriorated into a fuzzy secularity as the 19th century progressed, but Utah Mormons harnessed the fervor of Puritanism, and of 1840s revivalism, to propel agrarian beliefs to new heights of piety. Historian Charles S. Peterson described Mormon agrarian belief as "[c]osmic in its breadth," a conviction that:

Man and the world in which he lived were in a wicked and ungodly state. The redemption of the righteous was the first imperative and implied the second, the redemption of the earth.¹

Brigham Young, who led the Mormon migration to Utah, with his fellow Mormon leaders incorporated this version of Christian agrarianism into scriptural texts. Their writings reveal an intensely practical agrarian faith, according to which human beings sought not to improve themselves for a non-earthly afterlife, but rather to improve the earth as they improved themselves. With the resurrection of Christ, they believed, the earth itself, the quality of the climate, soil, and crops would change, assuming an Edenic state.² Donald H. Dyal, whose 1980 study outlined the tenets of Mormon agrarianism, recorded that early Mormon leaders preached "the regeneration of

² Parley Pratt, a Church apostle, as cited in Dyal, "The Agrarian Values of Mormonism," 127.
the earth not only as a spiritual event, but also a physical or more specifically agricultural event." Thus Mormon farmers, like American farmers across the Midwest and the Great Plains, saw their work as essential to the creation of a good place, a democratic place, a place safe from the despotism of foreigners, the depredations of natives, and the unprincipled machinations of speculators. Agricultural labor was indeed the key element in the creation of a godly place in Utah. Farm work provided the Mormons with their only true means of finding a place in God's kingdom. This agricultural redemption of the earth, according to Leonard J. Arrington, the pre-eminent historian of Mormon Utah, constituted one of the seven basic principles of Mormon theology. Such redemption, defined as "the orderly development of local resources," implied that "[m]aking the waste places blossom as a rose, and the earth to yield abundantly of its diverse fruits, was more than an economic necessity; it was a form of religious worship."

In previous stages of American settlement, the pursuit of an ideal society peopled by yeoman farm

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7 Dyal, "The Agrarian Values of Mormonism," 133.
families had required only hard work, perseverance, a strong faith in God's obvious favor toward a white, democratic civilization, and, of course, an abundance of fertile land. In Utah, that was not enough. About 15 inches of rain fell annually on the benchlands and valley floors of the sloping foothills of the Wasatch Front.

Even with their hard work, steel-willed leadership, and unswerving confidence in God's favor, the Utah Saints also needed water. The arid environment provided the backdrop against which Utah settlers developed a strong set of connections between the creation of ideal agricultural communities and the bringing of irrigation water to their farms.

The deterministic power of aridity frequently plagues students of American western history. Did western history unfold along certain lines because the land received less than twenty inches of annual rainfall and thus prohibited humid-land agriculture? Donald Worster and Wallace Stegner, two of the finest scholars of the West, see aridity as an essential factor in the region's history. The West is as it is, Stegner declares, because "Anyone who wants to live in the West has to manage water to some degree." They must obey a law of water scarcity, and live
"within the country's rules of sparseness of mobility." In the Mormon West the water question is heightened by the unique characteristics of Utah as a sub-region. The Saints' West sprang up differently from everything that came after. Does aridity account for the Mormons' distinctive modes of settlement? Is water the absolute key to understanding Mormon Utah? Worster, Stegner, and others who have addressed that question have established beyond all doubt that the Mormon's beliefs concerning their arid environment are as, or more, important in understanding Utah's history, than the lack of rainfall itself. Utah Mormons incorporated their encounters with the arid Great Basin into their history, their belief system, and their vision of themselves, and those images of dryness reveal much about the role of water in the Mormon past.

The creation of an Edenic agricultural civilization in a barren desert was a central myth of 19th- and early 20th-century Utah Mormon culture. That myth grew out of the parallels between the Saints' migration to Utah and the Biblical exodus, and out of the Mormon leaders' post-settlement exaggerations of the aridity of the land along the Wasatch Front. It turned on the belief that the east

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9 Wallace Stegner, The American West as Living Space (Ann Arbor, 1987), 36.
side of the Salt Lake Valley was so dry and infertile that it could not have supported just any group of Euro-American settlers; only the chosen could have built an oasis in that environment. "I am thankful to a fulness [sic]," declared Young in 1847, "that the Lord has brought us to these barren valleys, to these sterile mountains, to this desolate waste, where only the Saints can or would live...." This exaggeration began as a tool for group motivation and celebration, a way of encouraging settlers to conquer new deserts by invoking wastelands already banished. It became, however, a fundamental building block of collective Mormon identity: the belief that the first settlers had brought water to an unproductive land and made the world anew.

In reality, as geographer Richard Jackson has proven, the first Utah settlers settled an admittedly challenging environment that was in no way barren. They had planned it that way. Brigham Young reviewed all available information on the Great Salt Lake region prior to the beginning of the Mormons' 1847 overland trek. He read trappers' and explorers' accounts of the region,


11 See Richard H. Jackson, "Myth and Reality: Environmental Perception of the Mormons, 1840-1865, An Historical Geosophy" (Ph.D. diss., Clark University, 1970), 84, 188.
which described it in turn as possessing "more than ordinary fertility and productiveness," as "most beautiful country...intersected by a number of transparent streams." Explorer and legendary self-promoter John C. Fremont wrote of the northern Salt Lake Valley that "[t]he bottoms are extensive; water excellent; timber sufficient; the soil good, and well adapted to the grains and grasses suited to such an elevated region...."

Migrants to the Wasatch Front in the 1850s and 1860s did not settle a parched land, but rather a "narrow oasis" in the foothills of the Wasatch mountains. The initial wave of settlers, Jackson established, described their new home not as a forbidding wasteland, but as abundant and fertile, well-suited to agricultural pursuits. They found an environment fortuitously suited to their understanding of how nature should support


13 John C. Fremont, The Exploring Expedition to the Rocky Mountains and to Oregon and Northern California (Washington, DC, 1845), 144, as quoted in Jackson, "Myth and Reality," 81.

14 Dan L. Flores, "Islands in the Desert: An Environmental Interpretation of the Rocky Mountain Frontier" (Ph.D. diss., Texas A & M University, 1978), 238.
certain kinds of community life. Surveying numerous diaries kept by first generation settlers, Jackson found few if any references to the environment as a "desert" a "wasteland," or "barren." Instead, Jackson concluded, Brigham Young and his fellow leaders fostered a set of myths in the years following successful settlement that caused the larger Mormon community to integrate into their own history and consciousness a conviction that they had, with the assistance of divine power, transformed a desert into an oasis. The Journal of Discourses, a collection of the writings of Mormon leaders, offered convincing examples of the instillation of the belief that the Wasatch Front had, in 1847, been little more than, in the words of George A. Smith, "a desert, containing nothing but a few bunches of dead grass, and crickets enough to fence the land." This idea that the well-governed, hard-working populace, and the green, thriving, well-watered fields could not have been possible in the desert without divine intervention held fast in Mormon culture, to be applied again and again as settlers struck out for new colonies

16 See Jackson's discussion of these myths in "Myth and Reality," 190.
beyond the core region. Non-Mormon visitors enhanced the mythology. After glimpsing the verdant valleys and comparing them with other western locales, travelers came away with a distinct sense of the Mormons as a favored population.\textsuperscript{18} God's particular care in fostering the Saints' survival has remained a viable tenet of Mormon history for over a century.\textsuperscript{19}

Irrigation was the single activity most key to the transformation of the landscape from which these environmental myths were formed. It was also the key to the actual work done by settlers in the building of the Mormon kingdom. The diversion of water from mountain streams to gardens, orchards, fields, and pastures was important to the Mormon understanding of the human place in nature, and of nature in history. As decades passed and the memories of those who had actually seen pre-settlement Utah faded, the power over nature achieved by both God and Mormon settlers continued to increase. Pioneer history moved beyond the litany of the blossoming desert toward a belief in the actual improvement of the Utah climate itself. As Great Plains settlers believed that rain followed the plow, so Mormons came to believe that irrigation enhanced river flow. A writer in the

\textsuperscript{18} Jackson, "Myth and Reality," 207.

\textsuperscript{19} Jackson, "Myth and Reality," 166.
Millennial Star, a Mormon periodical claimed in 1884 that "Many streams have been greatly increased in volume, and in some places new springs have burst forth in the desert....The rainfall has greatly increased in some localities." Water was a dynamic participant in the mythic transformation of the desert into a garden. Each Mormon irrigator, from 1847 on, saw himself or herself to be participating in, and re-enacting, that transformation. The water itself connected them to their higher religious mission.

The Utah settlers' administration of natural resources, most notably land, timber, and water, embodied other theological aspects of the Mormon belief system. Mormons held that the earth's resources belonged to God, and were held by human beings only in a temporary state of stewardship. Stewardship meant that the church, through the community, allotted each individual only the amount of land and resources that he could use for the benefit of the community. Like the redemption of the earth, stewardship comprised a basic tenet governing Mormon Utah.

Collective stewardship as expressed in Mormon Utah

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21 Arrington, Great Basin Kingdom, 25.
implied a collective or cooperative mastery over nature. Because they were stewards of their land and resources, rather than outright individual owners, Mormon settlers bore a specific set of obligations to the community and to the church. Only through full and beneficial use of the earth's bounty, they believed, could the kingdom grow. Each individual, in maximizing the production of a single family's allotment, could support that growth. In addition, ten percent of a family's annual production was given to the Church to support its activities.

Mormon communitarianism demanded that the interests of the community come before those of the individual. That collective legacy has come under much scholarly scrutiny in recent decades, as historians have tested the degree to which Mormon communities actually practiced the communal ideals that they preached. The debate over communalism has included considerations of the nature of Mormon self-sufficiency, of their system of economic distribution, and of their modes of economic production. In a 1978 study of the political economy of Spring City, a central Utah town, Michael Scott Raber contrasted local modes of production with modes of distribution. Raber worked from the premise that where village- and territory-wide distribution of farm and village products were
communitarian, modes of production were not. Raber concluded that the individual family, not the community, formed the basic unit of production and of the theological quest for salvation through labor on the land. Donald Dyal reached a similar conclusion in his study of agrarian values in Mormonism, noting that, in Mormon communities, "[t]he individual or individual family is the basal unit of all activity." The family existed as a self-contained production unit and a microcosm of God's universal family, but according to religious and economic ideals, the domestic unit was expected to work and produce not primarily not only for their own benefit, but for that of the collective as well.

In contrasting the family with the community as important Utah institutions, Michael Raber raised a number of important points concerning the linkage between agricultural labor, nature, and community. Raber claimed that the Mormon settlement system, with centralized direction of colonization and collective ownership and development of natural resources for the common good, did not persist beyond the most initial stages of the colonization process. Those early years saw the

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22 Michael Scott Raber, "Religious Polity and Local Production: The Origins of a Mormon Town" (Ph.D. diss., Yale University, 1978), 11.

conversion of common, public resources into privately held allotments. Those allotments became the domain of individual households, and those households were responsible for the production of most of the goods necessary to sustain themselves.

In Mormon communities, Raber contends, there were two levels of production: the household level, and the supra-household, or community level.\(^{24}\) As a single entity, the community cleared fields, built fences, and dug irrigation canals. These were not tasks of actual economic production.\(^{25}\) These centrally organized projects, Raber points out, were for the most part one-time efforts to create the infrastructure of production, which would then support each family's independent quest to support itself. The individual laborer contributed his time and effort to these collective tasks only to the extent that he would personally benefit. In fact, the individual was assigned community labor—a length of fence or a stretch of canal—in direct proportion to the size and demands of his individual holdings. In Raber's version of Mormon village labor, an aggregate group of individuals sacrificed fragments of their valuable time to assist in the breaking

\(^{24}\) Raber, "Religious Policy and Local Production," 288.

\(^{25}\) Raber, "Religious Polity and Local Production," 289.
up of common resources into usable pieces. Once the fences were built and the ditches dug, each family could depend on protected fields and a sufficient allotment of water. Little need remained for further communal labor. Raber concludes that the most striking feature of the Mormon political economy was not its cooperative nature but "the relative lack of corporate arrangements for production at levels of operation above or beyond the household, and the self-conscious containment within the household of as much labor as needed on individual farm tasks...."26

Raber's analysis of these underlying economic patterns rightly emphasizes the importance of family in the Mormon community. Like John Borrowman and his journal record of his first son's birth, the individual Utah settler understood and expressed his or her attachments to God, land, and community through the lens of family. Raber does not consider, however, the ways in which the individual family remained connected to the community, especially to its ideals, its work, and its resources, after the initial community projects were completed. One of the ways they remained connected was through their continued use of irrigation water. Water in Mormon

26 Raber, "Religious Polity and Local Production," 288.
communities flowed out of canyons, which were public spaces, through main-line canals, which were owned and managed by community groups, and, finally, into fields and yards, which were worked by families for family survival. Water connected those different realms, and thus connected families to the community. It also caused conflicts between families and the community. The larger purpose of the irrigation system, as Raber pointed out, was indeed to bring water to family spaces, to private spaces. But it passed out of nature and through the community to get to those spaces, and thus both nature and community played a role in family water use. In addition, Mormon family activities of building and beautifying a home and garden, and raising children to further the religious community, were inherently connected to larger communal goals.

Raber's conclusion that the collective construction of economic infrastructure of production was a one-time happening after which the individual family took over the bulk of economic activity is tempered by his admission that water was a resource different in quality and use from land, animals, timber, homes, and churches. The creation of an irrigation system did not immediately produce anything, but instead created a means for

27 Raber, "Religious Polity and Local Production," 190.
producing from fields, gardens, and orchards. "The difference was," Raber admitted, "that irrigation involved continuing renewal of this act of creation, while the less fluid elements of crop production did not." Community irrigation construction efforts could last for years, and the repairs could last forever. In this "continual renewal" of the "act of creation," the annual planning and carrying out of the repair and use of the irrigation canals and ditches, lay the crux of these linkages between individual Mormon families and the Mormon spiritual universe. Cooperative economic activity sometimes did decline sharply after the early years of settlement, but each individual family remained tied to the legacy of that cooperativism by continuing ties to irrigation systems, to which they still contributed labor or taxes, and from which they drew water. Those ties to their community were not always welcome, or peaceful, or productive, but they remained. And every spring, with the start of the irrigation season, Mormons re-affirmed the connections between their labor, their community, their mastery of nature in the proving of God's bounty, and their redemption of the earth.

Water and work gave substance to these connections.

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28 Raber, "Religious Polity and Local Production," 289.
Mastery of nature and the purifying of the land served as powerful motivating ideals, but most Mormon families devoted their lives to muddy physical labor. The history of that labor is distinctive not because of the doctrine of stewardship or the injunction to master nature, but because of the clarity and faith with which the people themselves understood stewardship, mastery, neighborly relations, and the day-to-day meaning of their work. Henry Ballard, a Cache Valley settler, reported a gathering of neighbors in the "well crowded" Logan schoolhouse on the undoubtedly chilly evening of February 4, 1860. "It was a time of rejoicing," Ballard wrote. "Brother Hammon[d] Advised us not to forget our Dutys when the Spring opened but to be Alive to our Duty at all times in the Kanyon and in our fields and in all our movements." 29 Forty-five years later an editorial in the agricultural periodical Deseret Farmer claimed that "One of the greatest joys of the farmer's life should come from a realization of the relation of his work to that of his Creator. He is co-operating with nature—which is the handiwork of God—and from lifeless, useless things he creates articles for which a hungry, dependent world is

29 Henry Ballard Journal, 4 February 1860, TS, Joel E. Ricks Collection of Transcriptions, vols. 1-2, Utah State University Library, Logan, UT.
That Henry Ballard and his fellow Saints strove to be alive to their duty while cutting timber or digging ditches, or that they thought about their duty to their community and their God, gave them a connection to the land and water with which they worked. They understood themselves to be cooperating with nature, even when they had no conception of the autonomous ecological processes which they interrupted. Their labor had layers of symbolic meaning; like water, it tied them to nature, to each other, and to God.

Physical labor, of course, had much to do with the bringing of water to the newly carved out croplands along the Wasatch benches. The act of working together to build and maintain ditches reinforced the connections between nature, community, and the religious mission. Long after Utah was integrated into mainstream America and its culture of rampant individuality, irrigation systems continued to require the aggregate labor of individual water users, and continued to reinforce those linkages. The paradoxes of being an individual both separate from the community, and connected by labor and water to the physical community and the spiritual universe, permeated

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30 "The Other Side of Farming," *Deseret Farmer* 1 (15 June 1905).
Mormon life. Those paradoxes found one avenue of expression in the myriad uses of water.
CHAPTER III
FROM LOGAN RIVER TO LOGAN TOWN

Prior to 1859, water flowed out of the high limestone confines of Logan canyon and into Cache Valley without crossing any major thresholds other than the gradual slope of the valley floor. With rapid Mormon settlement in the early 1860s, the Logan River became part of a new ecology, a new system of encounters and exchanges in which the river itself played a crucial part. With its shaping of, and integration into, the villages of the east side of the valley, the river was channelled in new directions, for new purposes, across new thresholds.

As the villages of Logan, Hyde Park, and Smithfield sprang up, and as their citizens dug canals between them, the water flowed out of the canyon, a "natural" realm, into the towns, which were spiritual communities with a specific millennialist purpose, and a distinctive physical structure which reflected that spiritual goal. Within those communities, water diverted from the Logan River flowed between the larger social world of the village into the smaller domains of individual families. In doing so it flowed from the patriarchal world where male heads of household worked with, controlled, and directed water, to
the familial world of the house and garden. In the main "trunk" canals which crossed the benches, pastures, and grain fields, water flowed between the separate villages, connecting them in ways no other shared resource could.

The Logan River possessed natural characteristics that attracted Mormon settlers and structured the ways in which they used water. In comparison with other drainages, it was easily exploited. Any understanding of community water use must first take the river itself, and the landscape, into account. From its headwaters northeast of the town of Logan, the Logan River runs twenty-odd miles through the Bear River mountains, a spur of the Wasatch mountains, and down Logan Canyon to the floor of Cache Valley, where it joins the Bear River. The river drains 223 square miles of watershed, a topography that ranges from elevations of just over 4,000 feet above sea level to nearly 10,000 feet.¹ The Bear River mountains are predominantly limestone, with sandstone and dolomite in places. None of those rock formations readily absorb water.² Large glacial deposits at the center of the watershed do absorb water, and their storage capacity


supplies the river's continuous flow. The geology of the region thus insures that most of the precipitation that falls on the watershed ends up in the river.

The key climatological aspect of the valley's dependence on the Logan River watershed is the sharp discrepancy in precipitation between the valley floor and the nearby mountains. Annual precipitation in Cache Valley averages just over sixteen inches. The high peaks of the Bear River range just east of the valley, average over fifty inches in a year, most of it in the winter, in the form of snow. Because the Logan watershed is, in the words of water economist Frank Haws, a "tightly closed hydrologic system," it allows minimum loss or gain of water to or from invisible sources. The river thus efficiently conveys a substantial volume of water out of the inaccessible mountains and canyon and onto the valley floor. There the annual surface runoff is quite easily harnessed by hand-dug irrigation systems. The keys to that water management are the seasonal patterns of precipitation and river flow, which must be manipulated to provide water according to human, rather than natural, patterns.

After emerging from the mountains at the mouth of

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3 Haws, "Development of Logan River," 11.
Logan Canyon, the river cuts through the benches on the eastern slopes of the valley, and across the flat valley floor, meeting the Bear River in the middle of lowlying wetlands at the valley's center. Like the Great Salt Lake Valley, Cache Valley is a legacy of Lake Bonneville, the great inland sea of which Salt Lake is a surviving remnant. About 18,000 years ago, the ancient lake reached its highest level at an elevation of just over 5,000 feet. Streams entering the lake formed deltas of sand and gravel which became high benches at the mouths of canyons; as the lake's level dropped, new deltas formed out of "sandy, porous chestnut soils, fertile and rich in lime." This successive formation of deltas and fans at different levels left a series of flat, raised steps that climbed down the valley's walls. As it receded further, the lake left layers of alluvial deposits which now form the valley floor.

The nineteenth-century Mormon immigrants settled in the transition zone of the Wasatch mountain range, an area environmental historian Dan Flores characterizes as a "narrow, rich, alluvial piedmont of fans, deltas, and

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terraces, through which meandered the sweet clear water of the mountains." Receiving between 13 and 18 inches of rain and snow in a year, this corridor of fertile soils was, in Cache Valley even more than along the Great Salt Lake, particularly suited to Mormon social, religious, and economic goals of agrarian communitarianism, self-sufficiency, and isolation. As settlers gravitated toward the confluence of water, timber, fertile soil, and grazing bottoms at the mouths of the canyons, they remade the transition zone into a Mormon settlement zone. The villages that the Utah pilgrims located on and near the Logan river, like others along the Wasatch Front, evidenced a perceptive environmental strategy, a consciousness of the value of the resources available in those particular places. That consciousness was reflected in the organization and form of the villages themselves, as well as in their location against the dramatic backdrop of the Wasatch foothills.

The structure of Mormon communities, like the structure of the Logan River watershed, or of the soils of Cache Valley's alluvial benches, is crucial to an understanding of the flow of water between the two. The Mormon village, according to Leonard J. Arrington, held a venerable place, with the redemption of the earth and the

7 Flores, "Zion in Eden," 327.
stewardship of property, as an underlying economic ideal of the Saints' mission, one of the key foundation stones in the edifice of the Kingdom. The village pattern was based on the Plat of the City of Zion, a plan first put forth by church founder Joseph Smith in the early 1830s when he planned settlements for Jackson County, Missouri. Smith's plan called for a mile square village with blocks of ten acres divided into twenty lots, each a half acre in size. Streets ran east/west or north/south. House lots included room for a garden and lawn, or orchard. Farmland was located outside the residential areas of the town.

This Missouri-born plan continued to guide village planning once the Mormons left the Midwest for Utah. Though conceived long before the Saints' plans to move to the arid West, the four-square, compact village surrounded by crop fields proved, as Leonard Arrington pointed out, "peculiarly adapted" to Mormon goals for life in the Great Basin. The tightly concentrated housing pattern kept settlers close together, providing for a wealth of social and religious activities, easy regulation of community projects, and collective defense against displaced groups of Shoshone-Bannocks. In addition, Arrington noted, the

8 Arrington, Great Basin Kingdom, 24-25.
9 Arrington, Great Basin Kingdom, 10.
10 Arrington, Great Basin Kingdom, 24.
village as it developed on the Wasatch Front and throughout Utah, "permitted effective irrigation culture."

The compact settlement pattern that characterized Mormon villages, though evolved from ideal images of early New England towns, contributed significantly to the success of Utah irrigation. With homes and gardens concentrated in a small area, a few main canals branching from the local river were split into networks of smaller ditches. These in turn brought water to each family, with the water itself traveling as little distance as possible. The same main canals could carry water to agricultural fields both before and after they passed through the residential areas of the village. Those same canals could continue beyond the boundaries of the village and its fields to serve the next village to the north or south along the base of the foothills. The Mormon village pattern thus encouraged efficiency of ditch-digging and of water use, though efficiency was not always the result. The importance of water and its flow within the village grid itself will be taken up in the next chapter. Water outside that grid, in canals and between villages, held different meanings.

Samuel Fortier, a hydrographer and engineer who

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surveyed Cache Valley's water resources in the late 1890s, drew a detailed map of the region, showing the irrigation canals and ditches and the land they watered [Figures 2, 2A]. Fortier's map demonstrates the marked contrast between the path of Logan River canals between the separate village grids of Logan, Hyde Park, and Smithfield, and their trajectories within the villages themselves. Outside the rigid geometry of the towns, the canals looked somewhat like tributaries to the rivers, curving with the topography of the valley's sloping floor. Within the grids, especially in Logan, the canals followed the straight lines and right angles the village streets, conforming to the order that the Mormons brought to their wilderness. The flow of water outside towns and between towns looked different, looked more river-like, more "natural." The canals' curving paths appeared somewhat analogous to that of the river itself. Folklorist Austin Fife noticed the contrasts between natural patterns of river flow and strict angles of the village grid. He wrote in 1979 that "the rectangular grids followed by the fenced property lines and roads did not synchronize with the terrain features that had to be followed in order to always keep the naturally flowing water where it could
Figure 2. Cache Valley Basin with Inset [see Figure 2A] Showing Logan River Canals, Including Logan and Richmond, and Logan, Hyde Park, and Smithfield Canals. From Samuel Fortier, The Water Supply of Cache Valley (Logan, 1897).
Figure 2A. Inset of Map 2. Logan River Canals.
reach the cultivatable land."\textsuperscript{12} Beyond village boundaries, irrigation canals were more like rivers. They were, in fact, new, human-made rivers, directed toward community ends, but eternally plagued by non-human nemeses such as mountain topography, muskrats, mudslides, moss, and floods.

In a recent history of Chicago, western and environmental historian William Cronon uses the Hegelian and Marxist ideas of "first nature" and "second nature" to explore how 19th-century Chicagoans defined, and redefined, the "natural."\textsuperscript{13} In Chicago, "first nature," the original, naturally created landscape, embodied a range of different possibilities open to Euro-American settlers and developers. Out of "their vision of what it should be" early Chicagoans built on top of that first landscape, "[a] kind of 'second nature,' designed by people and 'improved' toward human ends."\textsuperscript{14} In doing so, they imposed "their own order...on the world of first

\textsuperscript{12} Austin E. Fife, "Family Owned, Horse Powered, Irrigated, Multiple Produce Farms of the Intermountain West," TS, 1979, Utah State University Library, Logan, UT, 13.

\textsuperscript{13} William Cronon, Nature's Metropolis: Chicago and the Great West (New York, 1991), xvii. Nature's Metropolis explores the city's meteoric development through the transformation of its western hinterland, and in the commoditization of the goods--grain, wood, and meat--produced in that transformation.

\textsuperscript{14} Cronon, Nature's Metropolis, 55-56.
nature...." That human order remained "natural," though, because it conformed to human visions of what should happen in that particular place, the trajectory of the appropriate course of events. Furthermore, "second nature" so thoroughly obscured "first nature" that it took its place. That which was man-made was taken to be a gift of nature, so easily, so "naturally," had it arisen in nature's place.

According to this idea of second nature, the railroads which passed through Chicago seemed natural. The flat landscape around the city and in its hinterland was "peculiarly suited" to railroads, much as the fringes of the Wasatch Front seemed so "naturally" adapted to compact Mormon villages and their irrigation systems. That either of them--Chicago railroads or Utah irrigation canals--sprang up and thrived, seemed entirely natural, as did their transformation of the surrounding landscape. In addition, Cronon points out, the bison and pine trees, which had once been part only of "first nature," became something entirely different when drawn into the human-constructed world of "second nature." They became commodities of the market, "things priced, bought, and

15 Cronon, Nature's Metropolis, 146.
16 Cronon, Nature's Metropolis, 72.
17 Cronon, Nature's Metropolis, 266.
sold within a system of human exchange."¹⁸ Water in Utah followed much the same path.

Cronon also proposes that the distance between first nature and second nature, is, in the history of Chicago and its hinterland, a measure of the movement from "local ecosystem to regional hinterland and global economy."¹⁹ In other words, the extent to which human construction of second nature obliterates first nature signals the degree of a place's integration into a larger economic system. It is that larger system, one of global markets, that redefines the "local" as something that is no longer local, that reshapes the first nature that made a city or a hinterland what it was to begin with, into something entirely different.

Cronon's discussions of first and second nature, though focused on a topic far from Mormon irrigation canal systems, make a number of important points about any human manipulation of a natural landscape. First of all, the canals that Cache Valley Mormons built to carry water from the Logan River to their houses, yards, and fields constituted a form of second nature. They caused water to flow to places it had not flowed before, changing not only the newly-watered land, but the river itself. To the

¹⁸ Cronon, Nature's Metropolis, 266.
settlers who oversaw that process, the canals became, literally, second nature, an obvious, "natural" solution to their need to redistribute the river to meet human needs. The canals became elements of a landscape destined for a full-fledged flowering of the Mormon kingdom and for the fulfillment of the land's bounteous agricultural and "natural" potential.

The water that flowed out of the Logan River and into irrigation canals was thus redefined, culturally, and economically. It was made part of a unique system of human exchange, given all of the spiritual, cultural, and historical meanings that Mormons bestowed upon water. The water of the Logan, as it flowed through Cache Valley villages, became part of a second nature. It was irrevocably separated from the water that continued on, uncaptured, across the valley to the Bear River, and into the Great Salt Lake. As irrigation water, it was measured, timed, commoditized, distributed, stored, and fought over in ways that changed its meaning and identity.

While irrigation canals formed a vital and distinct second nature, imposed by human artifice, they did not subsume the Logan River itself. The Logan continued to flow, even if diminished, much as it always had. First and second nature co-existed to a certain degree, both remaining visible, both struggling with the other to
assert its own order and dominance. According to Cronon's formulation, this "failure" of second nature to obliterate first nature was an indication of the enduring localism of this particular cultural and economic use of nature. In Cache Valley, second nature was built on top of first nature without causing first nature to be completely lost. Both "natures" were natural, but neither gained the upper hand, neither came to completely dominate the other.

Mormon settlers lived and irrigated in Salt Lake Valley for a dozen years before Church President Brigham Young dispatched colonizers north to Cache Valley. Young's scouts had termed Cache "the most beautiful valley that they had seen," on an initial survey in August 1847. Grazers took church cattle herds north to graze in Cache Valley in 1855, but harsh conditions—colder winters than the Salt Lake area—discouraged settlement until 1856, when Peter and Mary Ann Maughan and their family founded Wellsville. Skirmishes with Shoshone cattle rustlers and the threat from the federal army in the Utah War further delayed a proper foothold of villages

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until 1859. Over 2,000 settlers, many of them northern European immigrants, flooded in over the next two years, establishing a string of towns at the base of the mountains including Paradise, Millville, Logan, Hyde Park, Mendon, and Smithfield. This impressive rate of colonization continued through the early 1860s, with Logan reaching a population of 1,727 by 1870, and Smithfield of 676 by 1867. That growth continued. Over 5,700 people lived in Logan by 1895, and over 1,400 in Smithfield. In only 35 years, 18,286 people settled in Cache Valley, rapidly transforming its landscape and the flow of water across that landscape.

When the newly arrived citizens of Logan first diverted the waters of the Logan River in mid-May of 1860, they baptized themselves and the river into a new set of hierarchies—beliefs, laws, and practices—concerning water use. The basic tenets of religious belief that

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21 Ricks, *Forms and Methods of Early Mormon Settlement*, 64-65; and Feramorz Young Fox, "The Mormon Land System: A Study of the Settlement and Utilization of Land Under the Direction of the Mormon Church" (Ph.D. diss., Northwestern University, 1932), 65.

22 Logan population figure from Haws, "Development of Logan River," 42; Smithfield population figure from *The History of Smithfield* (Smithfield, UT, 1927), 8.

23 Samuel Fortier, *The Water Supply of Cache Valley*, Utah Agricultural Experiment Station Bulletin no. 50 (Logan, UT, 1897), 16.
influenced water use have been outlined, but the structure of actual irrigation practice that grew from those beliefs and from the settlers' goals for their community are of equal importance in unravelling the place of water in that community.

The history of Utah irrigation institutions has been told numerous times since the late 19th century by skilled historians and engineers armed with massive documentary evidence of, and direct experience with, state-wide patterns of water administration.24 A firm consensus on the basic characteristics of the Mormon system runs through those histories. This consensus holds that Brigham Young formulated a water policy by combining the principle of divinely granted stewardship of the earth's resources with knowledge gained from Hispanic water systems. Drawing from those sources, he decreed that water was a public resource, owned in common by all

members of the community. Water rights were grounded in the dual doctrines of beneficial use and prior appropriation. The first to divert water from its natural course and put it to work in a manner useful to the community established rights to the amount diverted. Only a lapse of beneficial use abrogated those rights.

Another key element of water use concerns the Mormon Church hierarchy, which controlled water rights until well into the twentieth century, and in informal ways does so today. As a result, "beneficial use" meant "beneficial" in the eyes of the church, beneficial to the progress of the community as they defined both "progress" and "community." This meant that any use of water not sanctioned by the church could be relegated to secondary status. A. J. Simmonds, in his history of non-Mormon settlers in Cache Valley, described how this led, at least initially, to a segregation of agricultural pursuits. Mormons, with their community-constructed water canals, raised grain crops on irrigated farmland.

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25 On the influence of Hispanic water law, Dan L. Flores, in "Zion in Eden," 330, noted that church leaders borrowed the idea of public ownership of water combined with priority rights to diversion from Hispanic communities of the Southwest. Richard Jackson notes that the Mormon battalion sent to fight the Mexican War studied irrigation systems in "Myth and Reality," 120.

26 Raber, "Religious Polity and Local Production," 168.
locked out of those canal systems by religious separatism, settled less irrigable parts of the valley, and supported themselves by raising livestock.27

These principles of public supervision, beneficial use, and ecclesiastical control distinguished Mormon water systems from those of other western regions. Other qualities contributed to their distinctness as well: their cooperative nature; their diminutive scale in comparison to other projects across the West; the simple tools used in their construction; and the speed, simplicity, and frugality of that construction. In 1865, even with ever-mounting numbers of Utah settlers demanding new and larger canals, the 277 existing canals in the territory averaged a mere 3.7 miles in length.28 The over 800 cooperatively owned ditches carrying water in Utah in 1920 had an average capacity of 24.5 second-feet, compared to the over 70 second-feet of water that ran in ditches in California, Idaho, and Colorado.29 Whatever magic made


the Mormon irrigation system successful, that magic had nothing to do with scale. The Mormon genius for distributing water lay in their consistent ability to manage small volumes of water.

The pioneers' rapid construction of the first canals has become legendary in Utah, and is chronicled in innumerable community histories. Leonard Arrington recorded the Cache Valley tale of how 28 men and boys from the town of Hyrum, south of Logan, spent most of the month of May, 1860 digging a nine mile long, four-foot deep irrigation ditch, by hand, while the town shored them up with daily deliveries of food and milk. Just to the north, Logan settlers labored from late March to mid-May of 1860 scraping out enough of the Logan and Hyde Park canal to water 2000 acres that first summer. Each farmer contributed labor in proportion to his land holdings, which were limited by family size, and doled out in twenty acre parcels by church leaders. Most of the ditch work was done with picks, shovels, and wooden plows pulled by ox-teams. Milk-pails and home-made plumb lines

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31 Joel E. Ricks, The Beginnings of Settlement In Cache Valley, Twelfth Annual Faculty Research Lecture, Utah State Agricultural College (Logan, UT, 1953), 23.
served as surveying tools. There is no denying the co-
operative nature of this work, the almost total lack of
capital investment, or the speed with which water reached
the croplands. The centrality of the first act of
communal ditch-digging to pioneer narratives underscored
the parallel between the birth of the community and the
first watering of the land. 32

While this general picture of pioneer irrigation
provides an accurate account of the cooperation demanded
of Utah settlers in the face of isolation and starvation,
it lacks depth. Most Utah historians, and water
historians, invoke this basic outline without providing
much detail to color in the picture. This lack of
specificity is rooted in a point that Leonard Arrington
and Dean May made in their 1975 discussion of irrigation
as "'A Different Mode of Life.'" 33 "The most striking
aspect of the institutions devised for the control of

32 For other pioneer accounts, see Marlyn L. Fife,
"Irrigation Water Values in Cache County, Utah"
(Master's thesis, Utah State University, 1967), 15;
Ricks, ed., History of a Valley, 149, and Ricks, The
Beginnings of Settlement In Cache Valley, 32; Isaac
Sorensen, "History of Mendon, 1857-1919," TS, Joel E.
Ricks Collection of Transcriptions, vol. 1, Utah
State University Library, 3; History of Smithfield,
47; and Richmond Bicentennial Committee, The History
of Richmond, UT (Richmond, UT, 1976), 17.

33 Arrington and May, "'A Different Mode of Life':
Irrigation and Society in Nineteenth-Century Utah," in
Agriculture in the Development of the Far West,
water," May and Arrington wrote, "would seem to be that they were, for the most part, informal and unarticulated—barely institutions in the strictest sense."

Given the milieu of religious beliefs that surrounded these water "institutions," it is not hard to understand that they were "unarticulated," and that historians find it difficult to pin them down, or to move beyond an invocation of their standard characteristics into a closer look at the place of water at various levels of community life.

The celebrated process by which irrigation canals came into being, this cooperative labor in the interest of group survival, held within itself the tension that remained central to the later administration of the systems. An individual farmer's contribution of his own labor to the digging and maintenance of a canal, whether through labor or taxes, was the key means by which he secured a private right to have water turned onto his land. This labor established personal water rights, becoming, as historian John Harvey writes, "the most crucial element in transforming a portion of the public

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34 Arrington and May, "'A Different Mode of Life,'" 19.
domain into usable (semi-private) property." An individual family, once in possession of land and a water right, and dependent on that land and water for survival, was forced to straddle an ill-defined line between their own best interests and that of the community which, through the ditch, had made their individual freehold possible, and which sustained them in numerous other material and spiritual ways. This system of securing one's place in the community, on the land, and along the ditch, made perfect sense to those attuned to Brigham Young's exhortations on manual labor as crucial to the progress of the community and the Kingdom. Just as individual Mormons devoted themselves to physical labor to gain membership in the post-resurrection world, so they labored on irrigation canals to gain their place in the agricultural approximation of that world in Utah. Salvation and farming were individual pursuits, however, and therein lay the true challenge of community irrigation.

The three major canals that ran water from the Logan river north through Logan toward Hyde Park and Smithfield


were the Logan and Hyde Park, begun in 1860, the Logan and Richmond (later Logan Northern), begun in 1864, and the Logan, Hyde Park, and Smithfield, begun in 1881. As was common in foothill settlements, irrigators dug the lowest canal first, the one furthest from the mouth of the canyon and closest to the center of the incipient town. There, the gentler slope and easier-managed river banks made the cutting of headgates fairly simple. Diversion from the river on a relatively flat plain was the first settlers' only viable option, as they lacked the time and equipment to begin ditch construction up in the rocky canyon itself.

Within Cache Valley's simple gravity flow irrigation systems, main canals branched into smaller ditches, and then into crop rows and village gardens. Water could be diverted only onto land that lay downhill from the canal, and thus irrigators referred to their land as being "under" the canal. The first Logan canal, the Logan and Richmond, watered land below it, leaving large tracts of irrigable land above the canal waterless until irrigators dug the higher, or "high-line" canals. Irrigators started the later ditches as soon as the rapidly growing population laid claim to enough land and demanded water. Since the three main Logan River canals ran down, or west, from the their diversion points and then swung north
toward Hyde Park and Smithfield, each brought the new swath of land below it, but above the lower canal, into cultivation. As folklorist Austin Fife pointed out, the lines of the canals marked patterns of land use. Land above the canal, without water, was used for grazing or dry-farming, and had a distinct, unwatered appearance. "Below" the canal, the greener orchards, gardens, and fields evidenced an entirely different regime. In bringing land under a canal, Mormon villagers transformed it from desert to garden. They brought it into their kingdom, a realm of order and civilization. Each canal, in bringing another level of the valley's fertile borders into that realm, constituted an enormous gain, both materially and spiritually. Samuel Roskelley of Smithfield reported such a gain in his journal for 1885, the year in which the Logan, Hyde Park, and Smithfield Canal was completed as far as Smithfield. "On Tuesday 16 June," he declared in larger-than-usual handwriting, indicating his excitement, "the Water first reached my land east of my farm through the Upper Logan Canal[,] which is a source of great rejoicing to me, to know that the water will run through from Logan."  

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38 Samuel Roskelley Diary, 20 June 1885, MS, Utah State University Library, Logan, UT.
With this pattern of parallel ditches built at increasing elevations came a hierarchy of water diversion. The higher canals, built later than the original, lower-elevation canals, took water from the Logan River at points further upstream from the headgates of the earlier canals. The high-line ditches had the power to take water first, to affect the water supply of all downstream diverters. In the late 1890s the Logan, Hyde Park and Smithfield Canals, the Logan and Richmond Canal, and the Logan, Hyde Park, and Thatcher Canal ranked first, second, and fourth in order of elevation, but in opposite order for priority of diversion. This ascendancy of elevation over community-sanctioned priorities of water right required water users under the higher canals to heed the social restrictions on their favored geographical position. The members of each canal company had social and economic relationships with those of the other companies, much like the relationships among farmers with land along the same ditch. Ideally, those relationships worked to nullify the natural advantages held by higher-elevation diverters who could take water before it reached

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the headgates of lower canals. The tension between the social imperatives of the Mormon irrigation system and those geographic advantages played an important role in community water use.

The two lower Logan River canals, Logan and Hyde Park, and Logan and Richmond, came into being under the auspices of the local county court, the first formal legal institution charged with the allocation of water resources, and the first administrative structure to give some shape to the "informal and unarticulated" world of water use. Peter Maughan, founder of Wellsville--Cache Valley's first town--and a bishop, or ward leader appointed by the Church, took his position as probate judge of Cache County at its creation in 1856, well before permanent settlement. In doing so he became both civil and religious leader of the community. As county judge, Maughan had direct control over the allocation of natural resources. He was directed in that function by an 1852 territorial law which read:

The country courts shall...have control of all timber, water privileges, or any watercourse or creek, to grant mill sites, and exercise such powers as in their judgment shall best preserve the timber

41 Arrington and May, "'A Different Mode of Life,'" 19.

42 Craig Woods Fuller, "Development of Irrigation in Wasatch County" (Master's thesis, Utah State University, 1973), 28.
and subserve the interests of the settlements in the
distribution of water for irrigation or other
purposes.\footnote{Quoted in Elwood Mead, \textit{Irrigation Institutions: A
Discussion of the Economic and Legal Questions
Created by the Growth of Irrigated Agriculture in the
West} (New York, 1903), 221.}

This law embodied Mormon ideals of stewardship and
community development, and contained according to early
analyst Elwood Mead, "some of the best features of the
highest development of irrigation law."\footnote{Mead, \textit{Irrigation Institutions}, 221.}

In lauding Mormon policy, Mead may have had in mind
the inherent localism of administration, as well as the
underlying principle of public ownership of water and
timber. Despite the centralized power inherent in church-
directed Mormon colonization, the probate judge's powers
over water resources represented anything but dictatorship
to Cache Valley settlers. It was more a system of
accepted custom, by which the water flowing through the
community canal could not be taken, or rights to it
challenged by anyone outside the community. Town leaders,
holding the powers granted by both church and court,
decided what was good for the collective. They assured
everyone who worked within the local system the benefits
of that system. Because community benefit involved the
pursuit of an equal distribution of natural resources, the
county court had to weigh petitions for water and timber according to that ideal. It rarely adjudicated direct conflicts over a particular amount of water or stand of timber, however. Those fights were settled outside the legal structure by the parties involved, by watermasters of irrigation companies, or by local bishops, who, admittedly, often served as probate judges and town councilmen. The imperatives of community and of shared wealth dictated that Mormons turn to church institutions, and to their well-enforced sense of mission and community, to settle disputes.\footnote{Raber, "Religious Polity and Local Production," 174.}

From 1852 until 1880, the county court heard petitions for rights to irrigation water and mill sites, and timber and grazing lands. Hyde Park founder William Hyde applied to the court in December 1862 for "a grant of one fourth of the water running in the north fork of Logan River enlarging the present water ditch by which the farms at Hyde Park are irrigated."\footnote{Cache County Court, "'A'County Book of the County of Cache, Organized April 4, 1857," TS, Utah State University Library, 18.} In June of 1863 the court granted a mill right to Thomas Smart and Samuel Parkinson for use of the waters of the Cub River west of Franklin.\footnote{Cache County, "'A' County Book," 37.}
The entire town of Smithfield acquired rights in March 1874 to "the big bend on Bear River" for grazing purposes. Probate judges also granted individuals or groups franchises on certain community projects, including timber harvesting, the running of saw and grist mills, and road construction. The county court defined borders of new towns, and appointed town watermasters and road supervisors, and other guardians of the infrastructure. Until the Irrigation District Law of 1865 took effect in Cache Valley, the county court also controlled the appointment of boards of directors, and the organization of community irrigation districts and companies, among them the Logan and Richmond Canal Company, founded in 1864.

The Logan and Richmond Canal got its start in the usual Mormon way. In 1864, new lands were surveyed above the towns on the east side of the valley, and Ezra Taft Benson, church leader for all of Cache Valley, called a meeting to point out "the benefits that naturally would arise" from a second, higher Logan River canal. Soon thereafter, another important segment of the valley's

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48 Cache County, "A' County Book," 221.

"second nature" came into being. Benson appointed five men—-one each from Logan, Hyde Park, Smithfield, Richmond, and Franklin, Idaho—to oversee the project and coordinate laborers. A professional surveyor ran a line for the canal from the mouth of the canyon, along the steep slope of the Logan bench, or "sidehill," and then north out of Logan toward Hyde Park.50 Given the rocky conditions at the canyon mouth, and the gradient of the sidehill, this second canal posed greater challenges than had the Logan and Hyde Park in 1860.

In an extension of the each-farmer-digs-in-proportion-to-his-land-holdings labor formula, each town was assigned a section of the difficult sidehill in proportion to the acreage that it, as a town, expected to water from the new canal.51 Digging began that fall and continued off and on through the winter. Newly-arrived immigrants taking up the newly-surveyed lands joined the previous settlers in digging the canal, and thus earned their right to irrigate from its flow. By the end of 1865 they had 2000 acres under the new canal.52

As always, farmers and gardeners under the new canal established rights to the "new" water by putting that  

51 Nyman and Gilgen, "History of North Logan, UT," 3.  
52 Haws, "Development of Logan River," 45.
water to community-defined beneficial uses. Those uses were, as usual, defined by the small group of men holding positions of church and community leadership. The impetus to begin the second canal had come from a powerful, prominent church leader whose vision for the community was perceived as having divine sanction. The group charged with the canal's direction included Samuel Roskelley and Marriner Merrill, both town bishops--prominent church and community leaders.

Though this small group of men controlled the construction and administration of the Logan and Richmond, they turned to the county court for official recognition of their activities. The legal structure governing their efforts shifted slightly however, with passage of the Irrigation District Law in 1865. The 1865 law empowered the residents of any geographical area, a valley, village, or neighborhood, to, with the approval of the county court, organize and tax themselves for the construction and management of canals.53 Under this measure, the court assured that only those citizens who wanted water, and wanted to contribute to the construction and upkeep of a canal, would bear its costs. This spared older groups, already drawing water from previous canals, the burdens of

53 Arrington and May, "'A Different Mode of Life,'" 10.
new projects.\textsuperscript{54}

As new canals benefitted certain segments of growing communities more than others, the 1865 law sanctioned the creation of residential and farm districts, or sub-communities, based on canals. The irrigation districts had great powers of exclusion or inclusion. Their claims to water had the effect of reserving a certain water supply for the use of a very specific group of people in a specific geographic area. In 1875 the Cache County Court approved an irrigation district set up by a group of citizens from the towns of Logan, Hyde Park, Smithfield, and Richmond. The district included

\begin{quote}
[a]ll the tract of land lying between the base of the mountains and the Logan and Hyde Park Canal in Logan Precinct...and...in Hyde Park Precinct with all that tract of land known as the New North and South fields in Smithfield Precinct as well as the New South field in Richmond Precinct.\textsuperscript{55}
\end{quote}

The county court had to approve district boundaries and

\textsuperscript{54} George Thomas, \textit{The Development of Institutions Under Irrigation, with Special Reference to Early Utah Conditions} (New York, 1920), 52.

\textsuperscript{55} Cache County 'A' Book, 26 April 1875, 262. The same year, the court approved the Providence and Millville Irrigation District, south of Logan, granting it "power to construct dams and to have control [sic] of all springs, streams, and rivers for irrigating purposes located in said district, and to make canal for the distribution of said waters, and a further grant of 4/5 of the water running in the Blacksmiths fork River." Cache County 'A' Book, 1875, 253.
the boards of directors in order to assure community benefit. The 1865 law, by splitting villages into districts, encouraged greater decentralization of water development. It also demanded greater democracy within the irrigation community, as members had to vote to approve the district's taxes, policies, and actions. 56

Given the power that the districts were granted over the water within their boundaries, however, irrigators living outside district boundaries had reduced chances of gaining full access to water.

The next territory-wide attempt to regulate water use and development came in 1880, when a new water law removed the powers of water grants and district supervision from the county court. In place of the probate judge the county selectmen became water commissioners, charged with adjudicating all water claims, and recording those claims in official county documents. 57 The 1880 law recognized that much of the water in small community streams had long ago been claimed and put to use, but that little of it had been measured, recorded, or in any way legally quantified. The governmental burden shifted from one of granting water to one of trying to formalize previous grants and

56 Charles Hillman Brough, Irrigation in Utah (Baltimore, 1895), 36.

57 Wells A. Hutchins and Dallin W. Jensen, The Utah Law of Water Rights (Salt Lake City, 1965), 12.
adjudicate contests over water long-ago committed to someone's ditch or someone else's mill. This divested the county court of its authority to grant water according to the criteria of beneficial use, and left Utahns without a way to appropriate "new" water.\textsuperscript{58}

The 1880 water law held sway over Utah irrigators only until 1897 when statehood brought about yet another reformulation of policy. In the seventeen years between 1880 and 1897, however, the 1880 measure effected a revolution in conceptions of water ownership and use, if not in the actual irrigation practice. The revolution exhibited a certain schizophrenia. It moved away from, yet also affirmed, Mormon religious and community ideals. Water was public property in pioneer Utah, its use inseparable from the land it watered. Water rights could not be bought and sold as private property separate from that land. In 1880 the territorial legislature reversed those provisions. Thereafter a water right was an individual's private property, to be bought or sold as such, without reference to land.\textsuperscript{59} The text of the 1880 law read that

\begin{quote}
such [water] rights may be appurtenant to the land
\end{quote}

\textsuperscript{58} Hutchins and Jensen, \textit{The Utah Law of Water Rights}, 14.

\textsuperscript{59} George Thomas, \textit{Development of Institutions Under Irrigation}, 144.
upon which it is used or it may be personal property, at the option of the rightful owner of such rights and a change in the place of use of water shall in no manner affect the validity of any person's right to use water....

This provision did not radically change Utahns use of water; irrigation practices remained much the same. What changed was the structure of authority into which the water "owner" entered when disputing a substance that had now become his private property. Rather than community groups presenting proposals for water use to probate judges, individuals now turned to county selectmen, who settled disputes over individual rights, rather than group claims.

The changes brought on by the 1880 irrigation law had their roots in the growing conflict between Utah Territory and the U. S. federal government. Among other attempted subversions of Mormon regional dominance, the United States was busy curbing the powers of Utah's county officials. The growing numbers of non-Mormons in Utah also challenged Mormon control of water resources. It seems plausible that the 1880 law was an attempt to assure

60 Thomas, Development of Institutions Under Irrigation, 54.
61 Maass and Anderson, ...and the Desert Shall Rejoice, 343.
62 Thomas, Development of Institutions Under Irrigation, 54.
Mormons continuing control of the water by making water into private property. The law switched the foundation of water rights from a community basis to an individual basis, but in doing so it worked toward maintaining the status quo of community control over water.

The second revolution of Utah's 1880 water law, which confirmed its schizophrenic nature, harked back to pioneer ideals and water rights while at the same time adjusting the legal structure to the necessity of continued growth. The 1880 law confirmed the doctrine of prior appropriation, the rule of "first in time, first in right." Within the structure of priority rights, though, the legislature designated two classes of rights--primary and secondary rights--based on the volume of the river flow. Those holding primary rights could draw water from a stream no matter what its level of flow. Holders of secondary rights drew water only when the river rose above its lowest average level. Secondary appropriators were allowed no water once the river dropped below a certain level. This provision opened opportunities to post-1880 settlers in areas where earlier diverters had sealed up the use of available water, but those opportunities lasted only as long as the excess seasonal flow. The law also

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63 Worster, Rivers of Empire, 82.

64 Mead, Irrigation Institutions, 228.
allowed holders of secondary rights to divert water during
the off-season, when primary rights were not claimed for
summer irrigation.\textsuperscript{65} It reduced the ability of one group
of water users to block appropriation of excess resources
by others, and thus appeared to serve the growth and
equality of the community within the tradition of Mormon
ideals.\textsuperscript{66} As Arthur Maass and Raymond Anderson commented,
the idea of an \textit{absolute} priority, such as that applied in
Colorado, was "incompatible" with the Mormon's
"cooperative community approach." In Utah, "the idea of
proportioning limited flows was a natural outgrowth of the
common community interest. The church could not allow
some settlers to have a full supply of water while others
were denied access to it."\textsuperscript{67} This principle would be
solidly reiterated in the early twentieth century with the
first full legal adjudication of the waters of the Logan
River, which called into question the place of primary and
secondary water rights in the Mormons "cooperative
community approach" to water use.

The territorial water laws of 1865 and 1880 may have
had little actual effect on the means by which the

\textsuperscript{65} Hutchins and Jensen, \textit{Utah Law of Water Rights}, 36.

\textsuperscript{66} Fox, \"Mormon Land System,\" 140.

\textsuperscript{67} Maass and Anderson, \textit{...and the Desert Shall Rejoice}, 347.
individual Cache Valley farmer diverted water through his lateral ditches to his crops, but they provided the overarching structure to the smaller patterns and negotiations that surrounded those diversions. As state power grew, the Mormon church withdrew from formal involvement in community water use, but its ideals remained central to that use. Most importantly, the patterns of community thinking and behavior that it developed in its members proved, at least in smaller villages, crucial to the ways in which they dealt with, and thought about, water. The structure of water use began as a religious ideal of cooperation. In becoming a more secular process and in adjusting itself to state laws such as those of 1865 and 1880, it maintained much of its original cast. The laws, even when trying to break away from church-created principles, continued to reflect community values.

When Utah achieved statehood in 1896, the larger governmental structure continued, with legislation and new bureaucratic institutions, to assert pressure on local control over water. In the small towns of Cache Valley, however, at least through 1920, the attempt to separate legal order and community order appeared to have little effect. Local irrigation companies, aided by a continued abundance of water, simply adapted legal structures to their own needs. Even when incorporating themselves into
new legal entities outside the church, and in using non-
church means to resolve their disputes, water users
remained inherently tied to church-created structures of
thought and action. Those structures included a
fundamental unwillingness to turn to powers outside the
immediate group for financial support, legal advice, or
legal adjudication of conflict. They included as well an
unswerving commitment to the idea that the individual
should contribute to the collective system in proportion
to his benefit from that system. And it included the
conflicts and tension inherent in a system where religious
ideals demanded both individual and community success, and
where each irrigator had to balance his contributions to
the collective with his pursuit of individual advancement.

Water in Mormon Utah flowed from the first
nature of the river to the second nature of the canal
systems and the village, the infrastructure that both
defined the community and provided the tapestry against
which Mormons wrestled with their goals and ideals, both
individual and collective. The community did not produce
these cultural, water-based ideals on its own, however.
Nature played a role. This second nature of canals and
towns, like all such human-constructed second natures, was
rarely free from the vagaries of first nature, from the
unexpected complexities of its own workings, or from the
cultural imperatives that brought it into being.

In July of 1890, at the height of the irrigation season, a mud slide careened down the slope of the raised alluvial bench at the mouth of the canyon, filled in the Logan and Richmond canal, and tore a 200 foot break in the canal's bank. With over 200 city lots and about 2,600 acres of farmland thirsting for their due, the landholders of the Logan and Richmond irrigation district spent a dry three weeks repairing the damage and building a wooden flume so that water could again reach their yards and crops. They then spent a year wrangling with officials of Utah State Agricultural College, a two-year-old institution whose application of irrigation water to farmland on top of the bench, just above the canal, softened the soil along the sidehill, and caused the mud slides.

In early July of 1891, a year later, it happened again. At an emergency meeting on July 11th, district stockholders debated their next move. James Adams, who owned 14 acres of farmland and one city lot in the Logan precinct of the irrigation district, declared to the assembled group that "the reason we are here is that the canal is broke and we want to know if all are willing to go to work and fix it, allso [sic] what are we going to do
with the College for destroying our Canal." The struggle between the Logan and Richmond district and the Agricultural College, which continued, as did the mud slides, into the twentieth century. It provides a microcosm of the first set of connections important to water use in Mormon communities: the flow of water out of its natural water courses and into community-managed canals, and the conflicts over management of and responsibility for those canals. Here, first nature—the rich, porous soils of that land formation—impinged on the second nature of the canal system and the farms it served, as, for example, when two sets of irrigators attempted simultaneous July waterings of land on top of the bench and below the canal.

This particular conflict also emphasized some important features of the canal systems: their generally unplanned nature, at least in relation to each other; their technological simplicity; their low level of capitalization. The stories of the Logan and Richmond Canal, and the Logan, Hyde Park, and Smithfield Canal, the two major irrigation thoroughfares that I will examine here, illustrate the flow of water through Mormon

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communities, beginning with the initial flow from a "natural" structure into a community structure, from first to second nature.
CHAPTER IV
GETTING WATER: COMMUNITY SYSTEMS OF EXCHANGE

The struggle within and among Mormon communities to harness water for shared and individual purposes took place not on the level of territorial water law (though these laws certainly played a role), but on the level of day-to-day and season-to-season water use. The tensions rooted in the struggle to put water to God's purpose grew out of the mundane, and often muddled process of appropriating, measuring, distributing, paying for, and controlling water. Through these processes, irrigators measured their share of the community resource, and defined their individual contributions to the upkeep of the ditches. At its core, irrigation was a system of exchange between the individual and the community. Canal companies, representing the water community, based the rate of exchange on a direct proportion. Everyone gave to the system in proportion to the amount of water they needed. The simplicity of that system was confounded, though, by the patriarchal nature of the society which gave small groups of leaders greater power over community-regulated resources, and by every individual's struggle to better his family's condition within the community. The
ideal of the system was complicated as well by the ill-defined, always-changing exchanges themselves, and by nature itself. Water flowed downhill, from one geographic point to another, and thus different water users, upstream, and downstream, no matter how democratic their intentions, bore unequal relationships to one another, and to the canal.

The conflicts that arose out of these exchanges between individual and community prove that Mormons did fight over water. Less obvious, however, and more subtly apparent in the inner workings of Logan River canal collectives, were the ways and the reasons that they fought over water, and the routes they took in surmounting the barriers raised by those conflicts. The need to manage water kept the problems of community purpose and individual salvation at the center of daily life. Water, for this reason and others, took on powers and meanings well beyond its salutary effects on agricultural production. The resolution of water conflicts continued, into the twentieth century, to reflect the insularity and solidarity of early Mormon villages.

Although the 1880 water law made it possible to redefine a water right as a piece of private property rather than as a community-granted, church-granted, or God-granted usufruct, Cache Valley irrigators in the last two
decades of the 19th century defined and dealt with water in very practical, non-legislative ways. The community used water in myriad ways, to power mills, water stock, cook, clean, and, eventually, generate electricity. The pre-eminent use of canal water, however, was irrigation of food crops. The process by which water was channeled to crops, rather than legal definitions of water right, dominated collective understanding of how water should be measured and distributed. The result of this agricultural mindset was a fluidity of exchange in which irrigators traded labor, grain, and cash for water according to mutually agreed-upon rates of exchange. The leadership of the Logan and Richmond Irrigation District, for instance, spent much of its time administering these various arrangements, recording the amount of labor and cash that each member contributed to the collective, and attempting to regulate the amount of water taken in return. The landowners under the canal met annually to vote on standards of exchange, to set wage rates, yearly tax assessments, and haggle over the worth of everyone's work and water. Not everyone in the community was required to contribute labor, cash, or crops, however. Widows and men in "poor circumstances" were provided with water tax-free by the community, a practice which underscored the extent to which the irrigation district was a community, rather
than commercial institution.¹

In March 1879 Robert and James Meikle of Smithfield, who were not at the time landholders in the Logan and Richmond Irrigation District, but would by 1884 own 28 acres between them, petitioned the district trustees for use of water from the canal based on labor they had done on the canal in 1865, 1866, and 1867, over ten years earlier. The trustees figured out that the Meikles labor had been worth $133, which entitled them to enough water for six and a half acres of land.² Thus labor on a canal, even if accomplished long ago, remained the key means of access to water, the immediate fruit of that labor. Robert and James Meikle may not have needed water from the Logan and Richmond Canal in 1865, but when they did need it later, their labor guaranteed them that right.

Although different methods of measuring irrigation water sprang up everywhere as more and more claimants and regulators sought to divide river flows, here the volume of water remained, for the time being, measurable only by

¹ Logan and Richmond I, 5 March 1881, 87.

² Logan and Richmond I, 8 March 1879. Water taxes and acreages cited, and calculations of average payments and number of acres owned, are derived from Logan and Richmond accounts for the years 1879 and 1884, found in the first volume of records, pp. 4-24, 188-215, and the years 1891 and 1896, found in the second volume of Logan and Richmond records, pp. 2-20, 172-93.
the area of the fields it could irrigate. The "water of six and a half acres," was clearly measured in terms of agricultural land.

In 1879, then, the Logan and Richmond landholders thought of water in terms of their fields, and in terms of the crops those fields produced. In October of that year the annual stockholders meeting bogged down in a debate over the price to be accorded a bushel of grain in the paying of annual water assessments. The water taxes were set at 10 cents per acre of agricultural land, and 20 cents per city lot. After "considerable discussion" the group agreed on a price of 75 cents for a bushel of wheat, in the paying of water assessments. A landholder with one city lot and 20 acres of land, owing $2.20 to the district for the year, could pay in cash, in labor, or in grain—just under three bushels. Water users paid water assessments based not on the actual volume of water they used, but on the amount of land and the kind of land they watered. Water was not really taxable apart from its use for irrigation; it was part and parcel of the way in which it was put to use. When irrigators looked at and thought of water they saw water, certainly, but they also saw their own labor, their investment in the land and the community, and they saw grain. With assessments paid in

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3 Logan and Richmond I, 13 October 1879, 33.
grain, the exchange came full circle. The product of the water itself—the crops—could pay for the water. Any system of exchange, however, that attempted to balance water on one hand, and land, labor, and grain on the other, all of which had different values in different seasons and years, generated its share of confusion.

Questions of how to measure and distribute water came up again and again in the 1880s and 1890s. For Robert and James Meikle, the Logan and Richmond district trustees measured water according to acres of land. How much water that actually involved was never specified, but rather regulated by the farmers and watermasters, according to commonly held conceptions of how much water was needed for each acre of crops. The standard unit of distribution was the "irrigating stream," a somewhat vague volume considered to be the largest free flowing stream of water that a single irrigator (with a shovel) could distribute over his crops. In June of 1882, Smithfield's watermaster complained that Hyde Park, whose irrigators got water before it got to Smithfield, were cutting through the canal banks and taking more than their share. The trustees discussed the issue and, in an attempt to even out the distribution of water, "ordered that the

water be divided so as to give each one hundred acres a stream all through the district." Presumably, this water would be distributed on a set schedule, every one or two weeks. This attempt to match specific volumes of water with specific acreages indicated that such co-ordination required special effort, and that the irrigators' conception of equal distribution was based in the idea that a given amount of water was best measured by the amount of land it irrigated. The Logan and Richmond district account books kept records of water use according to the number of acres and number of city lots each subscriber watered, and assessed water taxes accordingly. Actual volumes of water rarely entered into the proceedings. This agriculturally-based system of measurement would change, however.

In October of 1879, Thomas X. Smith, the Logan City Watermaster, and a local ward bishop, approached the Logan and Richmond Irrigation District on behalf of Logan City with a request for a grant of year-round water rights to one square foot of the canal's water, a specific volume equivalent to 100 acres of water right. The agreement that followed signaled a slight shift in the inseparability of water and land. In its contract with Logan City, the irrigation district required the city to

5 Logan and Richmond I, 24 June 1882, 118-19.
pay taxes on 100 acres of water right, even though Logan city was not watering 100 acres of land but rather supplying its residents with water for various other purposes. This deal also signaled a geographic division between water users that changed community relationships. The Logan and Richmond Irrigation District was taking form as an entity separate from the town of Logan itself. The Logan and Richmond canal flowed only through part of Logan, and then out of Logan, to serve other communities. The community of Logan residents and the community of irrigators along the Logan and Richmond Canal emerged as distinct factions with distinct interests and distinct ways of using the same water source. Growing demands for water thus complicated the accepted systems of exchange for water, and increased the chances for conflict.

The intricate details of neighborly water-sharing realm, whether between individuals or villages, required a constant hammering out, as irrigators sought fair solutions to the dilemmas posed by clashes between the river itself and the uses to which they put it. In December of 1896 members of the Smithfield Precinct challenged a district by-law that directed Hyde Park water users to pay an additional ten percent on their annual taxes, and Smithfield water users an additional twenty percent. Proponents of the extra tax held that the canal
had longer to travel to supply water to the towns farther north, and thus those towns should contribute a greater proportion to the canal's upkeep. This challenged the cherished system of directly proportionate water exchange. By May of 1899 James Cantwell, long-time representative of Smithfield water users, reported that his village planned a lawsuit to challenge the 20% "local expenses" tax.6 The suit materialized the following December, with Smithfield claiming that the by-laws, along with the extra local taxes, had been drafted by the wrong party. The towns came to an out-of-court agreement however, and the trustees agreed to draft a new set of by-laws, eliminating the offensive taxes.7

Despite the seeming prevalence of inter-town water disputes, the majority of conflicts described in irrigation district account books, and in the literature of local water history, demonstrate that much of the tension involved in district administration arose from struggles over the individual water users responsibilities to the collective infrastructure, and the various canal companies' contributions and responsibilities to its

6 Minutes, 16 May 1899, Logan and Richmond Irrigation Company Minutes and Account Book, vol. 2, Bound MS 29, Utah State University Library, Logan Utah [hereafter Logan and Richmond II], 277; Logan and Richmond II, 25 February 1899, 272-73.

7 Logan and Richmond II, 4 December 1899, 286.
individual members. In 1887 a legal conflict arose concerning the Logan Irrigation District, the district surrounding the Logan and Benson Canal, built in 1860. Farmers in the tiny outlying village of Benson had dug an extension to the original canal to serve their fields. The trustees of the Logan Irrigation District took no responsibility for the canal extension or the distribution of water from it.

By 1887 the Benson irrigators found themselves deeply frustrated by internal battles over individual water rights. In 1898 they sued to force the Logan Irrigation District to acknowledge the Benson extension as part of their canal and take over its administration. In doing so, they turned to a higher, but wholly community based, collective power to mediate individual conflicts, a common pattern in Mormon village life. The local court denied this request, asserting that the Benson farmers "constructed the Benson extension to the canal without any suggestion or aid from the Logan farmers, while the Logan section was constructed by all in common." This followed

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9 Swendsen, "Appropriation of Water from Logan River," 312.
the Mormon community rationale that the labor involved in canal construction or maintenance was the only true tie to that canal, and the only tie that carried rights to and obligations toward use of that canal. The state supreme court, however, overturned the local decision, stating that the trustees of an irrigation district cannot arbitrarily set limits on its services within the geographic boundaries of the district.10 Within the area designated as a water community, the community was obligated to meet the needs of all of its members, at least to a certain point.

These issues of individual and community obligations arose at different times in different forms. Since members of each precinct had shared certain interests, petitions to the trustees often took the form of collective demands. At the annual landowners meeting of December 1894, William Hyde of Hyde Park suggested that the votes to elect the board be cast by precinct. James Adams of Logan countered with a move to give each landowner one vote. Rasmus Nielsen pointed out that according to law, they were bound to vote according to acreage watered under the canal, and the group agreed to

do so. This debate concerning how each individual was to represent himself within the group, how he measured his power in collective decision making, demonstrated, to some degree, the basic hierarchy at work. The individual water user was not to be considered merely a member of his irrigation precinct, nor as a voter equal to all other voters in the district. The village, or community, was not considered capable of representing each individual's interest, nor was each individual's interest considered equal. The established practice of voting by acreage gave each water user power over group decisions according to his degree of interest, the amount of land he had to water with the resources controlled by the group. This affirmed the tradition of the individual/community exchange governed by direct proportion.

The Logan and Richmond Irrigation District's traditional system of exchange for water was complicated in the 1890s by the possibility of re-constituting the canal as a corporate stock company. The struggle to come to a communal decision to incorporate the irrigation district began in 1882, and waxed and waned for many years. It came to a head at several points, including the winter of 1894-95. At that time, out of concern to place the organization on firm legal ground, and follow the

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11 Logan and Richmond II, 3 December 1894, 123.
letter of the law, the landowners voted to incorporate. This decision was followed however, by a long debate over the method by which to distribute stock in the new corporation, whether by "Dollars and cents expended on the Canal" or "according to waterright pr. Acreage as shown on the Books of the Company."\textsuperscript{12} Though the argument that followed ended as the majority of attenders wandered out of the meeting, it demonstrated that the question of what gave the individual water user rights to interest in the company--his individual contributions in labor and cash, or the amount of land he needed watered--remained an issue.

A year later, in January of 1895, the landowners abandoned the idea of a stock company and unanimously voted to maintain their current status, to legally organize themselves as an irrigation district.\textsuperscript{13} In the final decision they rejected the substitution of an exchange system based on financial stock in favor of their traditional system of taxes and communal labor. The recasting of water rights as shares in a corporation would have constituted a further abstraction of a natural entity--water--into a financial entity. That the Logan and Richmond District turned away from that abstraction

\textsuperscript{12} Logan and Richmond II, 4 January 1895, 125.

\textsuperscript{13} Logan and Richmond II, 11 January 1895, 126.
pointed to their favoring of the more concrete, hands-on, local administration provided by the irrigation district. It underlined as well the cultural importance of these exchanges based on labor and land.

Similar debates and conflicts over water use plagued the water users under the Logan, Hyde Park, and Smithfield Canal, the third and highest of the Logan canals running north from the canyon. The Logan, Hyde Park, and Smithfield began as a private, for-profit enterprise. The challenges of diverting water from the river in the canyon itself and running it through a canal carved in a ledge in the canyon wall proved too much for the initial investors. In the early 1880s a community organization took over, completed construction, and began operations as an incorporated cooperative irrigation company by the end of the decade.

The articles of incorporation of the Logan, Hyde Park, and Smithfield declared a capital stock of $20,000, consisting of 4000 shares sold at $5 each. The initial subscribers were required to pay for only 10% of their stock in order to have the corporation acknowledged by the county court, which retained authority over canal incorporation. Cash played a larger role as the arbiter of water use, but initially it remained secondary to the standard currencies of canal finance—labor, crops, and
water. In the first year of operation, the canal directors granted credits in corporate stock to irrigators who had worked to complete the construction. Thus stockholders gained further shares through their labor and non-stockholders earned water rights in the traditional Mormon way, by helping to finish and repair the ditch. Laborers were often paid half of their wages in cash and half in stock.\textsuperscript{14}

Despite the new language of shares and stock, the Logan, Hyde Park, and Smithfield remained a small, local operation. The trustees, or board of directors, reported the net worth of the company in February 1891 as consisting of 40 acres of land, a cooking stove, four and a half barrels of cement, a tent, some tools, and a dump cart. The total cash value of these items amounted to just over $500.\textsuperscript{15} The inflow of tax money and outflow of cash for materials and labor left the corporation with little in the way of liquid capital. Though the canal itself was worth about $14,000, wealth in and of itself

\textsuperscript{14} Logan, Hyde Park, and Smithfield Canal Company Minutes and Account Book, Bound MS 26, Utah State University Library, Logan, UT [hereafter Logan, Hyde Park, and Smithfield], 10 February 1890, 1 March 1890, 15 March 1890, 39-45.

\textsuperscript{15} Logan, Hyde Park, and Smithfield, 21 February 1891, 73.
was neither a corporate goal, nor a reality.¹⁶ Stockholders voted their shares in company business, and paid for their water at a lower rate than non-shareholders. In 1890 shareholders paid 12 1/2 cents an acre to water farm land, and $1.00 for city lots, compared to the 40 cents per acre and $1.50 per city lot paid by non-shareholders. Shareholders, of course, held first rights to available water.

Though the owning of stock distinguished members from non-members, and thus served as a criteria for full participation in this particular water community, all irrigators paid water taxes according to acres and lots watered. The old standards of exchange remained very much in evidence. The need for and use of water was based on land and crops, as usual, and not on corporate status. The advent of corporate stock, a measure of water-community membership and, indeed of water, however, was new to irrigators, and required some adjustment. Shares in the corporation could be earned, bought, and sold with no reference to the land or the water they represented.

For the first few years, shareholders wavered over what in fact distinguished them from other water users—those with more stock, those with less, and those with

¹⁶ Logan, Hyde Park, and Smithfield, 23 February 1891, 75.
none. Board President Hyrum Maughan raised this issue to the presiding group in March 1892. He "suggested the propriety of having some relation established between the shares held and the water used by Stockholders...." Maughan felt that they should review the records and find the total amount expended on "cleaning, repairing, and enlarging the canal from the beginning of the present ownership...." After figuring as well the amount that water users had paid in taxes, they could ascertain who was using less or more than their share. A similar question arose the next week, when a shareholder asked that some standard be set for "how much water right was required to water an acre of land or rather how much stock it was necessary to hold to water one acre." Irrigator Marrinus Anderson added that "I think that if we knew how much water right was required for 5 or 10 acres use [we] could govern ourselves accordingly." The measure of, and relationships among, land, water, time, and corporate stock remained mysterious and confused. Anderson added

17 Logan, Hyde Park, and Smithfield, 8 March 1892, 95-96.
18 Logan, Hyde Park, and Smithfield, 8 March 1892, 96.
19 Logan, Hyde Park, and Smithfield, 14 March 1892, 100.
20 Logan, Hyde Park, and Smithfield, 8 March 1892, 90-91.
that "a large number of stock holders...have several shares ...which does not entitle them to any advantage over those who have only one share." The old system of exchange for irrigation water teetered uncertainly on the brink of change.

A year later, the situation shifted from confused to merely variable. The Logan, Hyde Park, and Smithfield formally added the concept of time to the lexicon of the water exchange, which already included labor, cash, shares in the corporation, grain, and, of course, water. In 1890 the directors began to charge for water by the hour, and to allow a given number of hours of irrigation for each share. At the start of the 1893 irrigation season, for instance, one share of stock entitled its owner to five hours of irrigation, five hours being deemed sufficient to water one acre. An anxious debate ensued only a month later, and the directors determined to grant each share of stock one irrigating stream of water for fifteen hours. That system stuck. The following spring the directors designated each share of capital stock to be worth one

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21 Logan, Hyde Park, and Smithfield, 8 February 1892, 90-91.


23 Logan, Hyde Park, and Smithfield, 15 April 1893, 139.
irrigating stream for 18 hours during the season. Those hours were apparently to be distributed as the irrigator desired, and worked out in negotiations between watermasters and various water users. For the privilege of 18 hours of water each summer the stockholders paid a tax of 15 cents per share. By 1897, the tax had increased to 45 cents per share, but the irrigation privileges increased to 20 hours of one irrigating stream for each share.

With this system, water users could vary their demands to meet the supply. In the middle of the summer of 1899, apparently finding themselves with more water than they anticipated, the directors added an additional three hours to the share allowed each stockholder. That year the directors added further refinements to this distribution system in order to counter unbalanced water use early in the season. They decreed that no one could take over half of their 17 hours worth of water in their first seasonal watering. That winter they confirmed the merits of this modification. The custom of letting

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stockholders take their full due at the beginning of the season until was "detrimental to the best interest of the majority, giving one person the advantage of watering all his crop while the crop of others may be burning up. But both using the same headgate he could not obtain the precious fluid till his neighbor exhausted all his water right...." From 1900 on no one could take more than half of their share until all had received that half, "in turn as per application."  

Under the new rule, then, no one had a right to all of their water if that left later appropriators with none, and deprived them of the use of their land. The distinction between first waterings and second waterings provided for more flexibility in caring for different crops at different points during the irrigation season. With this shift, the canal company took a step toward adjusting the system of water exchange to match the environmental demands of seasonal change--i.e., to force irrigators to save water for the later, drier part of the summer. This measure also incorporated one of the fundamental principles of Mormon community--that all should receive water according to their need and their ability to put it to beneficial use--into the system of

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exchange.

These glimpses at the inner workings of the Logan and Richmond and Logan, Hyde Park, and Smithfield irrigation canals reveal that 19th-century Mormon water users came into frequent conflict over the digging and repairing of canals, the measurement and allocation of water shares, the payment of annual water assessments, and the administrative structure of community irrigation projects. These debates evidenced a constant tension between the irrigators' collective struggle to maintain the bonds of communitarian purpose symbolized by the canals themselves, and each individual's and village's need to get the fair share of water due them, protect their land from flooding, and protect their individual interests in the canal system.

Despite those tensions, Cache Valley water users possessed the impressive ability to see water conflicts as issues of community stability, plus an ability to see irrigation water as more than a volume of liquid necessary to the production of certain crops. Irrigators measured water not by volume, but in terms of farmland and city lots. They paid for water with their own labor, and that of their oxen and horses, as well as with grain. They recorded the value of that water in quantities of alfalfa, garden produce, and corporate stock. Most abstractly,
they measured water according to the time of its flow, by minutes and hour, rather than by volume. Together, these many ways of quantifying water made up a flexible system of exchange that, despite its chaos, obeyed certain community principles. This system of exchange allowed each irrigator water in proportion to the amount of labor or taxes that they contributed to the upkeep of the community ditch network. This assured all members access to water no matter what the level of the river. Though in practice such assurances were not always fulfilled, the principle held fast. The system of water exchange, and all the quantitative measures subsumed under it, linked water to more qualitative values, as well: the baptism and redemption of the earth; the transformation of the desert into a garden; the bringing of God's plan to fruition through constant dedication to shared purposes.

Cache Valley irrigators demonstrated their determination to hold to those ideals in their frequent attempts to solve conflicts among themselves without turning to formal legal solutions. Around the turn of the twentieth century, however, the increasing pressure on Logan River canal companies to meet urban demands, supply larger and larger shareholders, and find new methods and standards of water measurement and distribution resulted in challenges to the Mormon community's principles and
traditions of water use. These included challenges to both quantitative and qualitative ways of using and valuing water, and to the ideals underlying those systems of exchange.

What is perhaps clearest in this account of irrigation governance is that, as Donald Worster states, the structure of the ditch systems reflected key elements of the larger society. On one level, the meanings which water took on remained closely circumscribed by the basics of canals, ditches, taxes, and crops. The challenges of managing water, however, connected it to more abstracted sets of meanings, including community and power. The irrigation company board members who debated ditch breaks and law suits and irrigating streams with such assiduous devotion were reflections of a larger patterns within Mormon society as well, that of a patriarchy, a rule by the family, and community fathers.
The systems of exchange through which Cache Valley irrigators secured water were key to the transformation of a natural, free-flowing substance into a controlled, economically useful one. The individual's capacity to exchange labor, cash, or grain for water did not necessarily give him equal access to, or power over, the community water supply, however. Access to water was sometimes as much a function of geographic location in relation to the supply as it was a function of economic exchange. And power over the water supply as always a function of one's place within the community power structures. In Mormon communities, different groups of water users wielded power over each other in accord with their positions along canals and within community government. Power was rooted in the complex interactions between patriarchy and geography.

A small number of men oversaw the majority of negotiations, conflicts, contracts, decisions, and investigations carried out by the Logan and Richmond Irrigation District and the Logan, Hyde Park, and
Smithfield Canal Company. This is not surprising, given that Mormon society has been characterized as rigidly patriarchal. Cache Valley was part of a world governed by fathers, and the male leadership of Mormon communities certainly constituted an elite. The taking of plural wives constituted the highest sign of their social status. Samuel Roskelley, a long-time canal director for both canals for most of the last four decades of the 19th century, served as bishop of Smithfield and married five women, with whom he had thirty children. Were Roskelley and his fellow community leaders a propertied elite, in terms of land and water? Did they control the distribution of water to the extent that it gave them power over community water use? And, finally, was their control over the water distribution system influenced by their personal interest in the canal, the amount of water they personally claimed for their land? Did community leaders seek power over water in order to better serve the irrigation demands of their own land?

Many factors contributed to the changing distributions of wealth in Mormon communities as they became integrated into regional and national economies. Because water was such a crucial factor in agriculture, Cache Valley's dominant industry, and because access to and control over water provided economic benefits, it is
worth considering here the connections between water and wealth.

In a 1980 article in the *Journal of Economic History*, J. R. Kearl, Clayne L. Pope, and Larry T. Wimmer considered various factors influencing household wealth in Utah between 1850 and 1870. In contrasting the effect of place of birth on wealth with duration of residence, they found the latter to be more important. The earlier a Utah family had established a home and become economically productive, the greater their household wealth, regardless of other factors. Kearl, Pope, and Wimmer, along with Leonard J. Arrington and other Utah historians, agree that the distribution of wealth in Utah became more and more unequal as the 19th century drew to a close.¹

Though Kearl, Pope, and Wimmer make no mention of water rights or irrigation, their revelation of the influence on early entry into the economy is consistent with the theory that earlier settlers secured easily-watered land and priority rights to water, through diversion and through geographic location near rivers, canals, and proposed canals. This is common sense. The early community leaders of any Utah community gravitated

toward high quality, easily watered land, and distributed those tracts to the settlers in their charge. As planners of and workers on canal systems, they had access to the land most effectively watered by those canals. The male heads of families that settled earlier also became community leaders, in charge of church, village, and irrigation activities.

These conclusions are born out by the records of the Logan and Richmond and Logan, Hyde Park, and Smithfield canals. The men most active in the administration of Logan River irrigation districts and canal companies made up a water elite. They were a small group, actively involved in local management over long periods of time. Many of them owned more land under the canals than other irrigators who did not hold positions of leadership either on boards of trustees or as watermasters.

Robert Henderson, a member of the Logan and Richmond board of trustees in the early 1880s, owned a sizable chunk of land in very close proximity to the Logan and Richmond Canal. In the 1870s Mormon settlers recorded and legalized their land claims in deference to federal land law. They had lived on and worked their "claims" since settlement in the early 1860s, but retroactively recorded their legal ownership in later decades. In September 1872 Henderson filed for twenty acres of land in section 23 of
the quadrant designated as Township 12 North, Range 1 East, near the towns of Logan and Hyde Park [see Figure 3]. The Logan and Richmond Canal cut through the western part of that section of land, in marked proximity to Henderson's land.\(^2\) In 1879, according to the canal records, Henderson paid water taxes to irrigate 10 acres and 3 city lots under the canal. The same 10 acres, with only one and a half lots, appeared under his name in 1884, a year in which he served as a watermaster in the Logan precinct. The average amount of land watered by irrigators in Logan in those years were 9.7 acres and 1.6 city lots for 1879, and 10.8 acres and 1.6 city lots for 1884, figures which put Henderson squarely within the range of an average irrigator. By 1891 Henderson's holdings had increased to 18 acres, with the Logan average under the Logan and Richmond Canal increasing as well to 12.9 acres. As a board trustee, watermaster, and owner of land close to the canal, Henderson had clear power over the disposition of water in the canal, power matched by his interests in watering a substantial amount of land and protecting that land from damage from water in the canal. By the time he finished accumulating land, he had

\(^2\) Entry no. 73, Robert Henderson, 18 September 1872, West 1/2 of Southwest 1/4 of Section 23, Township 12 North Range 1 East, Cache County Land Claims Book, Uncatalogued Bound MS, Utah State University Library, Logan, UT.
Figure 3. Land Ownership Along Logan and Richmond Canal. Base Map from Samuel Fortier, *The Water Supply of Cache Valley* (Logan, 1897). Lands pictured:

1) Robert Henderson, West 1/2 Southwest 1/4 Section 23, T 12 N R 1 E.
2) Francis Sharp, South 1/2 Southeast 1/4 Section 24, T 13 N R 1 E.
3) David Drysdale, Northwest 1/4 Northwest 1/4 Section 26, T 12 N R 1 E.
4) John Morse, E 1/2 Southwest 1/4, Section 11, T 12 N R 1 E.
5) William Davidson, Northeast 1/4 Northwest 1/4 Section 14, T 12 N R 1 E.

Claim locations from Cache County Land Claims Book, Bound MS, Utah State University Library, Logan, UT.
surpassed the Logan Precinct average by 5.1 acres, a substantial amount of irrigated land.

In 1873 Francis Sharp filed for 80 acres just south of Smithfield, land quite close to the Logan and Richmond as it approached its third village [Figure 3]. Sharp, who served on canal's board of trustees in the 1880s, watered 9 acres in 1879, 20 acres in 1884, and 16 in 1891, amounts of land well above the Smithfield averages for the latter years.³

A brief overview of the amount of land irrigated by prominent irrigation administrators confirms the pattern suggested by Robert Henderson's and Francis Sharp's landholdings. Control over water went hand-in-hand with landed wealth, at least to a certain degree. Involvement in the irrigation district and larger-than-average land holdings indicated not only the power of the more wealthy over important natural resources, but also reinforced the general community hierarchy at work in Mormon communities. Only eighteen men, the central corps of water administrators, attended the annual landholders meeting of the Logan and Richmond district in December 1885. The twelve men from the Logan district watered an average of

³ Entry no. 96, Francis Sharp, 5 May 1873, South 1/2 of Southeast 1/4 of Section 34, Township 13 North Range 1 East, Cache County Land Claims Book, Uncatalogued Bound MS, Utah State University Library, Logan, UT.
11.5 acres in 1884, above the average of 10.8 for Logan. Individually, six of the twelve held significantly more than the average of irrigated land. The four irrigators from Smithfield at the meeting watered an average of 19 acres, well above the village average of 12.5 acres. Three of the Smithfield men at the 1885 meeting, Edwin R. Miles, Francis Sharp, and James Kirkbride, all of them members of the board of trustees at some point, watered over 20 acres of land in 1884.4

Although it does not prove universally true, those irrigators directly involved in the distribution of water from the canal, and in conflicts over that water, held more land than those whose names appear in the records only as annual taxpayers. About thirty names appear prominently and repeatedly in the Logan and Richmond account books from 1879 through 1912. Most of those men served as trustees or watermasters in their respective precincts. The fourteen watermasters listed for 1884 watered an average of 16 acres, while the average for all landholders under the canal stood at 11 acres in Logan, 5 lots in Logan Canyon Field, 16 acres in Hyde Park, and 13 in Smithfield. Five of those watermasters far exceeded those averages. These thirty-odd men, those most active

4 Logan and Richmond I, 7 December 1885, 247. Acreages were taken from the Logan and Richmond accounts for 1884, Logan and Richmond I, 188-215.
in running the cooperative canal, watered an average of 21 acres in 1884, 23 acres in 1891, and 23 acres in 1896. The figures in each individual town ran higher. Among the 11 water "leaders" with records for Logan in 1891, the average watered close to 28 acres, and about 26 acres in 1896, against averages for the entire precinct of 13 acres and 12 acres. Smithfield's average for 1896 was about 11 acres; the 8 most active "water leaders" averaged close to 26 acres each.

Each of the sixty-four original stockholders in the Logan, Hyde Park, and Smithfield canal company held an average of 11 shares in the company in 1889. The five members of the board of directors, however--those with the power to levy and collect taxes--held an average of 34 shares in the corporation. Those running the corporation thus held higher stakes than the average subscriber, as with the Logan and Richmond Canal. In the first decade of operation, however, group participation remained high. Of the 734 shares initially subscribed in 1889, 705 were represented by voters at an April 1889 meeting, where the assembled shareholders adopted by-laws and agreed to hire

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5 Logan, Hyde Park, and Smithfield, 1-4. Statements and calculations of water payments and average acreages are derived from "Water Reports and Accounts," for 1889-91, found on pp. 27-29; 67-70; and 84-88.
laborers to put the canal in working order for the season. Service as a canal board trustee or precinct watermaster was not the sole factor that marked irrigators with a more-than-average amount of land under a canal, or stock in a canal company. The location of any one irrigator's land in relation to the canal affected their ability to bring water to their crops, and thus the number of acres they planted. Robert Henderson's neighboring landowner, David Drysdale, filed in 1875 for 40 acres of section 26, just south of Henderson's tract [Figure 3]. Drysdale's land, like Henderson's, was run through by the Logan and Richmond Canal. Drysdale, who did not serve as a canal official or trustee, watered 14 acres in 1879, 10 acres in 1884, 18 and a half acres in 1891, and the same 18 and a half acres in 1896. He thus watered nearly seven acres more than the precinct average of 11.8 acres in 1896. His proximity to the canal gave him a clear advantage in securing adequate water in a timely fashion for a larger amount of land.

6 Logan, Hyde Park, and Smithfield, 10 April 1889, 21.

7 Entry no. 79, David Drysdale, 6 October 1875, Northwest 1/4 of Northwest 1/4 of Section 26, Township 12 North Range 1 East, Cache County Land Claims Book, Uncatalogued Bound MS, Utah State University Library, Logan, UT.
North of Logan, closer to Hyde Park, canal subscriber John Morse owned 80 acres of section 11 of the Logan township, land also cut through by the Logan and Richmond canal [Figure 3].\(^8\) Morse paid water assessments on 28 acres between 1879 and 1896, a period over which the average amount of land watered in Hyde Park decreased considerably. Morse's watered land was about 6 acres above the 1879 average in Hyde Park Precinct, 12 acres above the 1884 average, 16.5 acres greater in 1891, and 15 greater in 1896.

William Davidson, a neighbor-in-farmland of John Morse's, filed in June 1891 for 40 acres right along the canal, southeast of the village of Hyde Park itself [Figure 3].\(^9\) Davidson watered 21.5 acres in the Logan District that year, 8.6 acres more than the average irrigator of non-village acreage. Although these figures concerning land holdings and irrigated acreage prove nothing conclusively, they suggest that irrigators with land close to the canal had, in general, more land than

\(^8\) Entry no. 36, John Morse, 27 December 1880, East 1/2 of Southwest 1/4 of Section 11, Township 12 North Range 1 East, Cache County Land Claims Book, Uncatalogued Bound MS, Utah State University Library, Logan, UT.

\(^9\) Entry no. 104, William Davidson, 6 June 1891, Northeast 1/4 of Northwest 1/4 of Section 14, Township 12 North Range 1 East, Cache County Land Claims Book, Uncatalogued Bound MS, Utah State University Library, Logan, UT.
the average landholder, and were more involved with the administration and distribution of water than those with less at stake in the canal.

And what of landowners who were not canal company trustees, but held church leadership positions? Did power within the church hierarchy indicate power within the water hierarchy as well? For Samuel Roskelley, a ward bishop and temple officer, and William B. Preston, who became church leader for all of Cache Valley, it did. We have seen that Roskelley wielded significant power in the running of the canals, and watered acreages far above the average. Preston was able to use his influence within the community to get water from the Logan and Hyde Park Canal for the Logan Canyon Field, as will be detailed below. Bishop Robert Daines watered seventeen acres and in Hyde Park in 1884, just slightly more than the average of 15.7 acres. Another bishop, Thomas X. Smith, watered a bit more than the average amount of land in Logan and Smithfield in the 1880s and '90s. Daines and Smith were in no way among the largest landowners in the area, however. More research is necessary to determine the complete relationship between church and canal leadership and landed wealth.

10 Robert Daines is identified as a ward bishop in Samuel Roskelley's Diary, 28 April 1884, MS, Utah State University Library, Logan, UT.
What does this tell us? Despite the democratic ideals and practices through which the canals were dug and water distributed, the great majority of water users took little responsibility for the larger decisions made about the canal's fate. They took their water when they needed it, but attended few meetings and raised few complaints. When called upon they contributed annual taxes and labor in proportion to their landed stake in the canal's water. The inner circle of incumbent, repeatedly re-elected water officials attended meetings, made and dealt with challenges and complaints, and, perhaps not coincidentally, had a larger-than-average stake in the smooth running of the canal. They served the community out of a sense of leadership and duty, but also out of personal interest. The inner group was self-preserving and self-perpetuating. There is no evidence that they wielded power over water or over their neighbors in any overtly dictatorial way, but the villages clearly left the running of the canal to them. These were the men, undoubtedly, most willing to commit their time to attending meetings in a society where each individual attended dozens of meetings weekly, monthly, and annually in observance of religious and community practices. That this group of water leaders added another set of meetings to their monthly and yearly round speaks to their interest
in doing so, an interest reflected, for some, in the amount of land watered, and in their land's geographical proximity to the canal. The patriarchal structure of village life shaped the governance of irrigation districts, delegating power and authority to small groups of town fathers, many of whom owned a greater-than-average amount of land and thus had high personal stakes in the successful running of the canal.

These conclusions concerning the water elite and landownership along and under Cache Valley canals are merely preliminary. A further investigation of connections between the location of land in relation to canals, and amounts of irrigated land in relation to leadership position is necessary before final conclusions can be drawn. The relationship between water and power is central to an understanding of any irrigation community, as Donald Worster demonstrates. Worster claims that in all hydraulic societies, the necessity to control and distribute water leads to a concentration of power which eventually fragments both the rivers and the communities in question. Culture, however, mediates the ties between the distribution of water and the concentration of power. In the early decades of Mormon settlement in Cache Valley a patriarchal, communitarian culture shaped the governance of irrigation districts, delegating authority to small
groups of town fathers. Concentrations of power and irrigated land among the water elite and the church elite played a role in the social and economic development of the communities. Other elements of Mormon culture tempered accumulations of power, however. The fundamental injunction to subordinate individual goals to the progress of the community worked against the establishment of the kind of hydraulic society that emerged in California.

How did the power structures inherent in these patriarchal communities express themselves in the season-to-season workings of the Logan River canal companies? The rule of leading community fathers created one set of hierarchies, in that certain men had clear interest in and authority over the distribution of water. Those hierarchies were complicated both by community ideals and by the hierarchies of nature and geography. Water in irrigation canals flowed downhill, from one point to another, and thus, as observed above, an individual's geographic position in relation to the canal had much to do with their position within the social and governmental hierarchies of water use. Geography and patriarchy came together in interesting ways to challenge the underlying ideals of Mormon communities.

In the spring of 1880 the district trustees received a petition to divert two irrigating streams of water from
the canal near the mouth of the canyon to water Logan Canyon Field, an area of the bench soon to be surveyed into city lots. They refused the request. A few months later, in July, the trustees discovered that despite their refusal, William B. Preston—a very high church official, Logan bishop, railroad owner, and community figurehead—had put in a headgate and taken water from the canal. The canal trustees, a group of five less powerful, but still respected community figures, faced the difficult task of approaching a superior and questioning his water rights. They appointed a committee to "wait on" Preston, and ask him to meet with the board of trustees. Preston refused, and demanded that the board appear before him.

The irrigation season passed and nothing was done, but in October of 1880 all of the district landowners met to discuss the problem. After considering the opinion of secular authority, or "the Law on the Subject," one Smithfield farmer declared that "he wished the matter settled through the Laws of the Church; but if it could not be stopped that way, there was plenty of Landowners in Smithfield who would stake their means at a lawsuit." Others agreed, and the assembled multitude voted to

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11 Logan and Richmond I, 17 April 1880, 63-64.
12 Logan and Richmond I, 3 July 1880, 64.
"disapprove" of Preston's superceding of the trustees' authority. They then appointed five landowners representing Logan, Hyde Park, and Smithfield, to visit Preston once again. Although no specific mention of an it appears in the record, the canal company representatives apparently reached an agreement with Preston and the other irrigators in the Logan Canyon field, an agreement by which an exchange of labor for water resolved the conflict. The following March, with irrigation season once again approaching, the trustees resolved that the water users of Logan Canyon field "be extended the privilege to help protect the Canal from the Logan River by paying $100 in Labor on the Dam to be built...."14 The canal company granted Preston and the other new irrigators two irrigating streams of water in return for their contributions of labor on the canal.

By 1883 the Logan Canyon Field had become a fourth precinct of the irrigation district, with 21 holders of city lots watering over 90 lots under the supervision of a district-appointed watermaster. By bringing the new water users within the structure of the irrigation district, and levying taxes on them for the use and upkeep of the canal, the trustees legitimized the new group's use of the water. They extended the water community so that all use was

14 Logan and Richmond I, 5 March 1881, 87.
regulated by community structures. By doing so they resolved what had been a conflict with a powerful individual, William Preston, by making it a community conflict, and finding a collective solution. Community power had successfully tempered individual power. The issue had never been the amount of water, for at that time the Logan River provided more than enough water for the demands put upon it. The issues involved the structure of water use. All irrigators (and all water) had to go through community channels, so to speak, and contribute to the collective maintenance of the canal, in order to share in its benefits.

Several years later, following the July 1891 canal break that left most irrigators without water for three weeks, the trustees levied a special tax in addition to regular annual taxes, in an attempt to raise pay for the repairing and fluming of the canal on the sidehill. Water users in Logan Canyon Field, with land near the head of the canal above the sidehill, refused to pay the special assessment, claiming that they bore no responsibility for the upkeep of the canal below the point of their diversion. In doing so, they denied their full membership in the community as defined by shared use of the canal, and once again asserted their independence from the established power structure of canal government. The
trustees, representing all of the canal's users along its entire length, "moved and carried that their [the Canyon Field users'] rights in the Canal extend the whole length of it the same as all others." The community thus denied the challengers their claim to an exemption from taxes based on geographic immunity to canal breaks below their point of diversion.

The contending parties reached a compromise in late 1892, when the trustees agreed that the Logan Canyon Field water users need not be financially liable for canal breaks below their diversion, as long as they paid their regular annual taxes, and as long as they claimed no right to transfer their water rights to land below their diversion. This exemption of part of the canal community from shared responsibility was probably related to the unique costs and problems associated with the section of the canal along the sidehill. Underlying this bargain between one precinct and the larger canal community lay the reality that water users in different geographic positions on the canal had different relationships both to the water supply and to each other. Even with the pervasive religious imperatives of community, equality, and group effort, hierarchies of water use, water rights, and water control were an undeniable part of irrigation.

15 Logan and Richmond I, 27 November 1891, 416.
The irrigators of Logan Canyon Field had the "natural" advantage of a high position on the canal, and this gave them some power to renegotiate their obligations within the community. The geography of water—that it flows in a line from one place to the next, and gets to some users earlier and in greater quantity than to others—forced the structure of community water use to reflect natural imperatives.

The tension between Mormon ideals of directly proportionate shares in water use, and the conditions imposed by the geography of the canals was manifested in the struggle of Hyde Park and Smithfield—towns that got water last—to garner their full share of the flow. Much of this tension grew out of annual attempts to equitably distribute water in the absence of any technical means of measuring it, beyond rudimentary headgates raised and lowered by watermasters. Despite the ideals of community water use evident in the dealings of the Logan and Richmond, conflict arose early and often when water was most in demand.

In July 1892, in the midst of the irrigation season, the trustees were alerted that water was running out of the canal in places it should not be, that someone had attempted to block the canal at its headgate on the river, and that Smithfield "had been imposed upon in not getting
their proportion of water."\textsuperscript{16} In response to this situation, Smithfield trustee James Cantwell, Sr. proposed a formal division of the canal's water north of Logan. Logan and Hyde Park, according to this plan, got six streams of water each, and Smithfield nine streams. A three man committee was delegated to "go and divide the water accordingly," and mark the canal so that water users could read the appropriate levels.\textsuperscript{17} That division held through the 1892 season, but was disallowed the following December.\textsuperscript{18} In March 1893 the trustees moved to install three canal gates to gauge the water in the canal for distribution to each district precinct.\textsuperscript{19} That each town bargained as a unit, and took its water according to village, rather than individual, needs, showed that contests for power over water, and shared interests in water, resonated at all levels of water use, from neighbors sharing a city street ditch to neighboring precincts and towns. Because the communities of Logan and Hyde Park and Smithfield all drew water from the Logan River, through shared canals, they were forced to wrestle each year for an equitable distribution of water. The

\textsuperscript{16} Logan and Richmond I, 5 July 1892, 420.
\textsuperscript{17} Logan and Richmond I, 5 July 1892, 420.
\textsuperscript{18} Logan and Richmond I, 5 December 1892, 424.
\textsuperscript{19} Logan and Richmond I, 31 March 1893, 425.
canals tied them together in ways that caused conflict, but also reinforced their status as neighbors in the larger religious realm.

Mormon culture, with its community ideals and patriarchal power structures, saturated the practice of irrigation in other interesting ways as well. The running of the canal companies by small groups of community fathers often conflicted with ideals of democratic participation in natural resource distribution. In June of 1882 the Logan and Richmond trustees first discussed the incorporation of the irrigation district as a stock company, and drafted a constitution for such purposes. In June of 1882 the Logan and Richmond trustees first discussed the incorporation of the irrigation district as a stock company, and drafted a constitution for such purposes. 20 Two years later, in March of 1886, they called a special meeting of all landowners to discuss and vote on the issue. Only 44 of 336 members of the district appeared to express their opinions. Without a quorum, they could do no legal business. Ninety-seven members came to the next meeting, three months later, but still failed to achieve the legal quorum necessary to vote to incorporate.

The group then came up with a plan that betrayed the depth to which the administration of water use was steeped in Mormon culture, was part of community religious life, and was conceived of in those terms by those participating in irrigation companies and districts. The landholders

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20 Logan and Richmond I, 24 June 1882, 119.
appointed a committee of 10 men, as always, in proportion to the numbers of water users in each town--four from Logan, two from Hyde Park, and four from Smithfield, These representatives would visit the homes of each of the voting members of their district, present the articles of incorporation, and record their votes. The pollsters were to travel in pairs.\textsuperscript{21} This mode of garnering a group decision bore a striking resemblance to the methodology of Mormon missionaries, who visited the homes of potential converts in pairs and spoke with them of the advantages of the gospel of the Latter-day Saints. It also resembled the custom of having local home missionaries, as representatives of the church hierarchy, visit their neighbors in order to encourage participation in auxiliary church organizations such as the Women's Relief Society and the Sunday School.

These irrigation missionaries met with some success. At the next group meeting, 190 landholders appeared to cast their votes, a number still not sufficient for a legal quorum, but still quite impressive. The bringing together of the group, which, like all other district meetings, began with a blessing, evidenced that the missionaries had done a good job in assembling a congregation. Though the shift to incorporation would not

\textsuperscript{21} Logan and Richmond I, 20 March 1886, 251.
bring about any major changes in the administration or use of water, the formality required group participation. When the landholders met yet again on the issue in February 1887, they voted not to take a roll call--not to determine whether a quorum was present or not--and then, with 98 yes votes and none opposed, voted, in accordance with territorial law, to incorporate. They then dispatched representatives to collect the signatures of those not present to ratify the decision.  

It was only in 1912, in the face of a legal threat to the legitimacy of their water right, that the landowners of the Logan and Richmond District, on the advice of their attorney, dissolved the irrigation district and re-formed the organization as a stock company, renamed the Logan and Northern.  

Those present at the final meeting in December 1912 agreed "to transfer and assign all their rights and interest in and to the waters, property and ditches heretofore mentioned and accept in lien thereof certificates of Stock in the said Logan and Northern Irrigation Company." Perhaps the most striking aspect of the final vote on the conversion from irrigation

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22 Logan and Richmond I, 4 February 1887, 286-87.
23 Logan and Richmond I, 27 July 1912; 6 November 1912; and 20 December 1912, 445-54.
24 Logan and Richmond II, 20 December 1912, 454.
district to a corporation issuing stock was that only 10 votes were cast, all of them in favor of the change. Although the canal provided water for over 2,800 acres of farmland and 226 residential village lots, and although an attempt at incorporation two decades earlier had involved a widespread canvassing of collective opinion, the decision in this case fell to the central group leaders alone. Whereas in the 1890s the issue of incorporation drew the votes of hundreds of water users, in 1912, the trustees made little effort to consult anyone beyond the inner circle of irrigation district administrators. The election of the trustees themselves had become little more than an annual ratification of the status quo by this same inner circle.

The question of the advantages of incorporation involved geographic as well as patriarchal hierarchies of water use. The Logan, Hyde Park, and Smithfield Canal was organized on a corporate basis from its beginnings in the early 1880s. As a stock company, the Logan, Hyde Park, and Smithfield defined itself not by geographic area, as an irrigation district would, but by its physical assets and their translation into shares. The advent of shareholding, in place of landholding, would have, it seems, changed the position of each individual irrigator from one of geographic position along the canal to one of
financial investment in a given number of corporate
shares. Members of the Logan, Hyde Park, and Smithfield
Company, however, even as they transformed themselves from
landholders into shareholders, continued to define
themselves according to where they lived, and where they
took water out of the canal. In listing shareholders and
non-shareholders and the taxes owed by each, company
records referred to place of residence as the crucial
characteristic of each individual. Though their
membership was defined through shares in corporate stock,
water users retained their usual self-conception as
belonging to one town or another, and often dealt with
their canal duties as village-based units. In the spring
of 1898, for instance, the directors performed their
customary duty of doling out sections of the canal to be
cleaned prior to the start of the irrigation season. The
work was designated by town: "Smithfield will commence
work there and go to H. C. Jensen's, Hyde Park from
Jensen's until they meet Logan men."25 In 1899 elections
for the board of directors, each village district
nominated candidates of their own.26

Place of residence played an important role in the

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26 Logan, Hyde Park, and Smithfield, 6 February 1899, 233.
power structures of water use because, of course, exchange because, of course, where an individual irrigator lived determined why, when, and where they needed water. As the economy of Cache Valley developed in the latter decades of the century, interest groups coalesced along geographic lines. Different factions living in different places came to wield power over each other, through patriarchal structures, in ways that brought new sets of conflicts over water. In February of 1891 the Logan City Council called a meeting at the Court House, inviting representatives of the canal companies to discuss "the question as to who should control the water, the City or the Farmers." This question stemmed from the ongoing tension between Logan's need for an "urban" water supply from the canal and the farmers' need for their irrigation supply.

In 1892 the city considered installing a costly water system, but felt that such action would be folly if the farmers' control of the canal and the water supply rendered that supply undependable. The average agricultural land holder under the Logan, Hyde Park, and Smithfield Canal in 1891 watered about 33 acres, compared to just over 1 city lot for those watering only "urban"

land. Taxpayers under the canal in 1891 were listed in two distinct divisions—those watering land and those watering city lots. The groups were separated by their different irrigation needs, rather than by town. They were less neighbors with various, intermingled interests, and more competitors with conflicting demands. Of 129 total water users that year, none paid taxes on both city lots and crop acreage. Instead, 47 paid for acreage in Logan, and 36 for lots; 24 were taxed for watering crops in Hyde Park, and 8 for city lots; Smithfield paid as a single customer for its 98 lots.

This division between different sorts of water use favored the farmers, for they used more water to water more land than urban users, owned more stock, and paid more taxes. There were other indications, as well, that the water users of the Logan, Hyde Park, and Smithfield saw the canal as a farmers' cooperative in the Mormon tradition, not as source of urban water supply. In March 1892, the assembled stockholders brought up the possibility of declaring dividends on stock, of measuring and distributing cash profits. The group roundly denounced the idea of profiting from the sale of water. Director Nicholas Crookston explained that he had gone to great personal effort, traveling to Salt Lake City to wait "on several parties of wealth and influence," in order to
"enable the poor farmers on the Bench to buy the canal and save it from going into the hands of speculators." Only speculators from outside the community, in Crookston's eyes, would dare sell water to Mormon farmers for profit. The canal was built by and for the farmers, and they intended to keep it that way. Shareholders, if they paid for their stock in full, received dividends in the form of water, but not in cash. Profit was not an issue, only water. And water meant a different kind of wealth.

The Logan mayor and city councilors, however, with interests growing more and more distinct from those of the farmers, met with the Logan, Hyde Park, and Smithfield canal directors later in the spring of 1892 to discuss a permanent supply of water from the canal for the city's water system. The "city" and "canal" groups were not completely distinct. One of the city councilors, James Adams, had served for years as trustee, and watermaster in the Logan Precinct of the Logan and Richmond Irrigation District. The men discussing these issues were part of an inner circles of canal and community government, used to dealing with each other over numerous issues.

"All they [the City Councilors] wanted," the Logan, Hyde Park, and Smithfield secretary recorded later, "was a

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28 Logan, Hyde Park, and Smithfield, 14 March 1892, 97-98.
continued Supply of water for the purpose intended, according to the Stock they had in the Company...." The canal's habit of allowing each irrigator a certain proportion of yearly supply of water in the canal, left the question of the actual volume of water allowed to the whim of annual rainfall. Permanent guarantees of specific volumes did not fit into the traditional system of water distribution, yet the city council demanded such guarantees for its new pipeline. The council recognized the canal company's right, in the words of Logan attorney W. W. Maughan, "to sell the water and to say we have no water to spare." At the time of the final vote the following September, however, Logan City held 550 shares in the canal, out of a total of 2,353, or about 30% of the canal's stock, and of its water. The second-largest stockholder, the town of Smithfield, held 200 shares, with Cache County holding 50 shares, canal director J. Z. Stewart and his milling company, 67 shares. Logan had the clout to force a favorable vote, and had the new technology of an urban water system. This combination pushed the city council to demand a new system of water exchange, one that allowed permanent, unscaled water

29 Logan, Hyde Park, and Smithfield, 23 April 1892, 105.
30 Logan, Hyde Park, and Smithfield, 1 October 1892, 125.
rights that did not vary with supply, canal management, or community whim. Logan wanted a fixed right to a specific amount of water.

The following autumn, after two attempts to assemble the necessary quorum, the Logan, Hyde Park, and Smithfield stockholders--Logan City chief among them--approved a new article of incorporation that allowed for a contract with Logan City. The new article allowed any stockholder to take, as a dividend of paid-up taxes on stock, a constant flow of water based on the direct proportion of his or her stock to the total amount of paid up stock held in the corporation. That share of water could be used through all four seasons, for a period up to twenty years. The water user remained responsible for canal upkeep during non-irrigation seasons, and assumed liability for damages from the canal during those seasons. The contract with Logan City followed these terms, granting a constant, year-round flow of water into the city water system.  

The tradition of granting proportionate, rather than fixed, volumes of water held fast, but the city council nonetheless garnered a substantial amount of water.

The Logan City contract dispute demonstrated one way in which newly emerging groups of water users introduced

new systems of exchange and cycles of water use to an already varied conglomerate of factors. The city and the farmers, in this case at least, divided themselves into separate centers of power, and thus added to the patriarchal and geographic hierarchies of power already evident in the valley's irrigation systems. All of the groups and individuals who wielded power over water, whether through high status, landed wealth, commitment to administrative tasks, favorable geographic position, or membership in a prominent interest group, had to contend with the limits posed by community ideals. The fundamental shared belief that all should take and use water in ways equitable to all members of the community prevented wholesale concentrations of power in irrigation practice. Where individuals and groups demanded water beyond the usual bounds of fair community practice, protracted negotiations ensued, followed by compromises that strove to both adhere to Mormon ideals and to allow for community growth.
In the first two decades of the twentieth century, irrigators with interests in the Logan River recognized their common bond in this common source of water, and formulated a watershed-wide system of distribution that both met the needs of all claimants and reflected community ideals. This initiative, though it expanded the local sense of a water-based community, did not constitute a redefinition of Mormon community in relation to water use. Rather, it translated the traditional conception of Mormon community onto a larger scale, applying the principles, and exacerbating the tensions of Mormon water use by expanding its scale. Concern for a fair division of the river itself forced an unprecedented unity of purpose on a disparate group of water users. In this way the river, or first nature, forced a reassessment of the management and collective conception of the canal system, or second nature.

The Barber-Swendsen Report on Logan River water rights of 1902-1903, and the judicial decision of 1916 known as the Call Decree together formed the benchmarks of
the forging of a scattered group of conflict-ridden canal companies into the Logan River Water Users Association.¹
Both the Barber-Swendsen Report and the Call Decree were local decisions, made by Logan River irrigators for their own mutual benefit. These two attempts to give some concrete form to Logan water rights marked a journey not only from chaos to some semblance of order, but also from a strict construction of the water rights doctrine of prior appropriation to a modified system of prior rights influenced by Mormon community ideals. In addition, these agreements signified a collective attempt to adjust seasonal cycles of community water use to natural cycles of river flow. Before detailing the Barber-Swendsen and Call agreements, we must look to those cycles and the ways in which they shaped both the river and its use.

Along with deciding how much each resident of the irrigation district or stockholder in the corporation should pay in cash or labor for annual taxes, the board members of the canal companies regulated, when they could, the system by which the watermasters distributed water,

¹ A. G. Barber and George L. Swendsen, Special Committee for Canal Companies, "Report on Logan River Water Rights" (Logan, 1902-1903), Microfilm, Utah reel 51, number 4, Utah State University Library, Logan, UT; and Call Decree, 21 December 1916, District Court of the First Judicial District of the State of Utah, TS, Records of Cache County, Logan, UT.
throughout the day, the season, and the year. At this level the various cycles of irrigation intersected directly with the cycles of first nature, the rise and fall of the river. In running their canal systems, Mormon irrigators sought a system of water measurement and distribution that fit both within the river system and within the Mormon community, so that everyone got the amount of water they needed when they needed it, at the lowest possible cost. Their individualistic tailoring of such systems to their own needs and to the vagaries of the Logan River constituted another important aspect of small water systems in the American West.

As is evident in the workings of the Logan and Richmond and Logan, Hyde Park, and Smithfield Canal companies, irrigators had various ways of measuring and distributing water from their canals. In Mormon communities, water was important not only for its volume, but for the relation of that volume to the amount of land watered, the kind of crops watered, and the time and length of water delivery. All these factors contributed to the complexity of the ways and means of measuring and allocating water.

The cycles involved in irrigation water use evolved in response to the natural cycles of water flow and the human and natural cycles of agriculture. At the turn of
the twentieth century, the Logan River, its volume determined largely by seasonal run-off from snowpack, ran in a predictable seasonal cycle. From September through the winter and into early spring the river ran at a volume decreasing from about 20,000 acre-feet to about 10,000 acre feet, the lowest volume being reached in February and March.\(^2\) During those same fall and winter months, precipitation reached its highest levels throughout the Logan watershed. In April, as the accumulated snowpack began to melt, the river's flow increased to about twice its February volume, then in May it rose to four times that early winter flow. In June, according to Elwood Mead's measurement, it rose to 90,000 acre feet, decreasing to 70,000 in July, 30,000 in August, and 20,000 in September.\(^3\) Nearly a quarter of the river's total runoff flowed out of the canyon in June, nearly 45% in June and July together.\(^4\) Over the same period rainfall in Cache Valley reached its nadir. An average of .78 inches fell in Cache Valley in June during the last few decades.

\(^2\) Mead, *Irrigation Institutions*, 109. An acre-foot, a traditional measure of irrigation water, is the amount of water needed to cover one acre of land to the depth of one foot. An acre-foot is equal to 43,560 cubic feet of water, or a flow of one cubic foot/second passing constantly for 12 hours.

\(^3\) Mead, *Irrigation Institutions*, Plate IV, 139.

\(^4\) Mead, *Irrigation Institutions*, 140.
of the 19th century, with .27 inches falling in July and August.\textsuperscript{5}

The agricultural irrigation season ran from June through September on Logan River canals, the greatest need for water occurring in June and July. Demands for irrigation water thus coincided with the period of the greatest fall in the level of the river itself. The river reached its highest point at the beginning of the irrigation season, and had dropped to under a quarter of that flow by the end. This well-sustained summer run-off sharply distinguished northern Utah agriculture from farming in the southern part of Mormon country. The bulk of runoff in southern Utah rivers occurred in sudden, torrential summer floods, the force of which knocked out rudimentary dams and everything else in their paths before the water could be channeled to crops. Due to fairly predictable river stages, northern Utah irrigators had a much easier time spreading water across time and space from the point of the river's highest flow.\textsuperscript{6} The cycles of river run-off and those of agricultural irrigation did not coincide perfectly in either volume or timing. From the resulting disjunctions were born elaborate attempts to bring human and natural cycles into a workable system.

\textsuperscript{5} Fortier, Water Supply of Cache Valley, 7.

\textsuperscript{6} Mead, Irrigation Institutions, 8.
The work of making water flow where, when, and in the quantity desired had as much to do with the where and when of irrigation as with the volume supplied, in raw form, by the river itself. As calculated in the 1950s, the average frost-free growing season in Cache Valley ran about 165 days, from early May to mid October. Water use varied widely across that time span, according to the crops grown on various plots of agricultural land. Farmers did not irrigate field crops with a small amount of water every day, but rather applied water intensively one, two, three, or more times during the season. The nature of the crops determined the number and times of watering. Elwood Mead's study of water applied on Olaf Cronquist's farm in Logan showed an initial watering of about 15 acre feet over three or four days in the third or fourth week of June. This was followed by a solid week of watering in the second week of July, with about 50 acre-feet of water applied. Cronquist watered a third time in mid-to-late August, using about 35 acre-feet of water. But such practices varied with crop, with water supply, and with conventional wisdom. Samuel Fortier reported in his irrigation investigation of Cache Valley in 1897 that the custom with alfalfa was to irrigate every two weeks, with

7 Haws, "Development of Logan River," 22-23.
8 Mead, Irrigation Institutions, Plate III, 132.
the total amount of water supplied reaching a cumulative depth of six feet.\textsuperscript{9} One acre of alfalfa thus demanded six acre-feet of water, but that volume was spread over several waterings.

In 1896, farmers irrigated a total of about 38,000 acres of cropland in Cache Valley. Over half of that land, 20,000 acres was devoted to cereal crops, with an additional 15,000 growing lucern, hay, and other animal fodder. Potatoes and beets took up another 1,500 acres, and fruit trees 1,200 acres.\textsuperscript{10} Grains, alfalfa, and hay, had the greatest influence on irrigation cycles, as they demanded the majority of the water diverted from the valley's rivers. The prevalence of these crops was in itself an adaptation to the cycles of water flow. Grain and fodder crops could both be successfully cultivated with irrigation water applied in June and July, but not thereafter. The lack of late-season water with the decrease in river flow did not seriously affect those crops, if water was applied in a timely and balanced fashion prior to August.\textsuperscript{11}

The irrigation season under the Logan and Richmond

\textsuperscript{9} Fortier, Water Supply of Cache Valley, 17.

\textsuperscript{10} Fortier, Water Supply of Cache Valley, 16.

\textsuperscript{11} Arrington, "Life and Labor Among the Pioneers," in History of a Valley, ed. Ricks, 149.
Canal, as measured by Elwood Mead in 1900, ran somewhat shorter than the growing season itself, at about 125 days.\(^{12}\) That four month period was embedded within the larger 12-month cycle of farming and canal administration. From November through late February or early March Cache Valley irrigators kept one eye on the mountains and the other on their dry canals as they anticipated the water supply for the coming season and attended to large-scale improvements in their distribution system. James Cantwell, Jr., of Smithfield, a watermaster and sometime trustee under the Logan and Richmond, noted in his diary on November 28, 1889 that "it is raneing [sic] and snowing in the mountains, it has every appearance of being plenty of water next summer."\(^{13}\) Though farmers sowed winter wheat as late as December, the irrigators used the early winter freedom from their fields to attend annual canal company meetings, review the problems of the previous season, elect trustees, vote on the water assessments, and plan the new year's ditch repair and construction. In December 1879 Smithfield irrigators petitioned the Logan and Richmond District to allow them to widen the canal by four feet to carry more water to more land. The other


\(^{13}\) James Shurlock Cantwell Diary, 28 November 1889, photocopy of MS, Utah State University Library, Logan, UT, 230.
districts agreed, and Smithfield laborers began work in late January with the aim of finishing by March, a challenge given winter conditions.\textsuperscript{14}

In February and March, canal trustees met again to dole out instructions to canal superintendents, who coordinated ditch repairs, to replace broken headgates, assign sections of the canal to different precincts for cleaning and repair, and contemplate more serious challenges, such as mudslides along the benches, broken flumes, and ditch banks eroded by cattle crossings. The Logan and Richmond trustees met the first week of March 1884 to add 15 cents an acre to the labor assessment established the previous December. Freshets during the winter had clogged the canal, and more work was required to get it cleaned up before the season began.\textsuperscript{15} In assigning work in the early spring, the canal superintendents marked off sections of the canal for cleaning in proportion to each individual's or precinct's landholdings under the canal. Labor on special emergency projects, such as digging out mudslides, was doled out according to the same proportionate system.

The rising river waters of spring often provided seasonal challenges well before the first irrigation

\textsuperscript{14} Logan and Richmond I, 20 December 1879, 39.

\textsuperscript{15} Logan and Richmond I, 8 March 1884, 184.
diversion of the year. In the years prior to 1883 the United Order Milling Company, a community owned and run timber harvesting operation, floated logs down the Logan River to their town mill. In passing the top of the Logan and Richmond canal, the logs often damaged and blocked the headgate. In March 1883 the Logan and Richmond Trustees sent a letter to the United Order Mill asking them to prevent such damage, but the loggers did nothing, and by mid-June the canal trustees feared that loads of floating timber would break through the canal. 16 In this way, other seasonal cycles of water use—the loggers' harnessing of high water as swift canyon transportation—clashed sharply with irrigation cycles.

March could be a tricky month in other ways as well. Due to Logan City's contract with the Logan and Richmond Canal for a year-round water supply, the watercourse was full of water throughout the year. The constant flow of water made canal repair difficult, however. The water had to be turned out of the canal for several days, so that the canal bed could dry in time for cleaning and repairs. This cut off water to Logan City and to others dependent on the canal for stock watering and household chores. At the same time, it set up a narrow margin of time in which irrigators with land under the canal had to leave their

16 Logan and Richmond I, 10 March 1883, 148-49.
fields and devote themselves to working on the canal. With other seasonal demands, including spring plowing, fencing, and equipment repair, valley farmers had to work hard to fit an intensive bout of communal labor into their individual rounds.

Through April and May the sowing of crops and preparations for irrigation continued. The Logan and Richmond canal added a statute to its by-laws legislating that the troublesome portion of the ditch on the sidehill be cleaned out each year on the second Tuesday and Wednesday in April.¹⁷ In the second week of April 1888 James Cantwell, Jr. and his sons sowed lucern, orchard grass, peas, raspberries, and strawberries. The family planted their garden in early April as well.¹⁸ From late April through May and into June farmers watered hay and lucern and prepared to cut their first lucern crop. In 1889 Cantwell watered his lucern on April 28 and his meadow on May 14th.¹⁹ For the years 1864, 1865, 1867, 1870, 1873, 1874, 1875, and 1876, Henry Ballard, a farmer and church bishop in Logan, consistently began sowing his wheat and oats in the second or third week of April.


¹⁸ Cantwell Diary, 9 April, 12 April 1888, 217-18.

¹⁹ Cantwell Diary, 28 April, 14 May 1889, 226-27.
Ballard finished sowing wheat on May 5 in 1860 and May 17 in 1861, while concurrently fixing water ditches, and driving loose stock out of wheat fields to herding grounds.\textsuperscript{20}

The demand for water varied with the weather, the water level, and the progress of the crops. Early spring often brought a deceptive abundance of water. Irrigators faced dangerous flood waters in late May, only to find themselves fretting over parched crops by mid-June. James Cantwell, Sr. wrote in his diary for May 26, 1862, his first month in Cache Valley, that he "[w]as called on, and worked all day with many others, in preventing the water from flooding the farms."\textsuperscript{21} A decade later, on May 22, 1872 Cantwell reported that "Vegetation of all kinds has sprung out of the ground as if by magic. The general field crops are growing rapidly."\textsuperscript{22} On June 8th, 1913, James Cantwell the younger fretted that he had "been watering my wheat, water is low in the creek, and all are anxious for rane...."\textsuperscript{23}


\textsuperscript{21} Cantwell Diary, 26 May 1862, 81.

\textsuperscript{22} Cantwell Diary, 22 May 1872, 135.

\textsuperscript{23} Cantwell Diary, 8 June 1913, 283.
Cache Valley farmers judged the need for water by the amount of rain and the amount of stage of growth of their crops. Irrigation sometimes started in earnest by the third week of May, but the official irrigation season, as administered by the watermasters of the canal companies, began in mid-June, or ever later. On May 23, 1887, Cantwell, Jr. began a week of watering his wheat, "the ground being very dry." The following spring he wrote anxiously on May 30th that "the wheather is very dry and cold but we will have to water our grain for it is not growing." In 1914, Cantwell, Jr. watered lucern for the second time on May 30. A few years later he reported from his vantage point as watermaster on the Logan and Richmond that as of June 18 "many are thinning Beets and watering hay, and beginning to cut Lucurn."

The challenge was to balance the readiness of crops with the availability of the water. The demand for irrigation water in Cache Valley was highest in late June and early July, as farmers finished watering grain crops


25 Cantwell Diary, 210-211, 23 May, 30 May 1887, 210-11.

26 Cantwell Diary, 30 May 1888, 219.

27 Cantwell Diary, 30 May 1914, 292.

28 Cantwell Diary, 18 June 1917, 332.
and began watering second alfalfa crops. In the third week of June in 1916 Cantwell Jr. noted the previous night's rain with gratitude. It was "A most timely rain, for the beets where [sic] getting quite dry. We have an abundant water this season, but the beets and other late truck is not far enough along to water." Demands dropped off quickly after mid-August after grain harvesting and just prior to potato and vegetable harvest. The last week of June and the early weeks of July were thus periods of high activity for all irrigators, especially those holding positions as trustees and watermasters of canal companies.

It was in July, in the midst of waterings of grain and the cutting of hay, that canal breaks posed the greatest threat. The danger was due not only to the loss of water to the crops, but to the sudden demand for laborers to repair the break. Such work interfered with other pressing tasks. In 1877 Henry Ballard started cutting hay on July 13 and harvesting wheat on the 26th.

During the second and third weeks of July in 1912 and 1913

29 Marlyn Fife, "Irrigation Water Values in Cache County" (Master's thesis, Utah State University, 1967), 42.

30 Cantwell Diary, June 1916, 319.

31 Haws, "Development of Logan River," 117.

32 Ballard Journal, 13 July, 26 July 1877, 73.
Cantwell, Jr. kept busy watering lucern and wheat, the wheat being at the stage for their second watering. In July, more than any other month, however, problems with the canals demanded immediate attention. On July 27 of 1912 the Logan and Richmond trustees resolved to quickly draft a labor force of water users in order to get accumulated moss and grass out of the canal. The break in the Logan and Richmond Canal of July 1891, caused by the mudslide from the waterlogged lands of the Agricultural College, along with similar July disasters in other years, demanded immediate attention and thus cost much money in labor and lumber. Such mid-summer disasters were far different from routine canal maintenance in November or March, because the water flowing in the canal in July was crucial to the furthering of the entire year's cycle.

Another disjunction between the timing of crops and water flow grew out of individual farmers' decisions to water their crops quite independently of the timing of the river's flow. Irrigators were sometimes deluded by rainfall into delaying diversion of river water, a dangerous practice in the midst of the summer. Christian

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33 Cantwell Diary, 19 July 1913, 20 July 1912, 272, 284.

34 Logan and Richmond II, 27 July 1912, 445.
Olsen, superintendent of the Logan and Richmond, warned the assembled landholders against such folly in December 1892. He demanded that in the coming season, "we commence in time, and not let a shower of rain keep us from watering our grain 'til it is two weeks too late, like we did last summer."  

With the bulk of irrigation work done, Cache Valley irrigators spent August harvesting and hauling hay, and threshing grain. They watered and cut a third crop of alfalfa, and picked garden crops and potatoes into September. In October 1896, James Cantwell, Jr. reported a total harvest of 101 bushels of wheat and 77 bushels of oats, much of which he loaded onto railroad cars and shipped to California, where wheat sold for 45 cents per bushel. In mid or late October the canal companies turned control of the ditch and water over to Logan City for off-season use and maintenance, and with December's annual landholders' meetings, the cycle began again.

The seasonal variations in water flow and water use underlined the basic cultural premise that water had different uses at different times of the year, and was subject to different rules carefully carved out of situational contingencies. Water meant entirely different

35 Logan and Richmond, 3 December 1892, 424.  
36 Cantwell Diary, 1 October 1896, 252.
things in March, in July, in September, and was treated differently by season. As the technology associated with water use became more sophisticated, and as hydroelectric power stations sprang up in Logan canyon, an entirely new set of questions arose about cycles of water use. In 1923 Logan City rebuilt an older power plant on the Logan River. Using storage space provided by a new reservoir, the power plant could hold water during the day and release it at night in order to meet peak demands for electricity in the town below. By delaying the flow of the river, the power plant responded to new demands for a new way of using water, a new way that drastically changed the timing of river flow. The power plant's reserved water volume lowered the river by 60 cubic feet/second during the day, a practice that had serious effects on irrigators dependent on that flow. Logan River water users took the case to court in 1926 and the city was prohibited from interfering with the river's flow.37

Logan River irrigators adjusted their cycles of water use to the river's cycles of supply by distributing it through canals across space and time. Water diverted from the river course into canals was spread out to the fields in a variety of ways. The "irrigating stream" was an early measurement of irrigation water, and the basis of a

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common distribution system. A stream was a flow of water as large as one man could effectively control and spread over his crops; it was not a standard, measurable volume of water. Irrigation streams were meted out by watermasters through the use of diversion boxes set in the side of the canal at the opening of lateral ditches that ran to yards and fields. The boxes had vertical gates that could be manually raised to a specified height to allow the correct size "stream" to flow into the secondary ditch. The watermaster gauged the appropriate flow based on the total amount of water in the river or canal. Thus the entire measurement system was based on the common sense judgments of water officials appointed by the canal trustees and the community.

This "irrigating stream" method of irrigation rested on the conventions of proportionate shares, time of use, and rotation of use. Each irrigator's water was measured out as a proportion of the total amount of water in the canal, equal to the proportion of stock or taxes paid by the irrigator to the total amount of stock or taxes owned or paid by the entire water community. Watermasters meted

38 Thomas, Development of Institutions Under Irrigation, 109.


40 Mead, Irrigation Institutions, 110.
out streams, or fractions of streams. Each stream ran for a certain number of hours each season, or for a specified time period every week or two weeks.

In both situations, but especially with the latter, the flow of water itself was rotated among different users. One farmer used an irrigating stream to flood irrigate his field for a few hours, or a day, or a week, and then he closed the gate to his lateral ditch and the water flowed on. The amount he used was, again, determined by his proportionate right to the amount currently flowing in the river. By concentrating the amount of water in use at any one time, the rotation system lessened the amount of water lost to seepage and evaporation. In times of water shortage, the reduced flow in the canal was more effective in reaching crops when concentrated in a single stream, and used by farmers one at a time. If spread simultaneously through many ditches, it soon dwindled to a sluggish trickle. By rotating a full stream among users, the farmer got what Elwood Mead called a "good working stream" for at least a short period, even in the midst of drought.41

Members of Mormon communities thus held rights to a certain proportion of the total flow in a river or in a canal, at certain times, rather than a specified, constant

41 Mead, Irrigation Institutions, 238.
volume of water. As Logan irrigation engineer George Swendsen noted in one example of a Cache Valley system, "the water in one of the Logan River canals is divided into thirty irrigating streams. These thirty irrigating streams are rotated among those entitled to water from the canal, each irrigator having the use of a stream for a period of time the length of which depends upon his interest in the canal." Watermasters could not insure, however, that all irrigating streams carried the same volume of water.

The relative simplicity of such a plan was confounded by the endless variations in systems of water measurement. Different irrigation communities adopted different water measurements to match equally divergent definitions of water rights. Utah Territory's 1880 irrigation law pointed to just some of the confusion inherent in the patchwork conglomerate of irrigation management:

[A] right to the use of water may be measured by fractional parts of the whole supply, or by fractional parts with a limitation as to periods of time when used, or intended to be used; or it may be measured by cubic inches, with a limitation specifying the depth, width, and declination of the water at the point of measurement, and if necessary, with further limitations as to the periods of time when used, or intended to be used.  

42 Swendsen, "Appropriation of Water from Logan River," 308.

43 Quoted in Mead, Irrigation Institutions, 229.
As is amply evident in the records of Cache Valley irrigators, Utahns turned to other kinds of measurements as well, including acre-feet and cubic feet/second, to gauge their water use. George Swendsen, in recording Logan River water claims for his 1902 report, found claims recorded in inches, cubic feet/second, in shares in the Logan and Richmond Canal, fractions of the flow of the Logan, Hyde Park, and Smithfield Canal, numbers of lots, and numbers of acres.\(^4\) No standard system prevailed.

The ways in which they measured water, and most importantly, the ways in which they shared water, betrayed the ways in which Utah Mormons thought about water. At the turn of the century, with mounting numbers of water users crowding closer to small rivers, formal attempts to quantify permanent water rights highlighted the divergence between the Mormon sliding scale/proportionate water distribution system and the more legally amenable world of fixed and permanent water volumes. The Logan and Richmond Canal Company's formal recording of its volume of water flow in July 1890, a flow of 70.38 cubic feet/second, meant little in terms of irrigation itself.\(^5\) Rights to that water had to do with annual taxes, paid in

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\(^5\) Logan and Richmond I, 30 July 1890, 410.
cash and in manual labor. Those taxes were assessed on the number of acres and city lots watered by each taxpayer, and not on the volume of water distributed.

Mormon irrigators thought of water not only as a volume of fluid, but as a span of time determined by season, by crops, and by the individual's quantifiable stake in the community resource. The crucial aspects of water use included getting it to cover the right amount of land, and getting it at the right time, for the right span of time. Those parameters insured that each irrigator got the right amount. In June 1882 the Logan and Richmond Trustees divided water rights "so as to give each one hundred acres a stream all through the district." \(^{46}\) In April 1893 the directors of the Logan, Hyde Park, and Smithfield voted to allow each shareholder the use of one irrigating stream for fifteen hours for each share held in the company. That fifteen hours could be distributed however the water user wished. \(^{47}\) By 1903 it was twenty hours of water, with no more than ten hours to be allowed during the first watering. \(^{48}\) In the 1960s members of the Logan Cow Pasture company took water every 18 days.

\(^{46}\) Logan and Richmond I, 24 June 1882, 118-19.

\(^{47}\) Logan, Hyde Park, and Smithfield, 15 April 1893, 139.

according to a rotation schedule, each share allowing a 37 minute turn on the canal's north fork, and 50 minutes on the south fork.49

The definition of water rights according to time rather than volume worked well in reference to seasonal water use. As the bargains struck between Logan City and Logan canal companies demonstrated, irrigators claimed water rights during the summer, and then shifted those rights to non-irrigators for other uses during the off-season. These definitions of water rights--by season and time--prevented waste, as no one claimed specific volumes of water throughout the year when they could not put a constant flow to constant beneficial use. Thus in traditional Mormon water distribution practice, an individual's water right could not be defined or taken without reference to, and cooperation with, all neighboring water users. Watering of crops was not a continuous project, but a discrete moment or series of events requiring a farmer's complete attention. It demanded the unspoken assent and collective labor of all other water users along the ditch.

In their reports to county officials and other "higher-up" authorities, canal companies needed to declare

the volumes of water in the canal, the water's surface velocity, and the canal's width and depth. In its own financial reports to its landowners, however, the Logan and Richmond trustees included only the sum total of acres and city lots watered, and the taxes assessed on those properties. In 1903, those figures stood at 2,787 acres and 240 lots in three precincts. In describing and speaking of their collective water right they spoke in terms of land, not in volumes of water or surface velocity. This explains in part why no individual or group of Cache Valley irrigators systematically measured or recorded the volume of water in the river or in their canals prior to the turn of the century. Those initial measurements were commissioned by the irrigators, and carried out by local engineers, only when legal challenges began to make them necessary.

It is easy to understand, then, the complications that ensued when non-community-based legal authorities attempted to impose some sort of regularized system of

50 Logan and Richmond II, 7 December 1903, 353.

51 Logan and Richmond II, 7 December 1903, 353; 4 December 1911, 436; 6 December 1909, 418; 3 December 1906, 392-93.

legal water rights on long-held Mormon practices. In 1897 the newly christened State of Utah established the office of State Engineer and charged that official with measuring stream flows and, a few years later, with establishing a standardized system of water appropriation. An ensuing 1898 law declared that "[t]he standard unit of measurement for flowing water shall be the continuous flow of one cubic foot per second and shall be known as the second-foot." Such official assertions were complicated by the customary use of irrigating streams, miner's inches, acre-feet, and cubic feet/second as other methods of measurement.

Only when Samuel Fortier, George Swendsen, and Elwood Mead measured the water volume of irrigation canals in Cache Valley did anyone establish just how much water was applied to irrigated land. In 1896, according to Fortier's estimates, each second-foot of the average flow of 60 second-feet of water in the Logan and Richmond Canal irrigated 46.4 acres of land. For Cache Valley as a whole, each second-foot of diverted water irrigated 52 acres in June, 1896, 67 acres in July, 113 acres in August, and 166 acres in September. Such measurements

demonstrated the flexible and seasonal nature of local water use. With the rivers at their highest in May and June, there were more second-feet available, so each discrete unit of volume had less land to cover. As the river's level dropped, each second-foot could be stretched in accordance with seasonal needs. With these measurements, irrigators were told for the first time how much water they actually used, and how they used it.\(^{56}\)

There were cultural forces behind the Territory's, and later the State's, failure to recognize or quantify the water rights of community canals. Cache Valley irrigators favored local control and endorsed the decentralization of water use inherent in irrigation districts and mutual irrigation companies. Increasing demands on the Logan River, however, especially challenges from power companies seeking dam sites, forced the canal companies to cooperate in legally affirming their water rights, and in enforcing those rights. In these efforts to comply with state law, Cache Valley irrigators accepted new legal structures governing water use, but at the same time they adhered to their traditional values as expressed in traditional modes of water use. The unification of the Logan River water users stemmed not from a recognition of the integrity of the river's watershed, but from this

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\(^{56}\) Haws, "Development of Logan River," 75.
legal need to formalize water rights, rights that had been maintained for decades by custom and assumption.

In November 1900, James Cantwell, Olaf Cronquist, and E. R. Miles, of the Logan and Richmond Board of Trustees consulted with the leadership of other irrigation districts on the subject of holding a conference on the rights to water from the Logan River. E. R. Miles was later elected to represent Logan and Richmond at the group meeting, which took place in January of 1901. Samuel Roskelley and Reuben Perkes, both long-time landholders and directors of the Logan, Hyde Park, and Smithfield, represented that canal in meetings that month. The Logan River canal organizations, faced with challenges from power companies and other claimants, moved to have official measurements and records made of their rights, and to lobby the state legislature to pass laws ratifying and protecting those rights. The Logan, Hyde Park, and Smithfield Directors recommended to their constituents in 1901 that they have "representatives from this company work with like representatives from all other irrigation organizations who obtain their supply of water from Logan River, so that in an organized body they may work with the State Legislature to frame and pass such laws as shall have the state assume the control of, and impartially
distribute the waters of our Rivers...." Where local companies had been reluctant to relinquish local control and to live by non-local legal determinations, they turned gladly to the promise of state-wide legislation when threatened by non-community forces against which they had little leverage without legal structures.

One of those threats unfolded in the midst of these first steps toward river-wide collective organization. In 1900 the Hercules Light and Power Company approached the Logan, Hyde Park, and Smithfield Canal Company, and asked to use the canal from the headgate down to the mouth of the canyon to generate power. The power company promised to deliver an undiminished flow to the irrigators. The canal directors refused to make a deal, though, claiming of the canal that "we have the right to its care and management without being dictated by capitalists whose interests are not in common with use as a farming community."  

The Logan River Water Users Association, when it finally came into official being at a meeting in January 1906, had as its purpose a collective division of Logan River water among the various canal and mill companies,

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58 Logan, Hyde Park, and Smithfield, 26 January 1901, 274.
and the legal settlement of those water rights. Each individual company or district paid an annual assessment to the Water Users Association to cover its expenses, and thus the new umbrella organization took a form similar to that of its constituent irrigation companies.59

As a first step toward this goal, the community of Logan River irrigators hired two local experts to make detailed surveys of the canals, measure the flows of water in each canal, and determine the rights of each claimant. From 1899 to 1901, George Swendsen, who succeeded Samuel Fortier as professor of irrigation engineering at the Utah Agricultural College in Logan, made detailed measurements of river and canal discharges throughout the year, and determined the total acreages watered under the canals. Samuel Fortier had begun such measurements in 1896, but prior to that date no official records of water rights or canal flows had been kept.

At the request of the Logan River canal companies, Swendsen and A. C. Barber formed a special committee to formulate a report presenting Swendsen's measurements, along with a record of each diverter's date of appropriation. This effort was complicated by the fact that few canal companies had filed any official record of their water supply. In addition, the canals had all been

59 Logan and Richmond II, 20 January 1906, 384.
widened and deepened over time, and thus carried more water than their original claims allowed. Swendsen himself concluded in a preliminary report that the recorded water claims provided no fair basis for a final settlement of priority rights.\(^60\) Realizing that the only dependable information lay not in official documentation or in legal interpretations of rights, but with the farmers themselves, Barber and Swendsen refused to turn to the courts.\(^61\) As Swendsen pointed out, "[t]he irrigation laws of the State have provided no means for the collection of such data. With only the evidence that can be gathered from individual sources as a basis of action, there is no wonder that all are united in the belief that the matter should be settled out of court."\(^62\)

Based on information provided by individual irrigators, the 1903 Barber-Swendsen report proposed a strict construction of prior appropriation, or "first come, first served" water rights. Since irrigators had appropriated water in eighteen different years between 1860 and 1902, Barber and Swendsen outlined 18 classes of

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\(^{60}\) Swendsen, "Appropriation of Water from Logan River," 315.


water rights.\textsuperscript{63} Class One included the three irrigation companies that had claimed water in 1860, class 2, the claimants of 1861, and so on. Due to redundancy of claims and the abundance of water at certain points of diversion, the eighteen classes were reduced to a mere nine for practical implementation.

Using Swendsen's calculations of the volumes of water in the river, and the volumes required by each appropriator, Barber and Swendsen worked out a table indicating which water users would receive water at various stages of river flow. The total water demand for the first nine classes of prior appropriators ran to 217.84 second-feet, and for all classes, 259.27 second-feet. Measurements of river volume at the height of irrigation season in July and August, ran from a minimum of about 170 second-feet to a possible maximum of 500 second-feet or more. Barber and Swendsen recommended that as soon as the river dropped below 259.27 second-feet, the irrigators implement diversion according to the classes of water priorities. At 200 second-feet, water users in classes one through nine, who had made claims up to 1880, would receive their share. At a river stage of 120 second-feet, only the first three classes of

appropriators, with claims made from 1860 through 1864, could claim their entitled volume. At the extremely low river volume of 96.31 second-feet, a highly improbable flow, given that the river barely approached such a level even in January, only the 1860 appropriators would receive water. Early appropriators thus held absolute rights to their full volume of water, whatever the water supply. These holders of "primary" rights had rights to the entire volume of the river. Later appropriators held only "secondary rights," which gave them access to water only when the river reached above-average level. Armed with Barber and Swendsen's facts and figures, the Logan River water users could calculate each canal's rights at every river stage, and could clearly document prior claims and rights to subsequent challengers.

The results of Barber and Swendsen's community-commissioned, and community-based investigation of water rights were not legally binding, but all of the water users on the Logan River agreed to its conclusions and accepted it as law for more than a decade. This widespread acceptance of the water rights established by the local committee stood in marked contrast to Cache Valley's response to state-level attempts to impose order on the local water regime. Between 1909 and 1912 the State Engineer, Caleb Tanner, surveyed irrigation and
irrigation lands associated with the Logan River. In 1912 Tanner requested that all water users file individual water claims with his office. Few Logan River water users responded. An August 1912 editorial in the Logan Journal criticized the new legal demands, declaring that individuals had no way of measuring their water use in second-feet, and that they should be able to respond in groups, as canal or ditch companies. Logan irrigators could not conceive of water rights as a matter of a legal relation between the individual and the state.

The Barber-Swendsen water distribution system, however, even given its responsiveness to local sentiment, did not prove a permanent solution. Its interpretation of primary and secondary water rights followed such a strict understanding of prior appropriation that later appropriators found themselves without water during dry summer months, while earlier claimants, however, received their full share. The intra-community discrimination inherent in such a close adherence to prior appropriation did not fit squarely into local conceptions of the structure and purpose of Mormon communities. This much became evident through challenges to the Barber-Swendsen distribution schedule in the early years of the new

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64 Haws, "Development of Logan River," 83-84.
65 Haws, "Development of Logan River," 84.
century. In 1916 the Call Decree, named for the presiding district judge, Justin D. Call, re-structured the use of Logan River water in ways that better reflected community interests. The new system represented the full integration of the cycles of the river's flow and the cycles of Mormon agriculture and industry.

The conflict which led to the Call decision erupted during the 1914 irrigation season. In January 1915 a group of lower-elevation water users including the Providence Irrigation Company, Logan Hollow Irrigation Company, Logan North Field Irrigation Company, Logan Island Irrigation Companies, and several others brought suit against the two upper canals, Logan and Northern (previously Logan and Richmond) and Logan, Hyde Park, and Smithfield, and against Logan City and the Utah Agricultural College. The plaintiffs charged the upper canals with taking extra water, and specifically accused the Logan, Hyde Park, and Smithfield of conveying water to Logan City that, in fact, "belonged" to irrigation and mill interests lower on the canal. Despite the terms put forth by the Barber-Swendsen report, which favored prior, rather than upstream, diverters, those upstream forces had overstepped their bounds. The geography of elevation--nature--was winning out over straight interpretations of prior appropriation, as the big canals with the highest
headgates made off with water at the expense of smaller, lower-down canals.

The district court decision (the Call Decree) that settled this conflict abolished this distinction between primary and secondary water rights. It ruled that all water users on the Logan River had an equal right to divert their proportionate share of water no matter how much water was in the river at any given time. Water users drew up a set of water schedules which detailed each Logan diverter's water rights at various stages of the river's rise and fall [see Figure 4]. Schedule One applied to water diverted between July 1 and September 15, the height of the irrigation season. Schedule 2 applied to the less demanding periods of the season, April 15 through July 1, and September 15 through October 15. Schedule 3 detailed the scale of water rights for the rest of the year, mid-October through mid-April.

Schedule 1 was then broken down into four blocks, labeled A, B, C, and D, which designated changing levels of water flow. These four sub-schedules governed

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66 Call Decree, 21 December 1916, District Court of the First Judicial District of the State of Utah, Logan, UT.

67 The water schedules cited and reproduced here are not from the county records, but from the Seventh Ward Irrigation Company Papers, MS Collection 100, Box 1, Folder 4, Utah State University Library, Logan, UT [hereafter Seventh Ward Irrigation Papers].
Figure 4. Call Decree Chart showing Logan River Water Distribution. Copied from original by Eugene Schaub, Logan, UT, 28 April 1916, Seventh Ward Irrigation Company Papers, MS Collection 100, Box 1, Folder 4, Utah State University Library, Logan, UT.
distribution from July 1 to September 15 [Figure 5]. At each stage of the river, each group received a measured proportion of the flow. That proportion rose and fell, along with everyone else's proportion, with the river. Thus, on schedule A, at a river stage of 140 second-feet, the Logan and Northern Canal (Logan and Richmond) received 32.2 cubic feet/second of water, at 150 second feet, 34.5 cubic feet/second, and on upward. At the other end of the scale, on Schedule D of the July-September allocation, river stages rose as high as 440 second-feet. At that point, the Logan, Hyde Park and Smithfield drew over 120 cubic feet/second.

Some water users' rights continued to grow throughout the river's rise, while others' leveled off at a certain maximum level. Once the river rose above a stage of about 240 second-feet, Logan City's share leveled off at 10 cubic feet/second. Above 340 second-feet, the Seventh Ward Irrigation Company's claim stayed at its maximum of 2 cubic feet/second. The schedules and charts provided as part of the legal decision gave each water user the power to determine the exact volume of water due him at any given river stage [Figure 5]. The decree also ordered

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68 Haws, "Development of Logan River," 90-94.

69 "Resolution," Call Decrée agreement, with Schedules A-D and graph, Folder 4, Box 1, Seventh Ward Irrigation Papers.
each water user also installed functional headgates by which such measurements could be assured. This highly quantified sliding scale of water distribution marked a clear departure from the fuzzy, indeterminate systems of allocation and measurement which had previously ruled Cache Valley irrigation. It also sounded the death knell of strict enforcement of primary and secondary rights, insuring all water users a share of water no matter what the condition of the supply.

The Call Decree affirmed of the community-based values that guided Utah irrigation from the beginning. It affirmed the basic right of all members of the community to share its collective resources in proportion to their needs and their ability to contribute to the whole. It stood as a legal, collective recognition that the Logan River was fully claimed, that the balance between water supply and beneficial use had been reached, and that further stretching of the water supply might endanger the community that rested on that balance. In doing so, the Call Decree struck an impressive balance between the individual and the community. Each individual canal company or irrigator was empowered by the Call Schedules to protect its own needs, to measure its rights and obligations, while at that same time participating in a highly collective distribution system that depended for
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Figure 5 [continues on next two pages]. Logan River Water Distribution Schedules A-D, as set by Call Decree, 1916. Copied from original in Seventh Ward Irrigation Company Papers, MS Collection 100, Box 1, Folder 4, Utah State University Library, Logan, UT.
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Figure 5 Continued. Call Decree Schedules.
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Figure 5 Continued. Call Decree Schedules.
its success on the cooperation of all parties. In signing the decree, each participant in the legal settlement gave up all future right to make different claims to Logan River water rights.\textsuperscript{70}

The meticulously calculated charts and tables of the Call Decree encapsulated yet another set of cycles. The Call schedules were based on the timing of the agricultural irrigation season, the demands of off-season, non-irrigation water use, and on the rising and falling of the river through those cycles of water use. The Call decision also reflected communitarian ideals which called for each water user to get water in proportion to their need and to their participation in the maintenance of community water systems, no matter what the supply. The lines drawn on the Call decree's graphs of river stages and water allotment thus represented the coming together of natural cycles of water supply, human cycles of water use, and a set of cultural imperatives that sought some balance between the two. The 1916 measure addressed the tensions inherent in water use as practiced in Mormon communities. Those tensions were expressed through the struggle of individual irrigators and canal companies to

\textsuperscript{70} Call Decree, 21 December 1916, District Court of the First Judicial District of the State of Utah, Logan, UT, 6.
protect their own claims to water while serving collective needs as well. The Call Decree addressed as well the battles between higher- and lower-elevation diverters to mediate the natural advantages of higher points of diversion through adherence to prior appropriation and to principles of shared community interest. In enacting its measures, in measuring water and following schedules, Logan River irrigators acknowledged the power that these conflicts had over their community, but also asserted their own powers of internal community solidarity in overcoming strife.
CHAPTER VII
WATER IN THE STREETS: VILLAGE LOT IRRIGATION

We have seen that the relationship between Mormon community and the Logan River consisted of the working out of flexible systems of exchange and cycles of water use that fit within both the seasonal rise and fall of the river, and the value system of the community. So far in this story, however, the methods and cycles of community water have applied to the administration of the larger canal companies serving Logan River towns. Those exchanges and cycles of water use unfolded on the much smaller level of the city block, as well, and it is necessary to examine water use on that level in order to form a complete picture of the way water flowed in Mormon towns.

For it was on the level of the city block, the city lot, and the garden that the actual exchanges under discussion in this chapter took place. It was there that water flowed from the realm of the community into that of the individual family. It was in crossing from the street ditch onto city lots, for village water users, that water became private property. The right of each family to take water from the street into their own garden lay at the
heart of that family's relationship to the community itself. That right formed the meeting point between the individual's obligation to contribute to the collective workings of the town, and their struggle to put community resources to work for individual gain, to transform community progress into personal reward. The details of the water exchange at the level of the city lot, and the laws governing cycles and structures of town irrigation, reveal some of the meanings embedded within village water flow.

Sociologist Lowry Nelson and geographer Richard Francaviglia have produced the most comprehensive considerations of the Utah Mormon village as a unique social, cultural, geographic, and architectural entity.¹ Nelson characterized the Mormon village as a "social invention," the product of the Mormons' bringing together of diverse elements intended to "prepare a dwelling place for the Saviour at His Second Coming."² Mormon social


² Nelson, Mormon Village, 28.
ideals combined 19th-century communitarianism and millennialism, with goals of isolation and self-sufficiency. Their models included the traditional New England village structure and the Plat of Zion. The convergence of these factors with the arid and isolated Utah environment, along with the "extraordinary group solidarity" of Mormon settlers, produced the Mormon village pattern, characterized by an orthogonal grid of wide streets and large houselots, shade trees, and, of course, irrigation ditches. Those ditches and the yards they watered embodied the values associated with the village as a whole.

During the summer of 1875 the Deseret News published a short promotional description of Paradise, a village with a telling name located at the south end of Cache Valley. "The town is laid off in the usual manner," it read, "with plenty of city lots...which are judiciously...distributed by Bishop H. T. Jackson, past which lots murmur, in suitable streams, the life diffusing water."

As this editorial demonstrated, the running of water in the streets formed a central icon of the ideal Mormon

3 Nelson, Mormon Village, 38.


5 Deseret News 24 (11 August 1875).
village. A settler of Orton, a Mormon colony in Alberta, Canada, reported of the future visions of their town that "President Wood said we would see the time when water would run down the streets of Orton and flowers and trees would grow everywhere." Six Nineteenth-century European immigrants imagined New York's street paved with gold; Mormon pioneers saw water running in the streets.

Unlike immigrants to the eastern United States, Mormon Utahns made their vision a reality. Water did, by design, run through the village streets, as reported in 1869 by Sanpete County convert Robert Mallinson to his brother back in England: "[i]nstead of our water being buried underground in pipes as with you, we have water ditches, on each side of the streets, planted with shade trees on the edge of the side walks." Seven Though the constant flow did serve the practical purpose of keeping the ditches and water supply relatively clean, these free flowing streams, symbolizing as they did God's bounty and the transformation of the desert, had great value.

In regulating the ordered, peaceful use of village

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6 Nelson, Mormon Village, 249.


irrigation streams, church leaders followed Brigham Young's exhortations to cultivate garden cities of beauty, grace, and order. Their regulation and preservation of street ditches reflected the importance of the use of irrigation water on city lots in the building of the cities of Zion. Esther Ruth Truitt, in a study of Salt Lake's garden landscapes, noted that the open ditches gave the city a tranquility, a "character of motion and elegance." An account of early Salt Lake City, where settlers channelled the waters of City Creek through the streets in open ditches, noted that "[a] continuous flow of water in the ditches was maintained only in the center of town." Irrigators used headgates to start and stop flow in other sections of town. The center of Salt Lake City, the geographic center of the Mormon Kingdom, above all other places, had to include a constant, ostentatious display of life-giving water.

In Logan, nineteenth- and early twentieth-century city laws reflected the importance of a free-flowing source of irrigation water for yards and gardens. A 1908 Logan statute declared it unlawful "for any person to place or maintain in or about any water ditch an


obstruction of any kind, which hinders or prevents the free passage of water through such ditches." Once the city laid piped water mains in the 1880s to provide houses with a domestic supply, street ditches were reserved for irrigation alone. Thereafter, city watermasters had to grant special permission for anyone to pipe water out of the ditches for uses other than city lot irrigation. One 1886 city law forbid the altering of "the course of water intended for irrigation or other purposes without the consent of the Watermaster." Another outlawed the constant flow of water for domestic or stock-watering purposes. Irrigation was the only use of water that justified a constant flow.

The symbolic resonance of the sight and sound of running water preserved street ditches, and the use of concrete gutters as ditches, long after many city lot

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11 Logan City Council, An Ordinance Revising and Arranging the Ordinances of Logan City (Logan, UT, 1908), chap. 7, sec. 62, 22.

12 The law read "[A]ll resolutions, ordinances, and permits allowing any person to convey the waters of Logan River...from the ordinary ditches by pipes for any use or purpose whatever, wherever the water mains are laid, are hereby repealed." Logan City Council, Revised Ordinances, 1886, chap. XI, sec. 197, 88.

13 Logan City Council, Revised Ordinances, 1886, chap. XIII, sec. 229, 96.

14 Logan City Council, Revised Ordinances, 1886, chap. XI, sec. 193, 88.
owners ceased watering gardens from the street. Although improved technology provided alternatives to open ditches and canals, Utah Mormons maintained this traditional form of conveyance and distribution. To this day, openly flowing water in Mormon towns demonstrates the communities' profound cultural investment in the image and reality of running water.

From the beginning, water defined the town of Logan. Church leaders chose its site based on the proximity of the Logan River and its canyon, and in the initial 1860 description of the city limits, surveyor Jesse Fox relied heavily on watercourses as boundaries. The Logan River, the Logan and Hyde Park Canal (then just being dug), the Hyde Park ditch, and the Little Bear River served as major landmarks in marking out Logan.15

Church leaders divided Mormon towns into wards, which served as units of water management as well as units of religious organization for worship. All members of a single ward attended church together, and obeyed the dictates of the ward bishop. Because wards were also sections of the village, they doubled as useful irrigation districts. Assistant watermasters in each ward served under city watermasters, and supervised the equitable

distribution of water. In the first years of settlement, though, water users drew few distinctions between watermasters as town officers and as church officers. Ward bishops either served as de facto watermasters or appointed others to fill that position. They instructed their constituents in the digging of ditches and oversaw their use, and often adjudicated water disputes. The religious governance of the ward and the regulation of water use were largely inseparable functions. This made sense, given the role that irrigation water played in the spiritual aspects of community development and growth.

Logan River water made its way into town wards and gardens through small lateral ditches that branched from the main canals. Those ditches ran along the wide village streets between the houselots and the street. Strict city laws governed the points at which irrigators' diverted water onto their lots, the exact point at which water flowed from the community into the individual family's domain, and was transformed from collective property to

16 Logan City Council, Revised Ordinances of Logan City, Containing All the Ordinances in Force on the 18th Day of April, A.D. 1877 (Logan, UT, 1877), art. IV, sec. 5, 267.

17 Thomas, Development of Institutions Under Irrigation, 92; and Fox, "The Mormon Land System," 131.
individual property. Because this specific water flow, from street to yard, involved both community property--streets and sidewalks--and individual property--front yards with their trees, flowers, and shrubs--restrictions abounded. There was great potential for damage to both town and family property from overflowing or clogged ditches, and at these points of transfer between community ditches and city lot, irrigators were unsure just who was responsible for the water, and for the damage it could do. That uncertainty produced a detailed set of regulations that reflected the tensions inherent in the crossing of water from public to private realms.

The Logan city ordinances of 1886, for instance, included an entire chapter of laws concerning sidewalks. These regulations required all city lot owners to dig and maintain ditches "to convey the waters running in the streets along the fronts and sides of said lots, to the acceptance of the City Watermaster." The law decreed as well, with great specificity, that "[s]aid ditches shall be made 16 feet from the fence line of city lots on Main St., and 12 feet from the fence line in all other

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18 Logan City Council, Revised Ordinances of Logan City. To Which are Prefixed the City Charter and all Territorial Laws Applicable to Logan City (Logan, UT, 1886), chap. 13, sec. 223, 95.
In addition, the ordinances read, "[t]he curb of every sidewalk shall be set on the outer edge of the sidewalk...and said curbstone shall be the inner edge of the water course...." The sidewalks themselves were to be six feet wide, except on Main St., where they were to be 16 feet wide. Those widths were "measured outward from the boundary lines of the blocks as platted on the official map of this city, to the inner edge of the water ditch." Finally, the law read that, "[t]he line of shade trees shall be eighteen inches from the inner edge of the water ditch." Any water user that diverted water from a street ditch across the ordered universe of the sidewalks was "required to dig suitable ditches to convey the water across the sidewalks to or from their respective lots; and all such persons are hereby required to make good box culverts and keep them in repair, the covering of the culverts to be on the same grade as the sidewalks, and to put suitable water-tight gates at the ditch entrances of the culverts...." This inordinate amount of instruction

19 Logan City Council, Revised Ordinances, 1886, chap. 113, sec. 224, 95.

20 Logan City Council, Revised Ordinances, 1886, chap. 13, sec. 213, 93.

21 Logan City Council, Revised Ordinances, 1886, chap. 13, sec. 210, 92.

22 Logan City Council, Revised Ordinances, chap. 13, sec. 222, 95.
indicated that these junctures, the places where water flowed out of the community sphere and into the family sphere, were areas of great contention. They required a degree of regulation that left no question as to each irrigator's responsibilities and liabilities in the control of the water running so freely in the streets. Mormon communities held themselves together in part through their ability to share and manage that free flow, and those streets, sidewalks, and ditches, all without causing internecine neighborhood warfare.

Whatever the legal dictates of the Logan City Council, the basic tenets of village water use took form on the very local level, in wards, neighborhoods, city blocks, and individual yards. City lot owners dug ditches from their orchards and gardens out to the street, and jury-rigged basic headgates. When they needed water, or at their designated watering turn, gardeners opened their headgates and let water flow across their lot to water their trees, vegetables, and flowers.

From the early part of the twentieth century, city lot owners in Logan's seventh ward regulated their water use through a cooperative irrigation company very much like the larger canal companies that served other parts of the town and the valley. The administration of the Seventh Ward Irrigation Company demonstrated Mormon water
users' commitment to the forms and patterns of collective water distribution, and to the free flow of water, even on a diminutive scale. Community irrigation was as important for the ways in which it held people together—or bound them together—as for the efficiency of the water delivery itself. The ways in which people related to each other within the structure of the organization, no matter how fraught with conflict, were crucial to a continued sense of community.

The Seventh Ward Irrigation Company was among the few ward-based incorporated irrigation organizations in the Logan area. In drawing the boundaries of the seventh ward, church organizers had to abandon the typical right-angled uniformity of the rest of the town, as this low-lying section was bounded on the north by Canyon Road, which skirted the curving foot of the Logan bench. The Logan River itself formed the southern boundary [Figure 6]. The Logan and Hyde Park Canal thus ran along most of the northern boundary of the seventh ward as it traced the bench, leaving the seventh ward particularly well suited for irrigation. This may have influenced the merger of ecclesiastical and irrigation company boundaries in this case. Because all of the shareholders of the

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Figure 6. Logan City with Boundaries of Seventh Ward, as of 1941. From Seventh Ward Irrigation Company Papers, MS Coll. 100, Utah State University, Logan, UT.
seventh Ward Irrigation Company shared ward membership as well, the connections between water use and the ideals of Mormon religious community may have been particularly strong among that miniature water community.

One powerful indication of those connections, or at least a useful symbol of them, was the conflation of roles performed by Frederick Scholes, who served as director, secretary, treasurer, and watermaster of the Seventh Ward Company from at least 1913 until the late 1940s. During a significant portion of that reign Scholes served as well as Recorder at the Logan Temple. This prestigious church position involved the official record-keeping of all rites performed at the temple. As irrigation company secretary and as temple recorder, Scholes had the dual duty of record keeping for irrigation and for temple baptisms, rites that emphatically involved water. Scholes was thus responsible for officiating at temple baptisms, wherein living people were baptized vicariously for their ancestors, and for the watering of home gardens. Both sets of baptisms were in a sense symbolic, and both connected the individual to the community of saints, whether it was a temporal or eternal community. Scholes often kept ditch company records on stationary from the
Logan Temple. 24 That the water in the company's ditches and the water in the nearby temple came from the same source, the Logan River, underlined the equation of these different sorts of waterings. 25

Seventh Ward irrigators diverted water from the Logan and Hyde Park Canal, the original 1860 Logan canal. When Scholes filled out an irrigation questionnaire accompanying the 1930 U. S. Census, he described the water works in question as a "Small irrigation ditch (Tapping Canal) carrying small irrigation stream to about 50 home gardens probably 15 acres in all." 26 Fifty individuals held a total of 135 shares in the company on which they paid an annual tax of fifty cents. The ditch, about a quarter of a mile in length, delivered an unmeasured amount of water to all users during an irrigation season that ran from May 1st to September 1st. 27 Ten years


25 Logan and Richmond Canal Company records noted in August 1900 that "The Temple was allowed 15 cu. in. of water, to run continuously during Irrigation seasons for the amount of 25 acres of water right." Logan and Richmond II, 4 August 1900, 305.


later, when filling out a similar questionnaire for the 1940 census, Scholes revealed the yearly cost of ditch operation to have been $53 in 1939, with the total water taxes collected that year amounting to $46. The water commissioner did measure the Seventh Ward's diverted share that year, but only during August and September, when, according to the legal schedule in effect, 2.5 cubic feet of water flowed into the ditch. No one measured how much water each individual shareholder received. The allotted volume easily met all demands.²⁸

Scholes's description underscored the smallness of this irrigation system. Though it served a small group of gardeners with a low volume of water, the Seventh Ward ditch company retained all the trappings of larger cooperative irrigation ventures. The company met annually to vote on taxes, work, and improvements, and to elect a board of directors, who in turn appointed watermasters. In 1916 the president and secretary of the company signed the Call Decree resolution, demonstrating that even this minor constituent of the Logan River Water Users Association sought active participation in the collective

Organized as a stock company as of 1913, and perhaps earlier, Seventh Ward water users paid taxes according to the number of shares they held, rather than according to the acreage or lots they watered. In 1917 the board allowed two hours of irrigation for each share held in the company, and set up a rotation of the irrigation stream so that each irrigator had the use of the water during a specific time of the week. In 1917 the 17 water users on the ward's upper ditch operated on a weekly schedule running from 2 a.m. Sunday, when the first diverter, John B. Linton, began irrigating for the four hours that his two shares allowed him. The cycle continued until 11 p.m. the following Saturday, when Frederick Scholes finished with his 8 shares, or 16 hours of water. The users along the upper ditch did not irrigate throughout the night because, given their small numbers, daylight provided time for everyone's turn. On the company's lower ditch, used by 33 irrigators, the water rotation ran 24 hours, 7 days a week. Water ran constantly in the ditch.

As with any irrigation system based on timed shares,

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29 Minutes, 22 May 1916, Seventh Ward Irrigation Papers, Box 1, Folder 2.

30 Water Schedules, Upper Ditch and Lower Ditch, in Minutes, Annual Stockholders Meeting, 22 May 1917, Seventh Ward Irrigation Papers, Box 1, Folder 2.
the Seventh Ward water users paid for and used water on the basis of shares of time, rather than volume. The crucial facts for each water user were how many shares of water they owned, and when they could take that water. Each irrigator's place in the community was defined, on paper, not as a geographic location along the ditch, but as a time period during the week. Timed allocations emphasized the cooperative nature of the whole operation. When an irrigator got water was as or more important than how much he got, and accurate, fair timing of water flow required vigilant cooperation.

But was there a connection between an irrigator's position along the ditch and the time that they were allotted for watering their lot? The Seventh Ward Company diverted water from the Logan and Hyde Park Canal at the corner of Fifth East and Canyon road, at the northeastern corner of the ward [Figure 6].  

On the upper ward ditch, the first irrigator in the weekly cycle lived close to the point of diversion, while later irrigators lived farther from the headgate. The same was true, in general, on the lower ditch. Irrigators did not, however, take their water in exact geographic order, one after another down each street in direct succession by houselot.

31 Minutes, 26 April 1915, Seventh Ward Irrigation Papers, Box 1, Folder 2.
Water users sharing one square block, however, even though their properties fronted four separate streets, often watered in some semblance of direct succession before the irrigating stream was shunted on to the next block. These conclusions are based on my cross-referencing of addresses found in R. L. Polk and Company's Logan City and Cache County Directory 7 (1915-1916) with Seventh Ward Irrigation Company irrigation schedules for the 1917 irrigation season, Seventh Ward Irrigation Company Papers, Box 1, Folder 2. The addresses found for the Lower Ditch of the Seventh Ward Irrigation Company were as follows:

1) John Skabelund (company director; 4th diverter), 3 p.m. Sunday to 4 a.m. Monday, at 461 East First North.

2) F. J. Birch (5th diverter), Monday 4 a.m. to 8 a.m., at 464 Canyon Road.

3) J. A. D. Challis (6th diverter), 8 a.m. to Noon Monday, at 106 North Fourth East.

4) Mrs. John Johnson (7th diverter), Noon to 4 p.m. Monday, at 90 North Fourth East.

5) Back to John Skabelund (5th and 8th diverter), 4 p.m. to 8 p.m. Monday.

6) M. Mouritsen (9th diverter), Monday 8 p.m. to Tuesday 4 a.m., at 40 North Fourth East.

7) Frederick Scholes (company director, 10th diverter), Tuesday 8 a.m. to Noon, at 456 East First North.

8) Carl W. Pehrson (11th diverter), Noon to 4 p.m. Tuesday, at 485 East First North.

9) Hyrum D. Davidson (12th diverter), 4 p.m. to 10 p.m. Tuesday at 60 North Fourth East.
from neighbor to neighbor within blocks, a system which must have provided maximum efficiency of water flow and use. The accompanying map of a part of the Seventh Ward indicates the order of watering times on the Seventh Ward.

10) F. A. Mitchell (13th diverter), 10 p.m. Tuesday to 2 a.m. Wednesday, at 405 East Center.

11) Caroline Turner (15th diverter), 4 a.m. to Noon Wednesday at 395 East Center.

12) H. J. Frederick (16th Diverter), Noon to 4 p.m. Wednesday, at 363 East Center.

13) F. O. Britzell (17th Diverter), 4 p.m. to 8 p.m. Wednesday, at 351 East Center.

14) O. W. Hanson (20th Diverter), 4 a.m. to 8 a.m. Thursday at 35 North Fourth East.

15) L.J. Carlson (21st Diverter), 8 a.m. to Noon Thursday, at 392 East Center.

16) J. H. Moser (22nd Diverter), Noon to 4 p.m. Thursday, at 384 East Center.

17) Kirsten Nielsen (23rd Diverter), 4 pm. to 8 p.m. Thursday, at 374 East Center.

18) O. P. Ecklund (24th Diverter), 8 p.m. Thursday to 4 a.m. Friday, at 351 East First South.

19) Job A. Larsen (26th Diverter), Noon to 4 p.m. Friday, at 40 South Third East.

20) Christina A. Larsen (27th Diverter), 4 p.m. to 8 p.m. Friday, at 36 South Third East.

21) Mary Baugh (28th Diverter), 8 p.m.-Midnight Friday, at 50 South Third East.

22) C. M. Wendleboe (29th Diverter), 12 a.m. to 4 a.m. Saturday, at 322 East Center.

23) John C. Larsen (31st Diverter), 9 a.m.-8 p.m. Saturday, at 20 South Fourth East.
lower ditch in 1917 [Figure 7]. As shown, the water moved from block to block away from its original source, with neighbors sharing the same square of town land most closely associated in the times of their water use.

None of this is at all surprising. It made sense that the city block formed the basic unit of collective irrigation, and that residents of each block follow each other in some succession before sending water on to the next block. The difficulty and potential damage involved in conveying a flowing stream across or under streets encouraged irrigators to minimize the flow between blocks. Though the Seventh Ward left no record of the way that irrigators living within single blocks negotiated their shared water use, this evidence that the city block constituted the basic unit of that shared, community irrigation suggests further avenues of close study of the social relations engendered by that shared activity. The Seventh Ward's pattern of watering also suggests the degree to which irrigators had to regulate their watering in order to discourage conflict in these shared, closely bordered ditches and lots.

How did irrigation work in these carefully watered yards? The flow of water through street-side village ditches, however crucial to village function and identity, made up only part of the story. Once the water crossed
Figure 7. Detail of Seventh Ward, with Inset showing numbered order of diverters from Seventh Ward Irrigation Co.'s lower ditch, 1917. Base map from Seventh Ward Irrigation Co. Papers, MS Coll. 100, Utah State University Library, Logan, UT.
the meticulously laid-out sidewalks, it passed onto the individual house lot, the basic unit of Mormon family life. As decreed by the Plat of Zion, Mormon villages consisted of spacious square blocks surrounded by unusually wide streets. Each block was divided into ample sized lots, usually between one and two acres in size, with about 8 lots filling each block.

Though they were the smallest division of land within the Mormon settlement pattern, city lots were the most intensively cultivated, and produced the greatest diversity of products. It was on these lots, around their houses, that Mormon families devoted themselves most fervently to fulfilling Brigham Young's charge to create oases of green. Heber C. Kimball expressed that charge in words immortalized in the Church's Journal of Discourses.

Brethren and sisters, let us go to work now and cultivate the earth...make gardens and adorn them and build good houses and adorn them. What a blessing it is for this people to have the privilege of beautifying the earth and making it like it was in the beginning in the garden of Eden...Let us prepare ourselves, that...we shall know how to do right, and make beautiful gardens....

Brigham Young wrote as well of his vision of garden cities, challenging the Utahns to "Build cities, adorn your habitations, make gardens, orchards, and vineyards,

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and render the earth so pleasant that when you look upon your labours you may do so with pleasure and that angels may delight to come and visit your beautiful locations."34

Mormon family gardens were more than a crucial part of the community plan for self-sufficiency through food production. As literal gardens within the larger figurative garden of Zion-in-the-desert, they became a microcosm of the Mormon universe. Because those gardens were individual family plots, their beauty and productivity reflected the family's spiritual as well as material progress. Because they were watered through from canals through wards or neighborhood ditch companies, however, Mormon gardens, connected families to the community. They therefore contributed to the pervasive tensions between individual progress and collective responsibility.

In his anthropological discussion of the mode of production in Mormon villages, Michael Scott Raber distinguished house lots as among the most important of the "spatial domains" around which villagers organized their economic lives.35 Working year-round on various projects, men, women, and children labored on the few


35 Raber, "Religious Polity and Local Production," 254.
acres around their homes to grow vegetables, berries, fruit, to make soap and starch, spin flax and wool, build tools, and wash clothes. Raber wrote that "houselots were the center of the most intensive household labors, and of those activities most directly related to the production of subsistence items...." The yards worked as extensions of the house kitchen, and as places of business for production of goods for the community. In addition to the family's house and barn, the lots often included granaries, corrals, pigpens, wells, and chicken coops, as well as gardens and orchards. Landscape historian Esther Truitt noted that the family outhouse often had to be strategically placed in order to be kept out of the way of the irrigation water that frequently flooded the lot. Garden crops included potatoes, squash, carrots, turnips, beans, peas, onions, parsnips, squash, melons, and sugar beets. Apple, pear, cherry, peach, and plum trees made up the orchard groves around the house, with currant,

36 Raber, "Religious Polity and Local Production," 256.

37 Raber, "Religious Polity and Local Production," 255.


gooseberry, and raspberry hedges lining walls and
defences. Some gardeners kept bee sheds on their lots as
equally. Along with the bounteous products of the house
lot came strong traditions of canning and storing food, a
practice enhanced by the church's demands that all
settlers keep enough food on hand to insure survival for
as long as seven years of famine.

Like the Mormon village, its irrigation systems, and
the surrounding fields, the city lot was a consciously
shaped, meticulously designed space. In considering the
ideal town patterns which directed early New England town
fathers in distributing land for individual and common
purposes, historian John R. Stilgoe observed that "shaped
space controls society." This was no less true of
Mormon villages than of New England towns. Mormon village
lots provided the backdrop against which families
struggled to fulfill the church's mandates for self-
sufficiency and the creation of a new earthly eden.
Church leaders created physical patterns of land
distribution and ownership that cultivated the moral and
spiritual qualities they deemed crucial to their mission.


42 John R. Stilgoe, Common Landscape of America, 1580
to 1845 (New Haven, 1982), 43.
Those standards included order, communitarianism, and equality. Village house lots took on that order, along with a tell-tale uniformity that expressed the Mormon conviction that each individual should pursue the same goals, with equal resources, for the benefit of the community as a whole. In her 1986 landscape study, Esther Ruth Truitt provided sketches of the typical Salt Lake City lots, which displayed this uniformity and order [Figure 8].

During the pioneer period of Utah settlement, everyone gardened, and numerous organizations sprang up to facilitate the trading of plant cuttings, techniques, and general garden information. Garden leaders, including high church officials like prophet Wilford Woodruff, helped to found the Deseret Horticultural Society in 1855, and the Domestic Gardener’s Society in 1859. The rows and groves of shade trees planted on city streets and lots, living there by the permission of human beings, and, more specifically, by the irrigation water brought to the village by human means, were key to the humanizing of the Utah landscape. In one local arborist's view, the trees were symbols of the people themselves. Like Mormon settlers, they had been transplanted from the East, and thrived only under well-managed irrigation systems. Their

Figure 8. City Lot Arrangements in Salt Lake City, Pioneer Period (left), and Post-Pioneer Period (right). Re-drawn from sketches in Esther Ruth Truitt, "Home Gardening on City Lots in the Salt Lake Valley, 1847-1918" (Master's thesis, Univ. of Connecticut, 1986), 51, 75.
greenness and bounty marked the places of human society; they stood as signs of a new kingdom, of a transformation of the landscape's physical and spiritual nature.

Scholars of the Mormon village economy, including Lowry Nelson, Michael Scott Raber, and Carol Madsen stressed that women did most of the day-to-day work on their city lots, leaving the heavier field labor to the men. In her survey of women's activities in Cache Valley in 1890, Madsen wrote that "[w]hile the wheat and other grains were planted and harvested by the men of the family, the garden vegetables and fruits were supervised by the women." Several men's journals from the early decades of Cache Valley towns indicate that, during that time, men regularly worked in their family gardens. Before he even staked a claim in Smithfield, during his first spring in Utah, James Cantwell, Sr. "got a small patch of land, and planted some peas and some other garden

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45 Raber, in "Religious Polity and Local Production," notes that "[E]xcept for the construction of fences, sheds, corrals, or houses, work done on the houselots was administered by women and accomplished by them and their children," 295.

seeds...."47 In his journal for 1888, Cantwell's son reported that on April 12th and 13th he "sowed some peas today and put out A patch of rasburrys...put out A patch of Strawburrys[.] today my son Willie is ploweing and Jimmy is helping me in the garden."48 Christian Jacobsen of Lewiston, a town on the Cub River northwest of Smithfield, took great interest in the products of his garden. In the spring of 1881 Jacobsen planted a garden in the odd hours around his duties as a schoolteacher. By the Fourth of July he had begun to reap the bounty of his labors. Of the holiday he wrote,

Stayed about home and hoed some in the garden...Brother Waddoups was to our home for dinner and we had new potatoes and peas for dinner out of our own lot[,] the first peas we had of ours but we had some of the Potatoes last Saturday and have been eating lettuce for some time and have had a few raddishes and onions once so we are getting some things of our lot....49

As the initial feats of pioneering faded, and gardening expanded from a pursuit of self-sufficiency and survival to one of economy, family discipline, and moral vigor, men played less of an immediate role in city lot agriculture. From the beginning the Mormon leadership had

47 Cantwell Diary, Spring 1857, 72.

48 Cantwell Diary, 12-13 April 1888, 217.

49 Christian Jacobsen Journal, 1871-1881, and 1899, 23 April 1881, 25 April 25, 4 July 1881, TS, Joel E. Ricks Collection of Transcriptions, vol. 6, Utah State University Library, Logan, UT.
delegated certain jobs specifically to women, such as food storage and preservation, and, in the 1870s especially, the keeping and harvesting of silk worms. 50 Women grew flax as well, as reported by Cache Valley's "founding mother," Mary Ann Maughan, in an account of her work in 1869. "We have made 150 yards of linen cloth," she wrote, "the flax was raised in our garden." 51 The church's instructions as to women's contributions to the household economy emphasized flower and vegetable gardening, and the canning and preserving of garden produce. Folklorist Austin Fife noted that women's work in Mormon villages included "the care of the garden and orchard, poultry, and sometimes milking and feeding of calves and hogs." 52

In the years following settlement, women were charged more and more to use garden and yard work as a catalyst in the education of their children, and of themselves. Brigham Young exhorted his followers in 1864 to "Raise orchards, if only for the welfare of your children...that they may be preserved from growing up thieves." 53 The morality inherent in the Latter-day Saints' agrarianism


53 Deseret News 13 (27 July 1864).
extended with full force to the city lot where young children came into direct contact with the labors and satisfactions of working on the land. Home gardens worked "to create an atmosphere of family co-operation and common interests in the home; that children might learn helpfulness from such small beginnings as working in a kitchen garden."54 "There is also," the same article continued, "the economical value of the great lesson gained when the boy and girl discover what is required in labor and material to feed themselves."55

By the twentieth century, women's work as gardeners was hailed as a contribution to urban renewal as well as health, home economy, and education of children. The Relief Society Magazine stressed in 1915 that gardening "in transforming vacant and often ugly city lots and idle tracts of land into beautiful and productive areas, it benefits the whole community."56 By 1932, the purposes of a garden were even more removed from the substantial support of the family. "Peace and kinship with God a garden gives you," wrote a contributor to the Relief


Society Magazine. "When creeds seem too thick along the way, when questions of the life to come molest, a garden is salvation. It is the finest place in the world in which to cleanse the mind and soul...."  

Family gardens, no matter who tended them, connected members of each household to the flow of water through the community. The question remains as to whether men's and women's use of, contact with, and attitudes toward irrigation water differed according to gender, and according to changing motivations for homelot gardening. An account of pioneers in Salt Lake City put together by the Daughters of the Utah Pioneers provides one of the few glimpses of women's home water use. "The pioneer mother," it noted, "kept barrels well filled with ditch water, caught rain from the roofs of their houses which poured into improvised cisterns."  

Because women were deeply invested in the family garden, they must have been involved as well in the watering of that garden. From the records of the Seventh Ward Irrigation Company it is evident that women dealt directly with such companies only after their husbands' deaths, as widows. In the great majority of cases, men, by paying taxes and working on  

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57 Lois V. Hales, "'A Garden is a Lovesome Thing,'" Relief Society Magazine 19 (July 1932): 458-59.

ditches, secured community ditch water for their family's house lot and garden. Men oversaw their timed water turn as well, operating the headgate and seeing to the distribution among rows of vegetables and fruit trees. Given the power that men held over water, it is clear that men's uses of water for crops and livestock held priority over women's uses.

In crossing onto house lots, however, irrigation water entered a space in which women's work was key to the family's health and production. Laundry, cooking, and cleaning all required water, and thus women had a direct interest in the source and quality of their home's water supply. Gardening, with its powerful symbolism of the entire Mormon mission, and its crucial status as a key measure of an individual family's ability to provide for itself, and thus to take part in the community's progress, provided women with a powerful link to the irrigation water so meticulously controlled by a community of men.

The topics of water use and community on the level of city blocks, and of the role of water in Mormon home gardens are in no way exhausted by this brief discussion. The wealth of sources, especially diaries, left by Mormon men and women provides rich possibilities for further investigation of the connections between community life and irrigation on this very local level. The boundaries
of the city block, where irrigators took water in successive turns, may provide a useful framework for such study.
"How pleasing it is to look upon this great valley with its beautiful water and timber," proclaimed church leader Heber Kimball to the people of Cache Valley in August of 1865. "I pray you not to defile this land," Kimball continued, "But be pure before the Lord, and sanctify this blessed land...that it may always be an inheritance for the people of God, and a land wherein the wicked will not be able to dwell."¹ Nineteenth-century Mormon settlers held fast to the idea that they alone could build communities in the Great Basin. The arid environment provided challenges that only a highly disciplined, cohesive society could meet. The greatest of those challenges lay with the management of irrigation water. "City creek is distributed to about the finest thread," wrote one early Salt Lake City resident. "Gentiles could not possibly live here, for they would kill each other with their hoes, and as it is, Mormons have protracted civil discussions day and night at the

¹ Deseret News, 16 August 1865.
head of the water ditches." Water was important in Mormon community life, both as the means by which to "sanctify this blessed land," and as the hotly contested subject of these "protracted civil discussions day and night."

The primacy of water began as an environmental issue but became a major cultural factor. Mormon culture mediated the relationship between Cache Valley settlers and their environment, and their environmental history is as much about culture, and cultural attitudes treatments of nature, as it is about nature itself. Mormon social values combined agrarianism, millennialism, economic self-sufficiency, shared community life, local self-government, and patriarchy. Those values shaped community institutions, but at the same time were themselves shaped by the environmental demands of settlement along the Wasatch Front. This thesis has examined the particular aspects of Mormon culture that governed water use because, as a crucial meeting point between nature and culture, Mormon irrigation systems revealed some of the important interactions between nature and culture, between aridity and Mormonism.

Chief among the elements of Mormon culture reflected

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2 George A. Smith, quoted in Fox, "Mormon Land System," 139.
in irrigation systems was a fundamental tension between the ideals of community religious life and the need of each individual to provide for personal and family success within the community. That tension produced a unique system of directly-proportionate exchanges, through which the individual water user could be assured that he was giving no more to the community—in labor, grain, cash, or stock—than he was receiving in water from the collective supply. In turn, the community, as represented by cooperative canal companies, maintained this system of exchanges in order to regulate individual water shares for the benefit of the whole.

This system of exchanges not only connected Mormon irrigators to each other, but also to nature. Water users exchanged their cash, crops, and labor not for specific volumes of water measured in standard units, but for water measured according to either the amount of land it watered, or the period of time during which it was diverted. These cultural exchanges tied water use to a fundamental myth of Utah Mormon culture, the transformation of the desert into a green, productive garden. The seasonal rhythms of irrigation bound irrigators to that myth as it bound them to the cherished ideals of community purpose which helped to maintain an equitable water distribution system. Water measured
according to times of diversion linked irrigators to agricultural cycles of water use and to the ongoing effort by the community to bring those human cycles into a functioning relationship with seasonal cycles of the river's rise and fall.

Cooperative institutions, such as those created by Cache Valley irrigators in the nineteenth century, have come under scholarly scrutiny recently by historians and geographers interested in human interaction with the natural environment. Because Utah Mormons distributed land, water, and timber through a system based on community interest rather than individual capitalistic exploitation, some have suggested that early Mormon Utah offered an environmentally "correct" adaptation to the arid West. In this historical scenario, Mormons appear as unwitting environmentalists, possessing a sensitivity to their surroundings that spared their lands the degradation visited by other Euro-American groups on ecological systems in other parts of the West. This theory grew from considerations of the centralized allocation of resources by church authorities in the early stages of Utah settlement. By declaring church ownership and power over land, water, and timber, the ecclesiastical hierarchy enforced its demands for wise use of all resources for the benefit of the larger community. Local bishops prevented
individuals from accumulating more property than they needed, and thus prevented monopolies and blatant inequality. Some interpreters of these policies, including Leonard J. Arrington, have stated that this centralized ownership and control prevented environmental degradation. More focused examinations of the question have disproved such conclusions. While Mormons clearly possessed a group ethic that dictated the proper use of land within Mormon society, it was a one-sided, human-oriented ethic that did not include consideration of the internal dynamics, or the limits, of the land itself. As environmental historian Dan Flores pointed out, Mormon settlers lived by democratic, communal values that modern environmentalists find impressive. In practice, those values did not prevent severe instances of resource depletion, range erosion, and flooding throughout Utah.

Though not environmentalists in the modern sense, Mormons took careful stock of their environment and shaped their settlement and resource use accordingly. Knowing that they could not farm without irrigation water, and that water could be brought to a small percentage of

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4 Flores, "Zion in Eden," 331.

5 See Flores, "Zion in Eden."
arable lands, Mormons claimed land in small plots located centrally around compact villages, and farmed those parcels intensively. Settling at the mouths of stream-carved canyons, they took advantage of a stratified environment that provided high mountain ranges for timber, summer grazing, and spring and summer snowpack runoff, fertile benchlands close to the natural watercourses that ran down the canyons, and well-watered valley bottoms for grazing. Given the amount of water available from those sources, they were able to sustain populations of a certain size in villages clustered along small streams.

With less-renewable resources, such as timber and forage grasses, the Mormons understood little of the need to balance population growth with ecological reality. Joel Ricks noted in his history of Cache Valley that the town of Hyrum, just south of Logan, boomed in the 1870s, becoming a thriving model of Mormon cooperative civilization. Blacksmith Fork Canyon provided ample timber and water for a sawmill and shingle mill, which combined with farming and dairying to make the community largely self-sufficient. Families traded labor for food in an elaborate barter system. The community supplied rapidly expanding Utah railroads with a steady stream of lumber for ties. By 1881, however, with the canyon stripped of trees, much of the population, which had
doubled in just a few years, had to seek employment outside of the valley. The early Utah Mormons do not, then, provide modern Americans with a model of a Euro-American community that sustained itself within the limits of its environment. Mormons did, however, initially settle in places that made environmental sense. They organized their communities according to principles of equitable distribution of scarce resources, especially water. These achievements placed them in marked contrast to many other American western communities.

The relationship between Mormon culture and the natural environment, as reflected in community irrigation systems, cannot be reduced to a question of the presence or absence of a primitive, divinely-mandated environmentalism. Mormon irrigators did not build cultural institutions based on a religious ethic of harmony with the natural environment. Their gradual attempt to incorporate the culturally-mediated cycles of community water use into seasonal rise and fall of the Logan River constituted, to some degree, an effort to work within the natural limits set by the river. What is interesting in that attempt is not its environmentalism or its lack thereof, but its complicated relationship to the

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culture from which it emerged, to systems of water exchange, to ever-shifting definitions of what water meant and how it was to be defined and distributed. The levels of community structure on which these water cycles and exchange systems unfolded, from the level of the canal companies to those of the town, ward, and city block, are interesting as well. The same patterns of water use appeared at each different level. Mormon culture held a firm grip on all aspects of irrigation, across the board.

Rather than a quest for either harmony with nature or complete domination of nature, the everyday activities of Mormon canal companies evidenced a certain spiritual and material understanding of the purpose of the natural world, and of the transformation of that world by dedicated communities of religiously motivated human beings. The key to that understanding, and that transformation, was water. Water was a community resource whose management expressed and enforced the fundamental goals of Mormon settlement. Water was afforded prominent display in the streets, yards, and fields of Mormon towns. Like so many other key resources in so many other places and times, water was in many ways a cultural construct.

Donald Worster's poetic assertion that the shape of a western community is reflected in the waters of its irrigation ditches provided the starting point for this
consideration of water use in Mormon communities. The reflection Worster witnessed—a reflection of alienation and degradation in California's hydraulic society—implied that where water is alienated, so too is nature alienated, and human beings as well. What then are we to make of Mormon communities in the late 19th century, where water was not alienated, but rather manipulated to fit within evolving systems of cultural and economic exchange that symbolized the very essence of community life? In the absence of alienation, what did the water in Mormon ditches reflect? Irrigation water use reflected the fundamental issue at the heart of Mormon community, the attempt to balance individual benefit with the greater community good, or the measure of each individual family's stake in, and obligation to, the community as a whole. And it reflected the prominence of local patriarchs at all levels of community government, including irrigation canal administration. In short it reflected a cultural order that included elements of the natural order, but which turned "nature"—the Logan River—into new human channels, to meet new human needs.
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