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**A STUDY OF WATER INSTITUTIONS IN UTAH AND THEIR INFLUENCE
ON THE PLANNING, DEVELOPING, AND MANAGING OF WATER RESOURCES**

by

Frank W. Haws

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PREFACE

For the purposes of this study an institution is defined as a formal framework or organization through which men pool their efforts and resources to accomplish specific purposes. Included in this framework is the pattern of organization and authority, the legal structure and the governmental rules and regulations that must be adhered to during the process of reaching the stated goals. The institutions related to water resources are many and varied and include: political governments (state, county, city, etc.); subdivisions of government created for special purposes such as irrigation districts, special improvement districts, metropolitan water companies (a department in city government); private organizations created by legislative consent such as domestic water utilities, mutual irrigation companies (a special form of corporation), water users association; and gargantuan organizations stemming from the federal government such as the Bureau of Reclamation, the Soil Conservation Service, and the Corps of Engineers. All of the organizations have built-in restrictions and constraints that influence the type of service rendered and the attitudes and motivation of the people who serve. One glaring conclusion that this research has brought to light is that the type of organization does make a difference. Many of the inefficiencies in water use, wasteful water practices, mismanagement of water enterprises, unjust allocation of water resources, long-term public debt and the high cost of public investment into needed or needless projects, can be attributed to the type of organization with the attendant fences, barriers, internal motivating functions, and policies engendered and perpetuated by it.

It can be argued that the organizations are only as effective as the people within the organization, but this study would indicate that in some respects the opposite is more nearly the truth—that the people are only as effective and as efficient as the organization will let them be. Perhaps the political economists have an answer as to why this happens—that it does happen is the conclusion of this study.

It has been said that even at the top levels of major water development agencies, new individuals with previous backgrounds in other industries, within a short time take on the policies and directions of the agency and become its advocate. The Bureau of Reclamation, for example, has changed its policies very little in 70 years—but men have changed their policies to fit the Bureau. Similarly, many have chastized the poor, ignorant farmer for the waste and inefficiency in small mutual irrigation companies. This study would suggest that the inefficiency is in the organization—not the farmer.

As a final point, the nature and magnitude of the problem must be mentioned. Recognizing that a problem is of organizational origin is one thing—changing that organization is another problem. Knowing where the problem lies will help to formulate a solution. Efforts to have people change against the established purposes and procedures of an organization have usually failed. Rearranging the organizational structure, however, can so shift emphasis and incentives that the desired ends can be accomplished. Maybe, with a new awareness, changing the organizational structure will not be so difficult.

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Credit is due Mr. Donald H. McLean who wrote his Ph.d. dissertation while employed on this project and who did much of the bibliographic assembly and legislative background for the various institutions studied.

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INTRODUCTION

When writing a paper on water, one is tempted to try to impress upon the reader the importance and need that water has to the survival of human existence. It seems strange that one should have to do this because it appears as such an obvious fact, and yet the ordinary urbanite citizen is unimpressed unless his personal supply is too little, too much, too hot, too cold, or too dirty. The value and importance of water depends upon our individual experience and circumstances. Because our affluent society today limits our experience to small individual problems, we need to make a conscious effort to expand our horizons and to see the overall complexities of water development. The purpose of this report is to try to give the reader this view and to look at the many forms of water-related social and political organizations that have evolved over the years to solve the water problems that have arisen.

Because man is a social being, his basic needs for food, clothing, and shelter generally involved complex interactions with many other individuals. Developing a water resource with the objective of achieving some social objective requires cooperative effort, although the motivating forces and rationing methods are sometimes of a different nature than found in the other aforementioned basic needs industries. In the first instance, profit and price have provided the motivation and the rationing. There has been no profit per se in water and therefore the motivation for development has been somewhat different, and rationing has generally been along arbitrary administrative lines as fixed by legislative rule. The cooperative effort needed to develop water resources has therefore been done under organized formal agreements by groups of individuals having similar and special-purposes. This formal pooling of effort and cost by groups of individuals, whether as a body politic, as a business corporation, or as an ecclesiastical group, will be referred to in this report as an "institution." In most cases, the institution referred to will have a formal organization, that is, there exists on paper as prescribed by law an outline showing the structure of the institution and the purpose for which it was formed. It is recognized that informal institutions, traditions, and customs exist that place restraints on water development, but these types of institutions are not emphasized in this study.

Because formal institutions are organized with specific purposes in mind, they are restricted by agree-

ment or law to do or not to do certain things. The restrictive nature of the formal agreement points or directs the institution on a course that it cannot easily deviate from. The inevitable result, when the number of different institutions becomes great and the courses different, is a clash of objectives—a competition for control of the limited water supply which may not be in the best interest of the overall general public. The problem of many different institutions making demands upon the public water supply would not be serious if the social and economic status of the people remained in a static unchanging mode. The different forces and directions of the institutional complex would reach a state of equilibrium and conflicts would cease to exist. The true fact is, however, that change does occur. The number of people living in a given area increases or decreases, the number of farms and farmers increases or decreases, urban dwellers usually increase, economic life changes, technology brings changes, and the pattern and nature of water use changes. The allocation of a nation's resources is dynamic and constantly changing. One of the questions that has served as a guideline in researching the institutional problem has been, "Are the institutional methods now used to allocate the water resources of a given area responsive to the changing patterns of society or does the institutional complex restrain and hinder the more efficient utilization of public water resources?"

To be more specific, this study is concerned with the water-related institutional complex in Utah, with particular reference to the rapidly changing Wasatch Front area of Utah. One of the main objectives will be to define the pattern that now exists. Another will be to explain how the main categories of institutions in Utah developed historically, and a final objective will be to criticize some of the institutional types as to their effectiveness in meeting their own objectives and their flexibility in terms of meeting changing needs.

It has been estimated that in Utah there are about 1000 separate irrigation companies, 300 domestic water systems, and a various assortment of water districts, metropolitan districts, conservancy districts, special improvement districts and private water companies. On top of this, there are numerous state agencies with water regulatory or planning functions, and federal agencies which further compound the system with additional controls, plans, or pressures. To understand this complex is the ultimate end of this study.

REVIEW OF LITERATURE

Laws and institutions are set up to insure order, equity, harmony, efficiency, and stability in public use of a common resource. Area, time, and social preference in nature of use may suggest use patterns the original laws and institutions are not equipped to handle. Thus, legal structure and organized institutions, in some instances over time, impose constraints that may impede optimum benefit from use of the water. These constraints may be due to the division of authority among institutions, lack of vertical and horizontal coordination between institutions, or water rights and restrictions on sale, or transfer of these rights. In addition the absence of suitable local institutions or laws to facilitate the development of water may be detrimental to the optimum use of the available water.

The Federal Council for Science and Technology (1966) has stated:

Research in this area should be directed to understanding existing water laws and institutions and their social, economic, and engineering implications. It should endeavor to identify the best features of the current situation with a view towards formulating model laws and institutional frameworks for the future.

In the area of institutions the research is directed primarily at special district functions with emphasis on land and water resource management. Future research is expected to deal with water law relating to the private as opposed to public rights and to problems resulting from the alteration of natural streams by the development and to the questions involved in modifying water rights systems. It is expected that the research on institutions will be extended to all types of districts and to various associations, compact authorities and mutual companies. (The Federal Council for Science and Technology, 1966, p. 63)

This need for research into a study of water institutions has been advocated by a number of authors. Kneese and Smith (1966) had this to say:

An outstanding development of the past few years is the increased research focus upon institutions through which water resources are developed and allocated and their quality managed. As time has passed more complex difficulties have arisen such as those associated with flood control, recreation and many other alternative modes for controlling water quality in entire regions. Evident in the West were institutional obstacles to water transfer from irrigation to municipal, industrial, recreational and other uses contributed strongly towards propelling the nation towards vast and costly engineering solutions. (Kneese and Smith, 1966, p. 7)

Caulfield (1968) has also urged a review of these water institutions

No assessment of the national water picture is complete without some discussion of the institutional processes by or through which water management functions. These institutional considerations include such diverse matters as federal, state and local laws, the form and power of water organizations, financial arrangements, public attitudes and political tradition.

The study, evaluation and development of institutional arrangements has not kept pace with our national progress in understanding the technical aspects of water development. (Caulfield, 1968, p. 23)

The laws and institutions affecting the distribution and allocation of water in Utah may be found in the early history of the Latter-day Saint Church, Utah laws, and court decisions. Many authors such as Wiel (1911), Chandler (1918), Thomas (1920), Hutchins (1927), Mead (1903), Harding (1963), Israelsen, Maughn and South (1946), and Watson (1948) have written about the development of water law and institutions in Utah. Hutchins and Jensen (1965) have given a very concise and interesting account of the development of water rights law in Utah.

In the past few years, many authors have written about the flaws in the appropriation doctrine and the inefficiency of the water institutions. Hutchins (1955) stated:

The principle of strict priority of appropriations even in states that recognize no other doctrine has been subject to criticism for decades. It is true that the value of the appropriation doctrine in the pioneer stage of western agriculture is recognized, as well as the ever-present importance of assuring to a water project the continuing right to use economically, reasonably, and efficiently the quantity of water upon which its development is predicated. Also recognized however, are its weaknesses in operation such as perpetuation of rights to specific quantities of water regardless of subsequent economic changes, decreeing of excessive quantities of water in early adjudication; and the reluctance of courts to order prior appropriators to make changes in long used methods of diverting, conveying and applying water in order that thereby more water may be made available for junior appropriators. In such respects the rigid principle not only is harsh, but it is not furthering the best utilization of limited water resources. (Hutchins, 1955, p. 870)

This criticism may also be applied, in part, to Utah. The early pioneers were dependent upon agriculture for their survival and thus upon irrigation. As Hall (1965) pointed out, these early irrigation projects took place without any competing uses. However, as Utah changes

from an agricultural to an urban and industrial state the competition for water is increasing (Criddle, 1958). This shifting of emphasis has caught the attention of many authors. Regan (1958), Schad (1960), and Fisher (1965) said that these shifting water uses are institutional problems and require analysis of existing water laws and organizations that control the development and use of water. Trelease (1964), Ellis (1966) and Kelso (1967) emphasized that laws used for allocation of water in earlier times would not be satisfactory in the future. They contended that these laws and institutions tend to protect existing allocations of water against competition for other uses and often impede plans for future developments. Smith (1964) argued that appropriative water rights are not conducive to transfer of water from rural to urban uses. Piper and Thomas (1958) contended that:

Existing legal rules may impede the development of water resources and may result in water not being used for the most beneficial purposes. Water rights tend to be fixed in perpetuity so that less economic uses may be continued even where obviously more beneficial uses could be obtained, absent these rights. (Piper and Thomas, 1958, p. 7)

Huffman (1953) called for a review of water institutions because of their importance as well as their being one of the most difficult aspects of water policies. Gardner and Fullerton (1967) contended that certain types of water uses and classes of users have been restricted by legal and institutional rules and policies. Stamm (1963) urged consideration of institutional or organizational factors that cause diseconomies of water distribution due to the historical development of the organization. These are caused by the duplication and overlapping not only of organizations but of distribution facilities. A case in point is Utah where there are more than 700 irrigation organizations, about 200 of them serving less than 300 acres of land each. Some farm units less than 100 acres in size receive water from as many as three ditches, each managed by a different organization. Saville (1958) contended that planning of comprehensive water projects by a state agency is almost impossible because of conflict of jurisdiction with existing state agencies. Bain (1965) drew the same conclusion that any present federal or state agency that attempts multi-purpose development encounters many legal and physical problems because of previous developments. Consequently the opportunities for water development have lessened and a suboptimal plan is prepared.

Fox (1966) has stated that the existing water law in many states fosters or permits the wasteful use of water supplies by individuals and organizations. This is due to the water policies that govern the organization which fail to encourage the efficient use of water, and also to the fact that the pattern of organization has not kept abreast of the technical advances of water management. There is a need to improve institutions, laws, policies, and agencies so that they operate more efficiently due to this technology. Stamm (1963) contended that the greatest ob-

stacle to the efficient use of existing water supplies is the reluctance to change on the part of the legal and institutional organizations. Bagley (1965) said that institutional mechanisms consisting of statutes, decrees, administrative rules, court decisions, ordinances and district regulations can greatly affect the efficient use of water. Fox (1965) states that in addition to the role of economic analysis in water resources administration, the institutional factors influencing the conduct of those engaged in management and use of water were diverse and complex. He suggests that reshaping of the pattern of policy agency, authority, and responsibility at all three levels of government is needed to resolve policy issues and coordinate conduct of related agencies.

In addition to the effect water rights and the multitude of agencies have on the efficient use of a water resource there must be added coordination and hydrologic unity. Piper and Thomas (1958) said that:

The realities of applied hydrology probably will tend towards compromise among individual users in water or in the use of water, over wider and wider areas but the evolution of water law seems more likely to restrict than widen the scope within which compromise will be possible. Many districts formed primarily for water development and reclamation projects, groundwater districts have areal boundaries unrelated to hydrologic reality. Many instances could be cited where the regulation of water has been ineffective because part of the water was beyond the jurisdiction of the responsible agency. (Piper and Thomas, 1958, p. 8)

Bagley (1965) states:

Many legal and institutional structures, which were set up to allocate, manage, and administer water uses, have not given sufficient weight to the hydrologic unity and the "mobile" and "renewable" peculiarities of the water resource. (Bagley, 1965, p. 71)

Ackerman (1959) claimed that there is no complete integration of water resource development in the United States. Also a problem of horizontal integration has been created by the divided geographical jurisdiction of agencies. Hatfield (1965) called attention to the vast multiplicity of water agencies and predicted inefficiency and disaster unless coordination is achieved. Udall (1962) mentioned a two-fold problem: Determination of the quantity and quality of water and management of the water in accord with the principles of hydrology. Fisher (1965) stated that water resources do not respect political boundaries and if water resources are to be used efficiently the users must be prepared to accept regional management, coordination and cooperation. American Water Works Association (1969) asked that each water resource be developed and managed with particular attention to the hydrologic and ecological systems of which the particular source is a part. Political boundaries should not become barriers to the most effective utilization for public supply.

RESEARCH PROCEDURE

Social institutions change with the passing of time. New stresses and pressures brought about through such things as increased population, increased use of resources and technological advances require institutions to adapt to the new environment. In order to understand the present day complex, an insight into the history of social institutions is helpful. In this study, written histories were reviewed and historical documents such as records of county and city governments, minutes books, court records, old newspapers and the state archives, were examined.

Knowledge of present day activities of the institutions was acquired through personal interviews with representatives of mutual irrigation companies, city water departments, private water companies, special improvement districts, and officers of state and federal government agencies. A staff of five interviewers con-

tacted over 200 separate organizations to acquire facts about the institutions. These were not opinion surveys, but attempts to acquire facts about organization activities, financial matters, etc. Surveys through mailed questionnaires were not attempted.

Published literature on water institutions and water law were examined and are listed in the bibliography. The geographic boundaries and authority of each institution was outlined on maps to ascertain the extent of overlapping jurisdiction.

An analysis of all the information gathered has yielded some conclusions and perhaps some opinions about the effectiveness of different types of institutions to manage water resources. In presenting these conclusions and opinions, much of the data gathered will be referred to but the details are too voluminous to publish with this report.

BACKGROUND OF UTAH INSTITUTIONS AND SCOPE OF STUDY

Utah does not have a long history of white settlement. Salt Lake City, the oldest city, was first settled in 1847. From this point in both time and space, Mormon colonization extended in all directions and by 1870 over 300 settlements had been established within the present boundaries of the state. This colonization was by direction and not by accident and the motivation was primarily religious.

Utah has an arid climate and rainfall is limited during the crop growing season. Therefore, each settlement had to depend upon irrigation to sustain the agricultural needed for survival. From that first day in that July of 1847 when water was diverted from City Creek in Salt Lake Valley to soften the ground so the plows could penetrate the desert soil, until the present day, Utah has been in the water business and over the years different forms of social organizations have been used to harness and distribute the wild mountain streams for the benefit of the public.

Today, the bulk of the population of Utah lives in a narrow belt of land which was once inundated by ancient Lake Bonneville, and which lies close to the western slope of the Wasatch range of mountains. This belt which is often referred to as the Wasatch Front includes the counties of Utah, Salt Lake, Davis, Weber, and Box Elder, with Cache County a close neighbor. About 84 percent of the total state population resides within this belt, and it is in this region that urban changes and industrial development are taking place today. The rest of the state maintains predominantly rural characteristics with little of the same type of change in water use patterns taking place that stresses the physical water supply and managerial systems in the Wasatch Front area.

Since resources were not at hand to inventory all of the existing institutions in Utah, efforts were confined to the thorough evaluation and analysis of selected counties along the Wasatch Front. The counties chosen for study include Utah County and Weber County with some selected information gathered in Cache County, Davis County, and Salt Lake County. Most of the Weber County information has been included in a doctoral dissertation by Don McLean (1972) which also describes some of the state-wide organizations involved in water resources and makes some significant observations about Utah water law.

The areas included in the study are outlined in Figure 1.

Historical

Water related organizations are formed to fulfill particular needs or to withstand or support political or social pressures. As needs or pressures change, the institutions change. Some, having outlived their usefulness, are abandoned; some are modified to meet new challenges; and sometimes new institutions emerge which break with tradition and attempt to solve problems in new ways. This evolutionary element in water institutions can be observed in the various institutions in Utah.

Water institutional development in Utah can be divided into several historical periods. The first period which can appropriately be called the "pioneer" period began in 1847 and extended until about 1880. The pioneer period is characterized by settlement, immigration, new irrigation development and a struggle for survival against the elements.

The Mormon migration to Utah was a mass movement of people, bringing many intelligent, skilled, God-fearing craftsmen from the eastern states of the United States and from the northern countries of Europe, to a remote and barren wilderness in which no white civilization had ever lived before. Survival depended upon the ability of this desert to produce food, and to do this the desert soil needed water. Water was relatively abundant, but not in the right places at the right times. Irrigation was needed—the forcing of water from the natural river courses into canals and ditches and on to the land.

During the period from 1847 to 1870, over 100,000 immigrants arrived in Salt Lake City to begin the search for homes in the mountain valleys of Utah and the surrounding area. This was not a free-for-all land grabbing type of colonization, but a directed, purposeful gathering of people who were united by a common religious belief. Families did not seek homesteads with large acreages, but instead were clustered together in well planned communities reserving the open spaces between for agricultural pursuits. In less than 30 years, about 300 new settlements were founded in Utah, most of them in the 10 years immediately following the so-called Utah War in 1857. Of this period, Tullidge (1889) says:

Utah, in its pure Mormon days, was peopled and its cities built up on a strict system of colonization, colonies going out from the parent under a thorough organization, which was perfected in the founding and growth of each settlement; ...

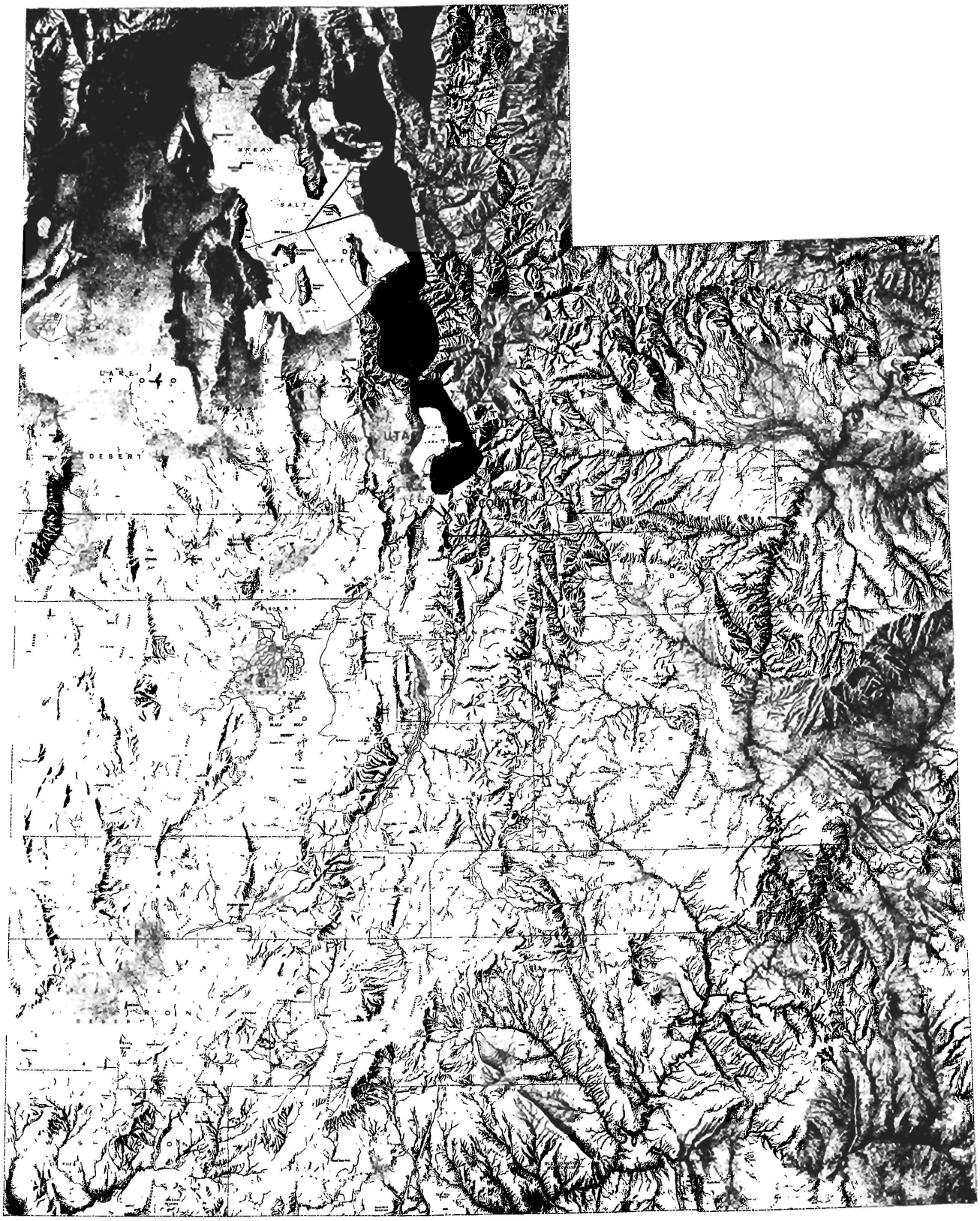


Figure 1. The Wasatch Front area of Utah and the counties of Weber and Utah which formed the study area.

For every settlement at least one irrigation system had to be built and put into operation. The system consisted of a main canal and sufficient lateral ditches to water every lot or parcel of land in the community. Because the growth of many communities was rapid, one system soon multiplied into many systems until the water supply was fully used. This type of development could not have been done on an individual basis where each settler had to find a separate place on the river from which he could divert and convey water to his farm. This great pioneering experiment could only have succeeded under organized, cooperative effort.

The umbrella under which this cooperative effort was made possible was the L.D.S. Church; the people were united under a common bond of faith and religion. Under guidance and direction of the Church, civil rule was established. Tullidge continues,

...it became properly regular to enact and administer the laws of a commonwealth through the ecclesiastical organization and methods of the community, previous to the granting of the city charter by the legislature when the civil organization proper came into effect. (Tullidge, 1889)

The first civil government in Utah was the provisional State of Deseret, a temporary organization formed in 1849 to await the action of the U.S. Congress to formally organize a state or territory. Congress passed in 1850 the legislation necessary to organize a territorial government, and consequently the organization was completed and the first legislative assembly met in 1852. The Territorial Judicial Act passed at this time gave to the county courts broad powers with regard to natural resources. The act reads,

The County Court has the control of all timber, water privileges, or any water course or creek, to grant mill sites, and exercise such powers as in their judgment shall best preserve the timber and subserve the interests of the settlements, in the distribution of water for irrigation or other purposes ... (Territorial Utah Laws, 1852)

The language in this act was patterned after that in the ordinance of the State of Deseret which granted:

...to the judges of the several counties of the state power to grant mill sites, and other water privileges, and to control the timber ... inasmuch as the said privileges do not interfere with the rights of the community, for common uses or irrigation. (Ordinances of the State of Deseret, 1851)

Thus the first civil authority used to develop water in this wilderness area came through the county government under the direction of the Probate Judge and the precinct water masters appointed by him. The influence of the L.D.S. Church cannot be ignored during this period as often the judge and the bishop were the same individual

and High Council Courts¹ issued decrees that became binding legal documents. Certainly decisions were made in "Quorum" meetings and discussions were frequent as the members met in weekly Sunday meetings.

No individual "rights" to water use were recognized or defined during the early period. The water resource was considered "common" or public. Hunter (1943) says "... they looked upon the resources of nature as gifts of God--wealth that belonged to the community and not to the individual." Neff (1940) continues the theme,

Mormon leadership, during the initial period, did not concede the principle of private "rights" in water. Community and social ownership of this invaluable resource was esteemed as paramount to individual acquisitiveness. Happily the idea was to secure the maximum use of water, and not until later did the doctrine of private title on water win legal recognition. Even then there was the question of whether title should be inherent in the soil or go with the owner. (Neff, 1940)

Even mill sites, which represented individual enterprises, were only granted special "privileges" with full control residing in the Probate Judge.

When the migration toward the West began, the West belonged to Mexico. When settlement began, the land was under the control of the United States by treaty with Mexico. When the second year of settlement was ended a provisional state government had been organized known as the State of Deseret. In 1850, the U.S. Congress passed enabling legislation to create the Territory of Utah. Territorial government replaced the provisional State of Deseret in 1852, but no civil rule existed in the communities until after they were incorporated by legislative enactment. This meant that civil functions in the community were handled under the direction of the ecclesiastical leaders. These leaders were not acting without civil authority, however, when they directed the development of water for common community purposes. The Territorial Legislature, or in some cases the County Court, gave, by ordinance or act, the authority to control timber, mineral and water to certain individuals who held high office in the presiding councils of the Church. For example, Ezra T. Benson, an apostle, was given exclusive control over all timber and water in Logan River in Cache County. He also had similar control over certain springs in Tooele County. He subsequently instructed the bishops who supervised development on these water sources. Brigham Young, the Church President, was similarly given authority to control the resources (timber, rocks, minerals, and water) in City Creek Canyon in Salt Lake County "... in order that the water may be continued pure unto the inhabitants of Great Salt Lake City; ..." ² For this privilege he was assessed \$500.00.

¹The "High Council" is an ecclesiastical body assisting in the governing of the Church subdivisions known as "stakes."

²Ordinances of the State of Deseret, 1851.

Development of water during the early period was orderly, supervised, and public. The first canal built in each community was strictly a public venture and an absolute necessity for survival. Public participation in the construction of the first canals involved the talents and energies of each citizen in a cooperative, directed effort under the supervision of the ecclesiastical leaders. The appropriation of public money to aid these projects was the exception and not the rule. Tullidge says of this,

... in defence of their colonies, in public improvements [including irrigation systems], the building of school houses, building of bridges, opening of canyons and making of roads, etc., the expense was borne at the private cost of the settler, by donation, and by the financial administration under the bishops of the wards, rather than out of taxes, either of the city or county. (Tullidge. 1889)

The first use of public monies to construct water projects occurred in 1850, when the Provisional Government appropriated funds to help build a canal on the west side of the Jordan River and also to help construct a canal from Big Cottonwood Canyon to Salt Lake City. Public money for the Cottonwood project was recovered, however, when in 1851 the legislature incorporated the Cottonwood Canal Co. The ordinance creating the company gave to it the exclusive right to develop 1/2 of the flow of Big Cottonwood Creek and the right to dispose of public lands along the canal right-of-way to assist in construction costs. The company was also instructed to refund to the state the money previously advanced.

Another act, in 1867, was passed to incorporate the Deseret Irrigation and Navigation Canal Company for the purpose of building a canal on the east side of the Jordan River to irrigate agricultural land along the route and to provide a navigable channel. The ordinance gave the company 1/2 of the waters of Jordan River and instructed the selectmen of Salt Lake County and Utah County to agree upon the point of diversion. The company was empowered to sell irrigation water and to collect tolls for navigation. If profits were realized, it could declare dividends. The rates for irrigation water were to be uniform and "pro rata for the quantity used, the distance brought, and the time required."

On January 20, 1865, an act was passed which is sometimes referred to as the Territorial Irrigation District Law but which has the title, "An Act to Incorporate Irrigation Companies." (Chapter CXXXIII and amended CLIV) The Act gave the County Court the power to organize the county or parts thereof into irrigation districts, and to tax or assess all users within the district on a uniform and equitable basis. The law was intended to provide a means of building and financing the later irrigation projects and to assess only those citizens who actually used the system. The Act was amended in 1866 to allow existing systems to organize in the same manner.

The Act, Section I, states,

Be it enacted by the Governor and Legislative assembly of the Territory of Utah, that upon the majority of the citizens of any county or part thereof representing that more water is necessary and that there are streams unclaimed which if brought out of their natural channels and thrown upon tracts of land under cultivation or to be put under cultivation can be of value to the interests of agriculture, the county court having jurisdiction may proceed to organize the county or part thereof into an irrigation district; and thereafter the landholder of such district shall be equally entitled to the use of the water in or to be brought into such district, according to their several needs.

The procedure to be followed was as follows:

At a mass meeting of citizens, a board of trustees was to be elected and a decision made as to the method of taxation, that is whether money was to be raised by taxing a percentage of the land value (mill levy) or to assess a per acre fee for land directly benefited. The elected trustees were to then survey and design the project, locate the ditches, and estimate the costs and amount of tax. The county after receiving the trustees report, would then post notices of an election in which the following questions would be asked.

1. Do you agree to the tax?
2. Do you agree to the suggested officers of the district?

If the issue failed to get a 2/3 majority, the proposal became null and void. If the proposition passed the officers were bonded and proceeded to function as a company, contracting to complete the work. After completion and payment of the construction costs, the O&M costs were levied by tax and collected by the county. The district did not have power to issue bonds and if any additional revenue was needed above the assigned estimate, a 2/3 majority of the taxpayers had to agree.

Allowing existing companies to organize under the same act undoubtedly was for the purpose of distributing O&M costs in an equitable manner upon the users of the system. The Act did not specify the means by which revenue would be raised if tax payments became delinquent.

Cities were incorporated during this period by legislative enactment and given the power to "provide the city with water; to dig wells, lay pump logs, and pipes, and erect pumps in the street, for the extinguishment of fires, and conveniences of the inhabitants." Salt Lake City, Ogden, and Provo were incorporated by enactment passed by the State of Deseret in February 1851. The territorial government later created a separate corporation, the Great Salt Lake Water Works Association, in which Salt Lake City was allowed to buy stock, to provide the city with water.

This first period of development was thus a period of great change and experimentation. A civilization had to learn how to live in a desert with irrigated agriculture. The early years of each settlement were presided over by the Church which had been given authority to control water resources through certain individual leaders by the provisional or territorial government. These first canals were truly public projects and existed for many years as loosely organized associations or cooperatives. Some of the systems were later incorporated or taken over by the city corporation. As growth continued, other devices were instituted to facilitate water development. A form of public corporation was used in some instances to raise money through the sale of stock, the water delivered often being considered as the dividend on the stock's earnings. The corporate law went through a number of changes before any semblance of uniformity existed and eventually irrigation companies were allowed to incorporate under the same procedures and laws as mining companies. The corporation law in 1880 contained the provision that a corporation could assess share holders up to 10 percent of the value of its capital stock. Irrigation companies also had the option of organizing under the territorial irrigation district act. This differed very little in actual performance from a private corporation, but the county had jurisdiction to form the district upon petition, to call for an election, and to collect taxes for the expense of the construction, operation, and maintenance. Raising the tax had to be approved by the taxpayers, and no other source of revenue was open to it.

By 1880 the population of Utah was a mixture of Mormon and non-Mormon (Gentile). No longer was the desert as hostile as it had once appeared. Communication with the rest of the nation was with rail and telegraph, money was more plentiful, and prosperity was beginning to be evident. A new day was dawning. Perhaps the one single distinguishing feature of the first period of water development in Utah was the "public" nature of the irrigation systems and the water resource. In a legal sense the water was *res communes*, owned by all.

The second period of water institutional development includes that period from about 1880 to about 1920 and marks the transition from public common ownership to privately owned "water rights," the entrenchment of this water right doctrine, the adjudication of rights by court decree, and the incorporation of mutual irrigation companies. The transfer of ownership was brought about as a natural result of population growth. Not all the immigrants who came were farmers: there was the miller, the blacksmith, the printer, the cooper, the sawyer, the merchant, the carpenter, and the other service trades typical of the period. Many of these people were not direct users of water from the canals and ditches except as they might have use for their own domestic purposes. A common ownership implies free use by all members of the community. Some of these citizens did not need and did not have access to the use of the common resource.

The first irrigation systems were social necessities and were really as much a part of the "community" as were the roads and streets. As time went on and growth brought change, the "public" nature of the irrigation ditches changed. A road or street served all people, the stranger and the resident, but the "public ditch" became a more exclusive service, delivering water to a fixed number of users. A point in time arrived when there were property owners living in the community who were not "users" of this "public ditch," their property being of a business, manufacturing or residential nature which did not require water from this source. Domestic needs were taken over by a separate water system most often administered by the civil government and financed by a use charge for the services rendered. In order for the "users" of the "public" ditch to guarantee and preserve this right to this use, and to provide a means whereby maintenance of the system could be done in an orderly and equitable manner, the users became "one" by incorporating under the laws of the territory or state. The construction of new canals and irrigation systems to satisfy the needs of incoming immigrants was creating another pressure toward private rights. Each canal with its fixed diversion point has capacity to serve only those lands below that point in elevation. Higher lands required a higher point of diversion. As long as the land and the water held out, new systems were continually being built or expanded. The later systems were not built under the same stress of survival as was the first ditch, nor did the new system serve everyone in the community. Should the old settlers build and pay for the system to serve the late comers? This question was answered with a No! and late comers had to build their own systems. This may over-simplify what actually happened because certainly some of the earlier settlers saw opportunities in higher ground and assisted in building higher systems—also the Church influence was still strong and helped to direct the work effort needed to accommodate new arrivals; but the concept of each man paying for that which benefited him was strongly ingrained in the pioneer. How do you maintain a public water system or systems that serve segregated groups rather than the whole community? The answer came in the form of irrigation districts or private corporations as a means of raising money and distributing costs to those who directly benefited. The new irrigators had the option to form in either way.

By 1880 there thus existed a mixture of water organizations: private corporations which really did not make a profit but distributed dividends in the form of water; irrigation districts with limited power to raise money; private users with special privileges to operate mills and power plants; and the orphan association that had been originally formed when settlement began. This latter entity was the original "public" water ditch which was now no longer as "public" as when it began. This original association was sometimes incorporated by the remaining users, or in some cases it became a branch of city government, depending upon the extent of coverage within the boundaries of the community.

One of the most significant events in relation to water development occurred in 1880 with the passage by the territorial legislature of the first Water Rights Act. The power once enjoyed by the county court to control the water resource was repealed and new procedures were established to allocate water to its different uses. The new law placed emphasis on the claim of the individual to private ownership in a right acquired through previous use. The new law recognized that such rights were valid and had legal status. A call to place all such water claims on record was issued and a committee of three selectmen in each county was appointed to issue certificates defining individual rights and also to sit in judgment on disputes over conflicting rights.

After 1880, the influence of the Mormon Church in civil affairs began to decrease. This coupled with the repeal of the law giving exclusive control to the county court, and the new law calling for identification of each "right" or claim forced the settlement of disputes and conflicts over water "rights" to the civil courts. The decisions made there eventually set precedents for the present water rights doctrine. The 1880 Water Rights Act underwent several rewritings during the next 40 years. The law enacted in 1919 contained most of the doctrinal provisions of the law today.

During this period, the territorial form of government ceased and Utah became a state. This act meant a major revision in county organization and in general a revision in city governments as well. In fact, a rewriting of all the civil statutes was necessary.

The first comprehensive water law was enacted in 1903, several years after statehood was acquired. However, the first law after statehood, in 1897, had committed the state to the appropriation doctrine. The law in 1903 defined an exclusive method by which water could be appropriated. Every use of water could now be attached to an identifiable "right." The county no longer held any power to allocate and the state elected not to allocate but to supervise methods of private acquisition and use.

During this same period, the courts heard many disputes between appropriators and began the process of adjudicating the rights existing on common river systems. The State Engineer began the process by collecting engineering data on all rights associated with a given stretch of river. Most of the court decrees in effect today on Utah's major streams were initiated or completed during this period. With the many different canals and ditches now in operation, and without the community control offered by the Church or the probate judge, it was necessary for the courts to step in to define and protect the claimants to water "rights."

Statehood brought with it the repeal of territorial acts and laws and the abolishment of some existing practices. The irrigation district act of 1865 was repealed

in 1897 and a new law not enacted until 1909. The new act was patterned after the "Wright" law in California. Districts that had been organized under the old territorial law did not reorganize under the new statute. During the interim when no district law existed, the old districts elected to incorporate as private businesses under the business corporation laws of the new state. Many of the old companies which had incorporated under the territorial law were perpetuated under the new state law and numerous associations of users began the process of incorporation soon after statehood and the passage of the new water law. Perhaps the threat of law suits and the pending adjudication procedures prompted many to move in this direction. The mutual irrigation company is the product of this period.

The third period of water development from 1920 to the present is characterized by federal participation in water projects and the numerous attendant organizations that have been instituted to guarantee repayment of the federal costs. Federal participation was made possible through the Reclamation Service, an administrative branch of the federal government created by the Reclamation Act in 1902. The Reclamation Service, predecessor of the present Bureau of Reclamation, was an engineering organization equipped to investigate, design, and supervise construction of water resource projects.

These projects required approval of Congress and the local interests and a method by which reimbursible costs could be collected and insured. In the early days of reclamation, the government contracted directly with each individual farmer, and costs were collected by the county as part of his property tax. The government held the first lien against the property in case of default in payment and a subsequent tax sale. The Strawberry project in Utah County, one of the first federal programs in Utah, contracted in this manner. As projects became more numerous, the individual contract gave way to group contracts. The projects were generally large enough to provide benefits to land served by more than one irrigation company, so several companies would mutually agree by covenant to share the costs of federal participation, and formed Water Users Association, an incorporated company in which the shares were owned by other corporations. Water Users Associations were empowered by law and their articles of incorporation to contract with the government and to assess their shareholders an amount equal to the annual repayment and operating expenses of the new project.

Reclamation in Utah did not open up vast new areas for settlement as was the case in some of the other western states. In Utah, most of the land and water was already occupied and appropriated. The real service of the federal projects in Utah was to insure existing farms against frequent late season drought. Traditionally, the farms in Utah have been small and the irrigation companies numerous. The Water Users Association was a

convenient way to reduce the number of negotiators to a contract, simplify collection of funds, and yet permit the individual companies to continue to operate in their own independent way.

The Water Users Association was limited in how much money it could raise because it could not reach beyond the boundaries of the irrigation companies and because irrigation companies were limited by the financial ability and prosperity of the farmers. This put a limit on the size of the project that could be built. To provide the necessary repayment guarantee needed for the projects costing above the ability of the Water Users Association, the Bureau of Reclamation devised a new type of organization and lobbied for it through many of the state legislatures. In Utah, this took the form first of the Metropolitan Water District Act and later the Water Conservancy District Act. Termed as a device to "eliminate politics" from water management decisions, (Skeen, 1971) the water conservancy district is a governmental subdivision empowered by the district courts with taxing authority. Its sole purpose is to perpetuate and guarantee repayment of the large reclamation projects.

To summarize then, the three periods of institutional development in Utah are: (1) The pioneer period characterized by public ownership, (2) the next period marking the change from public to private ownership, and (3) the period of federal involvement.

Present day situations

The Wasatch Front area in Utah today, has a multitude of organizations involved in some way in the water development picture. In terms of numbers alone, and ignoring the federal and state agencies, the following figures apply:

<u>Institution</u>	<u>Weber</u>	<u>Davis</u>	<u>Salt Lake</u>	<u>Utah</u>	<u>Total</u>
Mutual Irrigation Co	44	30	64	54	192
Water Districts	2	0	0	0	2
Municipal Water Co.	10	16	9	16	51
Private Domestic Wt. Co.	3	0	8	1	12
Special Improvement Dist.	6	1	6	0	13
Water Users Assoc.	2	1	0	1	3 ³
Water Conserv. Dist.	1	1	2	2	4 ³
Metro. Water Dist	0	0	1	4	5
Municipal Irr. Co	0	0	0	2	2
Sub-conservancy Dist	1	1	0	0	2

³Water users associations and conservancy districts often encompass several counties. The total is the actual number and not the sum of the several counties.

McLean (1972) has compiled an excellent reference giving the legal authority for each of the above types of organizations as well as their stated purposes and organizational structure. He has also given a good review of state and federal agencies and their role in the insitutional complex.

To visualize the spatial relationship of some of the organizations tabulated above, maps have been prepared from information gathered through interviews with representatives of the organizations. Figures 2 and 3 show the mutual irrigation companies for Utah and Weber counties. The companies are not large and some extremely small companies exist. From an engineering standpoint, there are no serious physical barriers to prevent all of the areas shown in each county from being served by one company. The division into companies has been to ease distribution and to share common administrative and operational costs. Under a different set of motivating factors, a single management system for each river system may have evolved eliminating the inefficiency and waste attributed to a system of many small companies.

Figures 4 and 5 show the areal authority of the other less numerous organizations the municipal water systems, the special improvement districts, the irrigation districts, and the metropolitan water districts of Utah and Weber counties.

MUTUAL IRRIGATION COMPANIES

in Utah County

1	Alpine Irrigation Company	29	Wood Spring Irrigation Company
2	Provo Reservoir Water Users Company	30	Springville City Irrigation Company
3	Lehi Irrigation Company	31	Matson Spring Irrigation Company
4	North Bench Irrigation Company	32	Lake Side Irrigation Company
5	Utah Lake Distributing Company	33	Lake Shore Irrigation Company
6	Spring Creek Irrigation Company	34	Spanish Fork West Field Irrigation Company
7	American Fork Irrigation Company	35	Big Hollow Irrigation Company
8	Pleasant Grove Irrigation Company	36	Wash Creek Irrigation Company
9	Mitchell Hollow Irrigation Company	37	East Bench Canal Company
10	Winn Ditch Company	38	Mapleton Irrigation Company
11	Hollow Water Company	39	Spanish Fork Southeast Irrigation Company
12	North Union Canal Company	40	Spanish Fork South Irrigation Company
13	Alta Ditch & Canal Company	41	Duck Creek Irrigation Company
14	East River Bottom Water Company	42	Payson City Irrigation
15	Smith Ditch Company	43	Salem Irrigation Company
16	Rock Canyon Water Company	44	Salem Pond Company
17	Timpanogas Canal Company	45	Holladay Field Ditch
18	Faucett Field Ditch Company	46	Strawberry Highline Canal Company
19	Upper East Union Irrigation Company	47	Summit Creek Irrigation Company
20	Provo Brick & Tile Company	48	East Warm Creek Irrigation Company
21	Provo City Irrigation System	49	Warm Spring Irrigation Company
22	West Smith Ditch Company	50	Goshen Irrigation Company
23	Provo Bench Canal & Irrigation Company	51	Upper Creek Irrigation Company
24	West Union Canal Company	52	Current Creek Irrigation Company
25	Lake Bottom Canal Company	53	South Fields Irrigation Company
26	Fort Field Irrigation Company	54	Lindon Pumping Company
27	Coffman Spring Irrigation Company	55	Pioneer Pumping Company
28	Mill Pond Spring Irrigation Company	56	Dixon Irrigation Company

Figure 2. Map showing location of mutual irrigation companies in Utah County.

MUTUAL IRRIGATION COMPANIES

in Weber County

- | | | | |
|----|--|----|--|
| 1 | Montgomery Irrigation Company - unincorporated | 32 | Mound Fort No. 2 |
| 2 | Emil Roberts Ditch Company - unincorporated | 33 | Farr Orchard Ditch Company - unincorporated |
| 3 | Triangle B Ranch - unincorporated | 34 | Glenwood Ditch Company |
| 4 | Liberty Irrigation Company | 35 | Hooper Irrigation Company |
| 5 | Lewis Shaw Ditch - unincorporated | 36 | Wilson Irrigation Company North Branch |
| 6 | Holmes Creek Irrigation Company - unincorporated | 37 | Wilson Irrigation Company South Branch |
| 7 | Holmes and Ferrin Irrigation Company - unincorporated | 38 | Old Wilson Irrigation Company |
| 8 | Charles Story Ditch - unincorporated | 39 | Weber Canal Water Company |
| 9 | Chambers Ditch - unincorporated | 40 | Garner Ditch Company |
| 10 | Eden Irrigation Company | 41 | Beus Creek Water Company - domestic supply - private |
| 11 | Middle Fork Irrigation Company | 42 | Barner Ditch Company - unincorporated |
| 12 | Huntsville Irrigation Company | 43 | Davis and Weber Counties Canal Company |
| 13 | Rollo-Johnson & Downs - unincorporated | 44 | Riverdale Bench Canal Company |
| 14 | Crooked Creek Irrigation Company | 45 | South Weber Irrigation Company |
| 15 | Andersen-Winters Ditch Company - unincorporated | 46 | Bambrough Irrigation Company |
| 16 | Emertsen Irrigation Company | 47 | Pioneer Irrigation Company |
| 17 | Downs Ditch Water Company | 48 | Uintah Central Canal Company |
| 18 | Ogden-Brigham Canal | 49 | Uintah Mountain Stream Irrigation Company |
| 19 | Alder Creek Irrigation Company sells directly to Pleasant View | 50 | Jones Ditch |
| 20 | Warren Irrigation Company | 51 | Dunn Canal Company |
| 21 | Plain City Irrigation Company | 52 | Harbertson Ditch Company - unincorporated |
| 22 | Upper Club Plain City - unincorporated | 53 | Bybee Ditch Company - unincorporated |
| 23 | Slaterville L.D.S. ward | 54 | Coop Farm Irrigation Company - unincorporated |
| 24 | Western Irrigation Company | 55 | Felt, Petersen & Slater - (part of coop) |
| 25 | Bertonati Ditch Company | 56 | Huntsville South Bench |
| 26 | Mound Fort No. 6 | 57 | Huntsville Mountain Canal Association |
| 27 | Mound Fort No. 5 | 58 | Marriott Irrigation Company |
| 28 | Mound Fort No. 3 | 59 | North Ogden Irrigation Company |
| 29 | Dinsdale Water Company | 60 | Pine Canyon Ditch Company |
| 30 | Mound Fort No. 1 | 61 | Pioneer Land and Irrigation Company |
| 31 | Mound Fort No. 4 | 62 | Shupe Middleton Canal |

Figure 3. Map showing location of mutual irrigation companies in Weber County.

**MUNICIPAL WATER COMPANIES
AND METROPOLITAN WATER DISTRICTS**
in Utah County

Municipalities

- 1 Alpine
- 2 Lehi
- 3 American Fork
- 4 Pleasant Grove
- 5 Lindon
- 6 Orem
- 7 Provo
- 8 Springville
- 9 Mapleton
- 10 Spanish Fork
- 11 Salem
- 12 Payson
- 13 Santaquin
- 14 Genola
- 15 Goshen
- 16 Elberta

Metropolitan Water Districts

- 1 Lehi
- 2 American Fork
- 3 Pleasant Grove - Lindon
- 4 Orem
- 5 Provo

Figure 4. Map showing location of municipal water companies and metropolitan water districts in Utah County.

**WATER IMPROVEMENT DISTRICTS, WATER CONSERVATION
DISTRICTS AND MUNICIPALITIES**

in Weber County

Water Improvement Districts

- 1 Bona Vista
- 2 Taylor, West Weber
- 3 Hooper
- 4 Uintah - Highland

Water Conservation Districts

- 1 Weber - Box Elder
- 2 South Weber

Municipalities

- 1 Pleasant View
- 2 North Ogden
- 3 Eden
- 4 Huntsville
- 5 Ogden
- 6 Roy
- 7 Riverdale
- 8 Washington Terrace
- 9 South Ogden
- 10 Clinton
- 11 Uintah
- 12 South Ogden

Figure 5. Map showing location of municipal water companies, water conservation districts, and special improvement districts in Weber County.

CRITICAL ANALYSIS OF EXISTING INSTITUTIONAL STRUCTURE

The balance of this report will attempt to analyze some of the problems associated with the types of organizations studied. The basic premise the writer takes in making this analysis is that water is a naturally occurring resource upon which all life is dependent, that each individual is entitled by birth to that water which will sustain and preserve his life, but that the convenience of having water delivered from the source to the point of use is a public cost in which he must share. Because water is sometimes a "scarce" commodity, there must be a method of rationing that resource to the users, and there has to be motivating forces created in order to make the water move from its naturally occurring sources to its final use. The institutions that are built must not create barriers to prevent just rationing and they must not dampen the motivation that makes the most effective use of the resource for the most good of all concerned. The institutions should be flexible enough to meet change but firm enough to instill confidence and security. In this light some of the institutions functioning in the studied area will be viewed.

Mutual irrigation companies

The mutual irrigation company is a unique social institution and the most used type of water institution in Utah. Ownership of the rights to most of the surface flow in the Wasatch Front area today is vested in the mutual irrigation companies with priorities dating back to the beginning of settlement in 1847. Despite the old priorities, however, the actual incorporation of the companies is not that old; most of the companies were incorporated during the first two decades after statehood in 1897. The reason for this has already been explained in the historical account. The important point is that these companies were formed not to finance new enterprises, but to protect the interests of an existing group with the unity and perpetuity common to legal corporations. This oneness was necessary during the early period in order to be more easily defended in court during the adjudication period, to provide the longevity needed to protect the successors in interest, and to provide a simple but effective way of distributing costs and benefits. Only one case could be found within the area studied where a mutual company was incorporated prior to going into business. This one example went broke several times before finally succeeding (Nyman and Gilgen, 1956). There is also no evidence that original shares in a company were sold for cash. Instead, shares were exchanged for equity in an existing or presumed water right and an

existing delivery system. This means that when the corporate body was formed, the distribution system including the diversion dam, canal, laterals, ditches and headgates, etc., were all in place, operating and paid for. No further capital expenditures were intended or needed at the time. The main purposes of the corporation were to provide a convenient and sure way of preserving identity, guaranteeing delivery, and keeping expenses to a minimum. Most of the companies today are using the same physical system they inherited at the time of incorporation, with little or no capital improvements added.

Distributing costs of operation and maintenance to each shareholder is actually a violation of established corporate procedures. The model corporation act limits the liability of the shareholder to the fully paid up price of the stock. Once the stock is paid up the shares are nonassessable for further expenses of the company. Utah law (UCA 1953-16-4-4) as amended in 1961 states that "The stock of any corporation for profit ... shall not be assessable for any purpose except as expressly provided by statute...." Mutual irrigation companies are excepted by law if such assessment is provided for in the articles of incorporation.

Since the irrigation company is formed as a non-profit making corporation, the only source of revenue, at least the only method used by the company, has been the shareholders' contribution or assessment. This makes the shareholders liable for all the debts of the corporation. In essence, this includes the private holdings of the shareholder despite the statement in the articles of incorporation that the personal property of each shareholder is to be non-liaible. If the shareholder does not meet payment on each assessment his stock can be sold and he can be denied delivery of water. Without water, the shareholder may be forced into bankruptcy. Therefore, to protect his investment in his farming enterprise, he may be forced to borrow funds using his land as collateral to meet the assessment for debts of the irrigation company. This type of liability of each shareholder has resulted in two things. First, special legislation has modified the Business Corporation Law to permit non-profit corporations such as irrigation companies to assess stock for the normal operating expenses of the corporations. Second, the debts incurred by irrigation companies have generally been kept to a minimum, limited to normal operation and maintenance with no unnecessary expenditures for improvements or rehabilitation. Practically all of the companies organized before 1930 limited potential assessments,

through their articles of incorporation, to a fixed dollar value or to a percentage of the total capital stock. Examples of this type of restriction can be seen in the following excerpts from some articles of incorporation. Article 13 of the Articles of Incorporation for the Felt, Petersen and Slater water and canal company, which has 2000 shares, states, "The fully paid up stock of this corporation shall be assessable for the purpose of paying debts and properly conducting its business, to not exceed ten cents on the share, and no assessment shall be made while any part of a former assessment remains unpaid." Total income for the company was thus limited to \$200.00 per year. Article 12 of the Glenwood Ditch Company (10,000 shares) says, "The stock of the corporation shall be assessable, but the maximum annual assessment shall be 5 cents per share with a minimum assessment to one stockholder of \$1.00 regardless of the number of shares owned" Other companies had similar provisions—Hooper Irrigation Company had a limit of 10 percent of the capital stock; Liberty Irrigation Company had a maximum of 50 cents per share; North Ogden, 2 percent; Alpine Irrigation, 5 percent; North Bench Irrigation Co., 10 percent of the par value; and Salem Irrigation Company \$1.50 per share except when an emergency exists and then the assessment could be raised to \$2.50 per share. Because the assessment was the only source of income for the company, it is obvious that the working capital was small and limited, certainly not enough to pay for good management. Not until the beginning of federal participation in water projects requiring repayment did these companies remove these limitations through amendments to their articles of incorporation. Today, however, most companies have amended their articles of incorporation to remove the restrictions of assessments, but the expenses of the company are still kept as low as possible. The purpose of the mutual irrigation company has been and still is to maximize the benefits to the shareholder by delivering water to him at the lowest cost. Any cost that fails to increase the water supply to the shareholder or to otherwise benefit him directly is avoided. To this end the companies have been eminently successful. Tables 1 and 2 list the companies in Utah and Weber counties and show how much an acre-foot of water costs each shareholder. Even with the costs due the federal government for project repayment, the cost of water is very low.

It is the shareholder liability in mutual irrigation companies that has kept the per acre foot cost of water to a bare minimum. As can be seen from the tabulations, some companies have kept costs so low that shareholders have received water at a cost of about \$0.10 per acre-foot (1 cent buys 3250 gallons delivered!). On the other hand, the shareholder liability has been a big deterrent to efficient utilization of the complete water resource system. Remodeling and updating water systems through consolidation and the use of better business management will require large capital investments which the shareholders have been unwilling to become liable for. The motivation is to resist change—unless the change can be

shown to increase benefits to the shareholder without an increase in cost. Some improvements to an old system, such as canal lining, have met with some success when the federal government paid half the cost and the benefits could be realized in less water lost to seepage. Consolidation of companies and the employment of professional management teams has been eminently non-successful.

Because the mutual irrigation company is organized to maximize benefits to shareholders, and each shareholder has equal rights with every other shareholder, the organization does not have much flexibility to meet changes created by urbanization or industrialization. An urban user places a different value on water than does the rural user. He also requires water of a different quality. The water must be sanitary and it must be pressurized. When rural land is taken out of agricultural production and used for subdivisions, the mutual irrigation company usually abandons that part of its system, retaining its "right" to the same flow of water for use on what remains. The subdivision represents a higher value market for water, but the mutual irrigation company is not interested in markets—only benefits to its shareholders. In some areas, the mutual irrigation company has ceased to exist because rural land has all been taken up by urban development.

An example to show what can be done to reverse this trend is the Union and Jordan Irrigation Company in Salt Lake County. When urban pressures began to develop within the area served by the irrigation company, the company modified its articles of incorporation to allow it to make a profit and declare dividends to stockholders. It then built a culinary distribution system, obtained a certificate of necessity and convenience from the Public Service Commission and began to market culinary water as subdivisions replaced agricultural land. In 1970, dividends amounting to approximately \$20,000 were distributed to the stockholders, many of whom still irrigate agricultural land. No exchange of water rights was necessary and the farmer investors benefited in three ways: (1) Their irrigation water costs them little if anything; (2) their land values are greatly appreciated should they decide to subdivide themselves; and (3) they continue to share in the earnings of the company as long as they hold shares in the company.

An example of a threat to survival is manifest in the Weber-Davis County Irrigation Company. This company owns the primary rights in Echo and East Canyon Reservoirs. The repayment contract with the United States has been completed and the deeds to the water rights and reservoirs should have been returned to the company, but it is unlikely that this will ever be done. No instances can be found where the Bureau of Reclamation has ever returned title back to the original owners or managers. The company serves agricultural land in Davis and Weber counties and is so located that urban pressures could mount rapidly. The company could do as the Union

Table 1. Water costs of mutual irrigation companies, 1970, Utah County.

Stock holders	Company	Acres	Amount of water in acre-feet		Total amount used in acre-feet	Cost of water to users	Cost per acre-foot to users	Storage water from	Cost of storage water/ acre-feet	Cost of direct flow water/ acre-feet
			River	Reservoir						
200	Alpine	1750	6125		6125	\$ 2,782	\$ 0.45		--	.45
10	Alta Ditch	318	1113		1113	24,726	22.21			22.21
1100	American Fork	5253		18,386	18,386	37,800	2.05		2.05	--
	American Fk. Metro	--		500	500	2,000	4.00	PRWUA	4.23	4.23
5	Canyon Irrigation	900	2100.9		2100.9			SWUA	1.25	--
31	Cedar Fort	500	1750		1750	924	0.52			0.52
	Clinton	1203	964.3	871.4	1835.7	--	--	SWUA	1.25	0.52
	Cobbley Ditch					D E F U N C T				
11	Coffman Springs	121	339		339	233	0.69			0.69
28	Current Creek	2100		7,500	7500	8,846	1.18		1.18	--
15	Dixon	255	800	300	1100	2,751	2.50	PRWUA	4.23	1.85
10	Duck Creek	560	1960		1960	-0- ¹	-0-		--	-0-
70	East River Bottom	394	1379		1379	675	0.48			.48

¹ Company sold water to Cook Construction Company during construction of freeway for \$2,000.

Table 1. Continued.

Stock holders	Company	Acres	Amount of water in acre-feet		Total amount used in acre-feet	Cost of water to users	Cost per acre-foot to users	Storage water from	Cost of storage water/ acre-feet	Cost of direct flow water/ acre-feet
			River	Reservoir						
12	East Warm Creek	1000	3500		3500	450	0.12			0.12
26	Fairfield	600	2100		2100	3,416	1.63			1.63
22	Faucett	90	229		229	147	0.64			0.64
126	Fort Field-Little Dry Creek	952	3027		3027	3,000	0.99			0.99
115	Goshen	2100		3,924	3924	2,000	0.51		0.51	--
9	Holladay Fld. Ditch	198	693		693	528	0.76			0.76
51	Hollow Water	550	1925		1925	381	0.19			0.19
92	Lake Bottom	1008	3535		3535	2,887	0.82			0.82
110	Lake Shore	4550	6351.1	1,484.5	7835.6	5,692	0.73	SWUA	1.25	0.60
16	Lake Side	670	2345		2345	200	0.08			0.08
860	Lehi	5880	19352	1,228	20580	32,181	1.56		--	--
100	Lindon Pumping	390	1365		1365	300	0.21			0.21
450	Mapleton	3800	2877.3	8,399.8	11277.1	19,184	1.70	SWUA	1.25	3.02

Table 1. Continued.

Stock holders	Company	Acres	Amount of water in acre-feet		Total amount used in acre-feet	Cost of water to users	Cost per acre-foot to users	Storage water from	Cost of storage water/ acre-feet	Cost of direct flow water/ acre-feet
			River	Reservoir						
10	Matson Spring	180	779		779	1,386	1.77			1.77
39	Mitchell Hollow	137	480		480	1,011	2.10			2.10
354	North Union	1792	5704.5	567.5	6,272	12,035	1.92	Provo Bench	--	--
	Payson City	1040	3640		3,640	11,670	3.20			3.20
7	Pioneer Pumping	150	525		525	300	0.57			0.57
	Pleasant Grove City	--		200	200					
782	Pleasant Grove	4749	15579	1,043	16,622	31,430	1.89		--	--
800	Provo Bench Cnl.	4500	38906	2,000	40,906	20,197	0.49	PRWUA	4.23	0.30
--	Provo City Corp.	6400	12097		12,097	8,000	0.66	PRWUA	4.23	0.66
1000	Provo Reservoir Water Users	5129	75124	16,000	91,124	-	--	PRWUA	4.23	--
10	Provo River Water Users			75,102	75,102	125,000	1.66		1.66	
68	Rock Canyon	530	1855		1,855	882	0.48			0.48

Table 1. Continued.

Stock holders	Company	Acres	Amount of water in acre-feet		Total amount used in acre-feet	Cost of water to users	Cost per acre-foot to users	Storage water from	Cost of storage water/ acre-feet	Cost of direct flo water/ acre-fee
			River	Reservoir						
375	Salem	2615	8230.6		8,230.6	11,000	1.34	SWUA	1.25	1.34
35	Salem Pond	600	2100		2,100	860	0.40			0.40
30	Smith Ditch	125	438		438	1,920	4.38			4.38
15	South Fields	200	700		700	2,700	3.85			3.85
--	Spanish Fork City	--	313.4	2,056.0	2,369.4	4,803	2.03	SWUA	1.25	7.12
200	Spanish Fork South	6572	12202	3,099	15,301	16,170	1.06	SWUA	1.25	1.00
200	Spanish Fork East Bench	6000	9869.7	6,087.5	15,957.2	22,841	1.43	SWUA	1.25	1.54
195	Spanish Fork West	6613	14432.9	1,964	16,196.9	13,208	0.82	SWUA	1.25	0.75
76	Spring Creek	800	2800		2,800	1,998	0.71			0.71
1200	Strawberry Water Users	39579		70,081	70,081	64,000	0.91			0.91
600	Strawberry Highline	14500	13450	34,761.1	48,211.1	49,435	1.03	SWUA	1.25	0.44
160	Summit Creek	3500	12250		12,250	48,426	3.95			3.95

Table 1. Continued.

Stock holders	Company	Acres	Amount of water in acre-feet		Total amount used in acre-feet	Cost of water to users	Cost per acre-foot to users	Storage water from	Cost of storage water/ acre-feet	Cost of direct flow water/ acre-feet
			River	Reservoir						
310	Timpanogas Canal	780	4314		4,314	2,310	0.54			0.54
3	Upper Creek Water Users	225		788	788	-0- ¹	-0-			
210	Upper East Union	623	4636		4,636	2,600	0.56			0.56
350	Utah Lake Distrib.	9000		16,629	16,629	12,678	0.76		0.76	
12	Warm Spring	1300	4550		4,550	948	0.20			0.20
12	Wash Creek	266	931		931	432	0.46			0.46
1030	West Union	1400	7454		7,454	32,000	4.29			4.29
15	Woods Springs	443	1550		1,550	890	0.57			0.57

¹No record kept.

Table 2. Water costs of mutual irrigation companies, 1970, Weber County.

Stock holders	Company	Acres	Amount of water in acre-feet		Total amount used in acre-feet	Cost of water to users	Cost per acre-foot to users	Storage water from	Cost of storage water/ acre-feet	Cost of direct flow water/ acre-feet
			River	Reservoir						
31	Alder Creek	0	This company leases its spring to town of Pleasant View for profit - no land served directly by company.							
24	Bambrough	254	1,212	144	1,356	2,112.50	\$1.56	WRWUA	\$0.75	\$1.65
	Bertinotti		954.8	29.9	984.7			ORWUA		
12	Beus Creek	0	This company no longer operates as an irrigation company. It now provides only culinary water to 23 homes at \$2.50 per month.							
7	Co-op Farm	344.5	2,030.6	232	2,262.6	4,830	2.12	WRWUA	0.75	2.29
7	Crooked Creek	50	270.0	0	270.0	37	0.14	--	--	0.14
1700	Davis & Weber Counties Canal	40,000	44,266	20,877	65,143	78,349	1.20	WRWUA	0.75	1.42
102	Dinsdale Water	300	695	3.60	698.6	2,200	3.15	ORWUA	2.11	3.15
15	Downs Ditch Water	97	564.6	90	654.6	525	0.81	WBWCD	2.27	0.57
34	Dunn Canal	--	1,414	264	1,678					
71	Eden	3,000	8,292	--	8,292	4,904.70	0.59	WBWCD	2.92	0.59
13	Emertsen	100	514.2	90	604.2	200	0.33	WBWCD	--	

Table 2. Continued.

Stock holders	Company	Acres	Amount of water in acre-feet		Total amount used in acre-feet	Cost of water to users	Cost per acre-feet to users	Storage water from	Cost of storage water/ acre-feet	Cost of direct flow water/ acre-feet
			River	Reservoir						
9	Felt, Peterson and Slater		856.6	96	952.6	426	\$0.46	WBWCD	\$2.92	\$ 0.17
78	Glenwood Ditch	78	361.18	27.7	388.88	300	0.77	WBWCD	4.86	0.46
545	Hooper	11,000	27,838	8,702	36,540	67,777.48	1.85	WRWUA	1.30	2.02
300	Huntsville	1095	7,077	540	7,617	5,580	0.75	WBWCD	2.92	0.57
34	Huntsville Mtn. Canal	1600	4,108	--	--	5,301	1.25	WBWCD	2.92	
25	Huntsville South Bench	225	447.8	436	883.8	5,700	6.50	WBWCD	2.92	9.89
57	Liberty	1000	3,359.2	0	3,359.2	1,512	0.45	--	--	0.45
46	Little Missouri	0	This company leases its spring to town of Pleasant View for profit - does not distribute water to shareholders.							
	Lynne		3,587.5	1,125.70	4,713.2	--	--	ORWUA	--	--
63	Marriott	580	2,078	234	2,312	1,327	0.57	ORWUA	--	--
	Middle Fork		450		450	2,788.8	6.20	WBWCD	2.92	6.20

Table 2. Continued.

Stock holders	Company	Acres	Amount of water in acre-feet		Total amount used in acre-feet	Cost of water to users	Cost per acre-foot to users	Storage water from	Cost of storage water/ acre-feet	Cost of direct flow water/ acre-feet
			River	Reservoir						
	Mound Fort No. 1		1204.1	0	1204.1					
6	Mound Fort No. 6	106.5	373.0	0	373.0	213.17	\$0.57	ORWUA	\$2.50	\$0.57
245	North Ogden Irr.	3500	7131.8	1691	8822.8	14,713.94	1.56	ORWUA	2.31	1.52
	North Slaterville		1569.1	198.3	1767.4	--	--	--	--	--
47	Old Wilson	500	926	0	926	373.50	0.41	--	--	0.41
30	Perry		1507.8	0	1507.8	945	0.62	ORWUA	3.00	0.62
6	Pine Canyon Ditch	120		0		144		--	--	--
10	Pioneer Irr. Canal	100	415	212	627	200	0.32	WRWUA	0.75	0.10
35	Pioneer Land	1000	--	0		2400		--	--	--
	Plain City	2200	4876.4	1858	6734.4	2068	0.31	WRWUA	0.75	0.14
60	Riverdale Bench	600	2163	122	2285	1982.05	0.90	WRWUA	0	0.90
16	Shupe & Middleton	75	325.37	0	325.37	306.50	0.94	--	--	--
	South Slaterville		3669	342	4011	--	--	--	--	--

Table 2. Continued.

Stock holders	Company	Acres	Amount of water in acre-feet		Total amount used in acre-feet	Cost of water to users	Cost per acre-foot to users	Storage water from	Cost of storage water/ acre-feet	Cost of direct flow water/ acre-feet
			River	Reservoir						
23	South Weber	378	1522	182	1704	960	\$0.56	WRWUA	\$0.75	\$0.54
44	Uintah Central Canal	200	844	165	1009	1404	1.30	WRWUA	1.59	1.35
33	Uintah Mountain Stream	100	--	200	Leases spring to Uintah for \$650/yr. 1154		2.52	WBWCD	4.00	--
125	Warren	4000	16,340	3000	19,340	19,600	1.01	WRWUA	0.75	1.06
115	Weber Canal Water	300	242	0	242	2125	8.80		--	--
310	Western		9202	1687	10,889	16,744.20	1.54	ORWUA	2.30	1.40
250	Wilson	5000	11,136	4506	15,642	27,256	1.73	WRWUA	0.75	2.14

and Jordan Company did and begin to develop culinary systems and sell water for profit. It is unlikely that they will do this, however. Instead, the conservancy district will probably end up as the culinary provider through sub-conservancy or special improvement districts. The question as to what will become of the Weber and Davis County Irrigation Company when urbanization takes over is not hard to envision. A company with an abundance of water but no market will eventually pass away. The mechanism for an easy, economical way to meet the transition from agriculture to urbanization is present in the form of a public utility type of organization, but instead of using investor capital to make the change, the bureaucratic pressures stemming from the federal project will probably force the change to come from tax dollars at a higher cost to the consumer.

In summary, the mutual irrigation company is a private business corporation with all the rights and privileges given to such "unnatural" persons by law, but which, because of its non-profit-shareholder support, lacks a real identity as a separate corporation. It contains more of the elements of a non-profit partnership than a corporation with each partner or shareholder assuming some unstated responsibility in the management of corporate affairs. Because of this the company is slow to change or adopt new methods, is conducive to waste and inefficiency in water use, and lacks sound business management. At the same time, the company hangs on desperately to its "water right" and opposes change in others' practices which might endanger the status quo. The company is inflexible and cannot easily adapt to change in land use practices such as urbanization and is gradually forcing itself into extinction.

Irrigation districts

"The irrigation act was passed for [the] purpose of authorizing the organization of irrigation districts with view of improving and making productive by means of irrigating large areas of arid lands which cannot be irrigated, improved, and made productive by individual effort." (Stevens v. Melville, 52 U. 524, 175 P. 602.) This is the interpretation placed upon the Irrigation District Act by the Supreme Court of Utah. The Act came from the State of California, but in Utah the use of the district as a vehicle to develop water projects has been minimal and in most cases unsuccessful. Most of the districts organized between 1909 and 1929 have been dissolved and their assets distributed. The last district to meet this end in the Wasatch area was the Bonneville Irrigation District which ceased to operate in 1959. Most of the districts formed under the old Territorial Act of 1865 were incorporated into one or more mutual irrigation companies prior to 1909.

The unpopularity of irrigation districts in Utah and the failure of the district method to survive is explained in part by the taxing structure. The Act specifies that the tax

is a special tax, and therefore benefits must be received by the taxpayer. Any failure to benefit is cause to exclude that parcel from the district. Also the failure of any taxpayer to fully pay his assessment constitutes a lien on that man's parcel and not on the district as a whole. It is conceivable that with sufficient failure to make payment the district could be so diluted in revenue that dissolution would be desirable. Another possible cause for failure is related to land use. The district is, in theory at least, limited to agricultural lands and therefore could not survive a change to urban or industrial uses. Further, none of the districts organized during the period mentioned had executed any contracts with the United States—a factor that also made dissolution easier.

To judge the success of a water institution on the ability of that entity to survive perpetually may be unfair. If the reasons for creating the organization have been met there may not be sufficient justification to perpetuate. A smooth procedure for dissolution and abandonment may be the greater blessing. The irrigation districts which have to guarantee repayment of long term contracts with the United States are not able to dissolve and must therefore adapt to whatever environment is created with the passage of time. The change of purpose of the district from making arid lands productive by means of irrigation to serving suburban or urban land with lawn and garden water may cost the taxpayers more than if the district were allowed to dissolve and other institutions such as municipal or private water companies were allowed to take over this service. A serious economic analysis needs to be made of the two-pipe service system now being promoted by the districts which cannot die because of long term government commitments.

In the Wasatch Front area, there are only two irrigation districts in existence today, the South Ogden Water Conservation District and the Ogden-Brigham Water Conservation District (the name change from irrigation district to conservation district was made in 1921). Both were organized in 1934 to utilize water impounded in Pine View Reservoir on Ogden River. The year before, the Ogden River Water Users Association was organized for the same purpose. The Ogden River Project was constructed by the Bureau of Reclamation and these three entities were formed to manage and collect monies to repay the project. The districts were formed to manage water to *new* lands, the OWRA to *existing* lands.

South Ogden Conservation District. This conservation district was organized in 1934 under the Utah Irrigation District Act. The objectives of the district were to conserve, distribute and put to beneficial use the water resources in the area and to provide irrigation water for agricultural users at a nominal cost. Its area of responsibility is from the mouth of Ogden Canyon south, including part of Ogden City, South Ogden, Washington Terrace, and Riverdale. The district includes 3,091.99 acres of land with 3,034.35 acres having a water allot-

ment. This is made up of approximately 9200 separate tracts of land most of which are residential. The water supply of the district includes 6,939.35 acre-feet of stock of the ORWUA, 2,300 acre-feet of Weber Basin water and a share in the flood rights of the ORWUA. The management of the district resides in the board of directors, elected by popular vote of the water users within the district to serve for a period of 3 years. The board elects its own president and appoints whatever employees it requires to perform the work of the district. In this particular case it shares a full-time secretary-manager, the Pine View Water Co., with the Weber-Box Elder Conservation District and the ORWUA. The original intent of the district was to include only those lands that had agricultural potential and to provide only a simple system consisting of lined ditches or concrete pipes. The information presented to this point is almost a direct quote from the history of the district as outlined by the Pine View Water System annual report. A look at some of the figures suggests this was not entirely an agricultural venture and there is question as to whether it meets the criteria of the supreme court to "make productive by means of irrigation large areas of arid lands ..." The district was originally formed with 2169 acres divided into "fewer than 1000" separate tracts of land. This means the average size of a tract of land under the project was about 2 acres. Based on 1970 prices the gross value of the crops grown on these two acres would be about \$300. It is difficult to see how this "new" land could represent a productive agricultural venture.

In 1940, just 5 years after organization, the district contracted with the Bureau of Reclamation for a loan of \$345,000 to construct a distribution system. The system constructed at that time consisted of 35 miles of high pressure steel pipe and two large concrete lined equalizing reservoirs and served approximately 1000 tracts of land. Since that time the system has been expanded to 150 miles of pipelines, six equalizing reservoirs serving over 9200 users of 3,034.35 acres. The 2 acre plots have now been subdivided into 1/3 acre lots. In 1969, the district applied to the Bureau of Reclamation for a loan of approximately \$400,000 to construct two reservoirs, to replace old pipelines and to pipe part of the South Ogden Canal. These obligations were in addition to the district's share of the project cost of \$4,200,000 to build Pine View Dam. During the period from 1965-1971, a levy of 23 to 30 mills had been progressively placed on lands within the district to provide finances for the repayment of loans and for the operation and maintenance of the system.

Weber-Box Elder Conservation District. This district was similarly organized in 1934 to provide irrigation water to areas of land that had never been irrigated or cultivated. These lands were situated between the bench lands of the irrigation companies and below the proposed Ogden-Brigham Canal. Since that time the district has been expanded several times until it now includes 6,883.63 acres of land divided into 4158 tracts of an

average size of 1.7 acres. The area of responsibility includes the northeast bench of Ogden City, the Pleasant View area, North Ogden City, Willard City, Perry, Brigham City and sectionlands in Weber and Box Elder counties. The district is under contract for 14,363.18 acre-feet of water including 2830 acre-feet from the WBWCD but purchased from the ORWUA. The district also has a share in the flood water rights of the association.

The district receives water at the head of the Ogden-Brigham Canal and delivers it into eight equalizing reservoirs. The operation of the district is administered by a board of directors composed of three members who are elected by popular vote of the water users in the area, to serve for a period of three years. The board elects its own president and employs whatever other employees it considers necessary to run the district including the sharing of a secretary-manager (the Pine View Water Co.). The trend towards residential development in the northeast portion of Ogden on the bench lands included in the district necessitated a pipe system to convey water from the Ogden-Brigham Canal to these lands. This led to the organization of the Weber-Box Elder Pipeline Association that secured a \$77,000 loan from the Utah Water and Power Board. The loan was used to construct a skeleton system to serve this area and was completed in 1950. As of now, this area has become a highly developed residential area of about 10,000 inhabitants. The final repayment of the loan was made in 1969. The operation and maintenance of the lines of the Pipeline Association had been taken over by the district and the Pipeline Association dissolved. In 1961, the district borrowed \$304,000 from the Bureau of Reclamation and in 1963 obtained another loan for \$811,000. In 1969, the district acquired an additional \$55,000 from the Utah Board of Water Resources. All of these obligations were in addition to the district's share of the project cost of \$4,200,000 to build Pine View Dam.

A tax levy ranging from 29.5 to 33.0 mills was placed on these lands to provide the necessary revenue for the repayment of the project and for operation of the district.

The only real distinguishing feature that makes the two districts in Weber County different from the older districts which have since been dissolved is the contract the districts have with the United States through the Bureau of Reclamation. This contract, though essential to the repayment of the Bureau, robs the district of some of its operational flexibility and water rights transfer capability. By contract, the Bureau now owns the water rights and all of the real property associated with the project such as dams, canals, pipelines, etc. It also has the first lien on the property to which water has been allotted—not just a lien on the district as a corporate entity. By contract it also has control over the use of the water—a landholder cannot dispose of his water to domestic,

industrial or other uses. This is one reason why the Bureau has pushed the two-pipe distribution system for urban residents (one for domestic, one for lawn sprinkling) without first proving the economy of such a system. And finally, by contract the Bureau has obligated the district for a long period (62 years) forcing the district to adapt to land use changes which might be more economically accomplished through dissolution and change. In Salt Lake County, for example, the urbanizing pressures are being met by private and municipal water companies who use revenue dollars to pay for the system. In Weber and Davis counties, the districts, coupled with the conservancy districts, are meeting the urban pressures with tax dollars. The consumer rate for water in these two counties is much higher than in any other county in Utah.

Domestic or municipal water companies

The domestic water needs of a community were not supplied by community water systems until some time after initial settlement. The legal mechanisms were established early, however, permitting the incorporated cities to dig wells and provide fire fighting water sources for the convenience of the inhabitants. In the early 1870's, the technology and the material means started to become available to the frontier settlements so that pressure delivery systems could be built. Today, there are a multitude of systems serving as few as 20 connections to as many as 67,000 (SLC).

Most of the incorporated towns and cities in the Wasatch Front area have their own pressurized water systems. The source of the water is usually a spring or a well so that the sanitary requirements can be met with minimum effort. The larger systems in Salt Lake City and Ogden use water from open streams which has been sanitized in large water treatment plants. The unincorporated urban areas, and in some few incorporated cases, the domestic needs of the residents are provided by private water companies or special water improvement districts.

None of the systems studied seemed to be in any financial difficulty. Bond issues, usually revenue bonds, although in some cases, general obligation bonds, have been the major source of funds to purchase the capital requirements—such as the reservoirs and major pipelines. Bond repayment and operation and maintenance costs come from the tolls charged for the use of the water. Property taxes, except in the case of general obligation bonds, are not used to finance or to maintain the water systems. On the contrary, nearly every system examined contributed money to the general fund and thus helped to reduce property taxes. The validity of this practice of using water revenue to pay for other services may be questioned particularly in light of the fact that the accounting procedures of most systems do not provide for the accumulation of a cash depreciation fund to replace or enlarge the system where needed. When such a need arises, a new bond issue is made with attended increased interest

costs. Of course this same argument can be applied to other utility services provided by a municipal corporation such as electric, garbage and sewer.

One restraint that municipal systems impose upon efficient use of the total water resource is created by the imaginary boundaries that surround the corporate territory. For example, Logan City, with a population of about 20,000 and an annual municipal water use of about 6000 acre-feet recently built and equipped 4 deep wells, which, with its original spring source, now has a capacity of over 50 cfs or over 30,000 acre-feet per year. The neighboring communities of North Logan (population 1405) and Hyde Park (population 1025) have inadequate culinary water, their present supply being insufficient to permit more residential growth in the communities. Logan City, with its surplus capacity, refused to sell water to these communities on the basis of the boundary restraint. As a result, both North Logan and Hyde Park are investing heavily in new wells, reservoirs and pipelines, thus multiplying the costs of resource development. Part of this restraint is probably the constitutional provision (Article XI, Section 6) that prohibits municipalities from "selling ... their water rights ..."⁴ The hydrology of the natural physical water system does not observe man-made imaginary boundaries and efficient use of the resource can only be accomplished by removal of these barriers.

Private water companies

In Weber and Salt Lake counties there have been organized in recent years several privately owned water companies which sell domestic water for profit. This type of utility was formed to serve the needs of urban developers in areas where corporate municipal systems were not available. The utility comes under the jurisdiction of the Public Service Commission which fixes the rates which can be charged, defines the area to be serviced, and imposes certain other regulations upon the operations of the company. The regulations are designed to protect the users and guarantee perpetuity of service; thus the user has security. The Public Service Commission permits the company to operate with a modest profit and requires that depreciation accounts be set up and reserves for replacement set aside. Some of the companies are incorporated while others are partnerships or sole proprietorships.

There are instances in Salt Lake County where mutual irrigation companies have had the type of water supply that could be converted into a domestic system and they now operate a business of selling domestic water for profit. The companies still distribute irrigation water

⁴Utah is the only state with this constitutional provision and it has caused some serious problems of water exchange to provide communities with adequate water systems. The common practice in other states of communities selling water outside of their boundaries is not entirely lacking in Utah.

to shareholders but do not have to assess shareholders for O&M expenses. Actually, the shareholders not only receive water, but cash dividends as well. The companies were incorporated as non-profit companies but actually operate for profit. One company, the Union-Jordan Irrigation Company, has received a certificate of necessity and convenience from the Public Service Commission while one other company, Bell Canyon, operates as a mutual company by requiring each domestic user to purchase a share in the company and has so far avoided regulation by the Public Service Commission.

Special improvement districts

A relatively new device for water distribution is the Special Improvement District which received legislative approval in 1949. The Special Improvement District is a governmental subdivision with authority equal to a municipal corporation but limited to the functions specified in the resolution creating the district. It has power to levy taxes on all taxable property in the district but can only use taxes for district purposes. It can also issue bonds and collect charges or fees for water delivered or other services rendered. The Special Improvement District is created by the board of County Commissioners who can also serve as its board of trustees or they can appoint trustees or cause an election of land owners in the district. It may act as sole operator in supplying, treating, and distributing water to its area or act as an intermediary by purchasing water from other organizations and distributing it at a price, or a combination of both.

There are five special improvement districts in the Weber-Davis County area and eight in Salt Lake County. There are none in Utah County. The districts in the Weber-Davis area are committed through binding contracts with the Bureau to repay parts of the construction costs of the Weber Project, although other separate sources of water are also available.

The special improvement district has been used to develop and distribute water mainly to residential users in the non-incorporated areas of the county although its authority is not limited to these uses. The South Davis County Water Improvement District in Davis County and the Bona Vista Water Improvement District in Weber County are obligated to use Weber Basin Conservancy District water and have borrowed heavily from the Bureau of Reclamation to finance distribution systems. Their water rates are among the highest in the state, but the true cost of water to the user is masked by the ad valorem tax collected by both the special improvement district and the conservancy district.

The South Davis County Water Improvement District delivers both culinary and irrigation water through two separate pipe systems at two separate water rates. It also collects a 4 mill tax on all taxable property in the district. The domestic pipe system was financed

through the sale of bonds while the irrigation system received a loan from the Bureau of Reclamation. The South Davis County Water District was successful in replacing eight separate small domestic water systems which had inherent problems of low pressure and inadequate supply. In 1970, it had 1446 culinary customers and 1367 irrigation customers. The justification for the two-pipe system is attributed to the cost differential between treated water and irrigation water. This differential does not reflect the true cost of water, but an arbitrary difference based on the ability of the user to pay. It is doubtful if the two-pipe system could be economically justified using the true cost of the water or in a free market situation.

The South Davis County Water District operates in about the same area as the old Bonneville Irrigation District, but whereas the old district could not function successfully because of limitation on funding and extent of use, the new special improvement district does not lack for funds and serves many uses. Part of the old water right of the Bonneville District was decreed to the South Davis County Water Improvement District when the district court dissolved the old district.

One point to be emphasized about the special improvement district is the exclusiveness of the services rendered. Any surplus funds earned through operation of the enterprise must be plowed back into the business or used to reduce service rates. There cannot be a transfer of funds into another service account or to general expenses as is common in a municipal corporation. Another point to be made is that the taxation plus toll method of raising revenue masks the true cost of water to the user. The Weber County districts, for example, all charge about the same toll (8.50/month minimum + 0.25/1000 gallons) but the tax varies from 0 to 12 mills.

Two differences between this type of district and the irrigation district are: (1) the power granted to develop water for all users not exclusively irrigation and (2) the tax lien has not been interpreted as applying to individual property owners but to the district as a corporate body.

Metropolitan water districts

The legislation to create metropolitan water districts was passed in 1935 and shortly thereafter five metropolitan districts were organized in Utah and Salt Lake County. There have been no metropolitan water districts formed since that time. All of these districts have committed themselves to repayment of part of the federal Provo River Project which built Deer Creek Dam and the aqueduct from Provo Canyon to Salt Lake City. It appears quite obvious that the Bureau of Reclamation needed an agency to collect and guarantee the repayment costs of the Salt Lake Aqueduct. Contracting directly with the city has some problems such as the constitutional restric-

tion of municipalities to dispose of its water outside of its municipal boundaries, the exposure of a large annual expenditure to the scrutiny of the electorate, and the more germane question of who would have first lien on the tax monies collected. The creation of a metropolitan district answers this question by assessing a separate tax on the property within the municipal boundary, setting a generous bonded debt limitation (10 percent of assessed valuation) and giving the United States first lien on the tax money collected to repay the project costs. The district also has liberty to sell water without regard to boundary lines and the financial operation of the district is probably seen by less of the electorate.

The metropolitan nature of the organization relieves the Bureau of Reclamation of the problem of distinguishing between domestic and irrigation water. The Provo River Project specifically authorized the aqueduct division to provide municipal and industrial water to the Salt Lake Metropolitan Water District and made all costs reimbursable without interest.

The district has broad powers to raise the necessary funds to meet its indebtedness. The Act permits the assessing of 2½ mills for administrative and operational expenses, permits an additional tax levy to specifically meet interest and principal payments on bonded indebtedness and permits additional tax levies without restraint for all other purposes including the contracts with the United States or other water users associations for long-term project debts. In addition, the district is required to collect tolls for water sold. The total tax levy for the Salt Lake Metropolitan Water District has never exceeded the legal limit of 2½ mills. The 1970 financial reports of the district showed the excess of revenue over expenses to be about equal to the revenue raised through the ad valorem tax, about \$655,000. However, the repayment schedule for long-term debt including bonds, amounts to about \$914,000 annually.

No other metropolitan water district formed in Utah has been an active distributor of water. All obligated themselves for partial repayment of the aqueduct but most have paid off the obligation and have since levied no tax nor collected any revenue from the sale of water. The Lehi Metropolitan Water District collects a tax of 1/2 mill (less than \$2,000 in 1970) but does rent water to Lehi Irrigation Company. The district also has loaned money to the Lehi Municipal Corporation. The Orem Metropolitan Water District collects a 1/2 mill levy and also rents water to Orem City, Geneva Steel Company, and other private users. The Pleasant Grove and Lindon Metropolitan Water District does not levy a tax at all but does sell water to the Pleasant Grove Irrigation Company. The Provo Metropolitan Water District does not levy a tax but does collect from Provo City for water delivered by exchanging Deer Creek water for municipal water owned by others.

Water conservancy districts

The most recent institutional arrangement to develop public water resources is the water conservancy district. In many respects similar to other water districts, the conservancy district has much expanded power to raise revenue and to develop water for all purposes. It is more isolated from "politics" and in many respects it is shielded from the desires of an electorate. The Bureau of Reclamation played an active role in framing the language of the original act which was first passed in Colorado. Bureau influence was also felt in pushing the act through the legislatures of Nebraska, Nevada, New Mexico, Utah, and Wyoming. The broad powers and revenue sources given the district has enabled it to guarantee the repayment of much more ambitious projects than had previously been possible.

The geographic boundaries of the conservancy districts tend to be large and are binding on all property within the boundaries whether directly benefited or not. Planning activities must be limited to the area boundaries, however. Revenue can be raised through ad valorem taxes, sale of bonds, water tolls, and special taxes if needed. A district does not sell water in the normal sense of a user paying for a product; instead it sells "contracts" which represent portions of the repayment schedule and which entitles the buyer to the delivery of water if he can use it. The "contract" must be repaid regardless of whether or how the water is used. Such arrangements may operate to prevent the development of less expensive sources of water. Subscribers who subsequently find less costly local supplies (such as groundwater) must make the government payment first which generally leaves the user without the means or the incentive to develop the cheaper method. The conservancy district fixes its own rates for water (with federal agency approval) and does not operate in a free economic market. In case of failure of a subscriber to make payment on time, the district has recourse to the tax sale and has the first lien on such sale.

In most cases, a conservancy district is formed in conjunction with some massive federal project—the district merely being the tool of the United States to collect monies, guarantee repayment, and under the direction of the federal agency, manage the project. Bound by contracts with the federal agency, the district is not a free-agent itself. It must follow agency requirements which in the case of the Bureau of Reclamation are to make water appurtenant to land, commit the land holder to repayment in the project, and fix water rates which are unrelated to cost of production so that a free water market is unable to operate. The district in reality has no freedom to operate except as the project dictates. Comprehensive state-wide or regional planning (in lieu of project planning) is thus hindered.

The removal of "politics" from the function of a conservancy district was accomplished by having the

board of directors appointed by the judge of the district court having jurisdiction. Whenever a replacement to the board becomes necessary, a new appointee is recommended to the court by the remaining board members—the board thus perpetuates itself and can become unresponsive to an electorate of the citizens who are paying for the project.

In the Wasatch Front area there are four water conservancy districts organized and functioning. The Weber Basin Water Conservancy District was formed to repay the Weber Basin Project constructed by the Bureau of Reclamation. The Salt Lake County Water Conservancy District operates in portions of Salt Lake County, but until the Central Utah Project began was under no contract with any federal agency to repay a large project. It began operations by drilling deep wells and acquiring some springs. Later it did contract with the Salt Lake Metropolitan Water District to buy water from the Deer Creek Project. Although it uses water from a Bureau project, it is not under the restraints that the Weber Basin District is under to promote repayment of the entire project. Another district is the Northern Utah County Water Conservancy District which was formed to promote projects of the Soil Conservation Service. This is a good example of how a need for a vehicle for repayment or management purposes leads to institutional arrangements and accompanying encumbrances as prescribed by federal bureaus. The main purpose of this district is watershed improvement—a project which at this stage offers little promise of production of revenue—such as sale of water or services. Most of the costs of the project are non-reimbursable flood benefits and come as grants from the federal government. The district is not engaged in developing or distributing water resources in general as are the other districts.

The Central Utah Water Conservancy District which is the repayment guarantor for the huge Central Utah Project has boundaries which include all of Salt Lake and Utah counties as well as the counties of Uintah, Duchesne, Wasatch, Sanpete, Sevier, Piute, Millard and parts of Garfield, Juab, and Summit.

One of the problems with the Water Conservancy District-U.S. Bureau of Reclamation partnership is associated with the tendency for the USBR to over-build a project. This stresses the ingenuity of the district to find customers who will subscribe to a repayment contract. Such a problem has become evident in the Weber Basin and probably accounts for the two-pipe delivery system promoted in that area. It is also to the advantage of the district to limit acquisition of water rights by others, even though there is unappropriated water that might be both physically and economically feasible for the new appropriator to develop. The conservancy district will often attempt to force these potential customers to obtain water from the district rather than to develop an independent supply.

An example of this practice in Utah is the strong actions of such districts to prevent owners of summer cabins on the upper watersheds to acquire individual water supplies, although the cabins are outside the operating area of the district and in a precipitation zone where construction of the cabin, yard and roads will actually increase runoff to the river if there is perceptible effect at all. Actual consumption of water for domestic purposes is negligible and stream depletion may be negative. Nevertheless, conservancy districts generally protest approval of applications to appropriate water for such purposes, but are perfectly willing to sell repayment contracts to that same prospective user.

Subconservancy districts

The Conservancy Act of Utah provides for the organization of subconservancy districts within or partly within and partly without the boundaries of a conservancy district. These subdistricts become political subdivisions of the State of Utah with all the powers of a public or municipal corporation. The subdistricts are separate entities within the conservancy district with the authority to contract with the United States of America, or any officer or agency of the United States of America and to contract with the conservancy district for the obtaining of water. The administrations of such subdistricts are completely autonomous, having their own boards of directors and officials. The steps for the formation of a subdistrict are the same as for the conservancy district. Thus far only one such subconservancy district, the Bountiful Subconservancy District, has been organized to use the waters of the Weber Basin Water Conservancy District although the organizing of another subdistrict in the Roy City area is pending.

Bountiful water subconservancy district. The subdistrict was organized in 1954 under Chapter 9, title 73 Utah Code Annotated, 1953, in the second judicial district in the county of Davis. The petition specifically states that the district agreed to allot to the subdistrict 6000 acre-feet of water annually for the purpose of irrigation. The cost of this water was to be \$18,000 annually or such other sum as the district and the subconservancy district may determine.

The subdistrict is administered by a board of directors, consisting of five persons appointed by the district court, who are not directors of the district. The term of office for the directors is three years. The board selects one of its own as president and elects a secretary who may or may not be a member of the board. The directors receive a compensation for their service as directed by the court but this sum does not exceed \$500 per year. In addition they are reimbursed for traveling expenses incurred in the performance of their duties. The board of this subdistrict has employed an attorney and a consulting engineer and several full-time employees including a manager to assist in its operation. The board has

the right to levy and collect taxes and assessments to carry out its purposes. Such taxes and assessments may be levied and collected on top of those being levied and collected by the district in which the subdistrict may lie. Such taxes are limited to paying the expense of its organization and administration and shall not exceed one mill. This ad valorem tax is included in the regular Davis County tax levy.

The subdistrict was organized for the purpose of constructing a water distribution system to serve 4400 acres of land in the vicinity of Bountiful. The area consists of a few large underdeveloped tracts of land, many part-time farms having a partial water supply and residential areas irrigating small gardens, fruit trees, lawns and shrubs.

A loan was secured from the U.S. Government of \$3,500,000 for the purpose of constructing the water distribution system. The loan was obtained under the Small Reclamation Act of 1956, PL 984 and is interest free on land classified as agricultural but requires 3 1/8 percent interest on municipal and industrial land. Funds for repayment of the loan are obtained from revenue produced by the sale of water.

The subdistrict was previously served by six private irrigation companies that took their supply from mountain streams and from the old Bonneville Irrigation District. Five of these mutual companies have been purchased by Bountiful City. The sixth company was purchased by the Bureau of Reclamation. The Bountiful Water Subconservancy District has all the advantages and disadvantages of the district. It was established to serve a smaller area with irrigation water under pressure in a covered system. The water is purchased from the district and then resold to the users. One objection raised to this type of institution is in regard to the selection of the board of directors. This is done by the judge of the district court. The selection of such a board can be done on his own initiative or with the help of attorneys or landowners in the district. Usually he accepts the recommendations of the remaining board. In this fashion it would be possible to pack a board. The subdistrict also has the advantage of changing its boundaries as the need for services increases.

The subdistrict acts only as a retailer. At the present time the subdistrict contracts for up to 16,000 acre-feet of water annually from the WBWCD at a cost of \$4.77 per acre-foot. They are charged for water allocated at an

annually increased increment until the full 16,000 acre-feet is realized. In 1970, they were charged for 13,887 acre-feet. They have two loans from the Bureau of Reclamation to cover costs of distribution and storage. The first loan for \$3,774,355 is to be repaid in 50 years with 3 1/8 percent interest charged to residential users. The second loan was for \$993,305 for storage reservoirs and is to be paid in 60 equal installments. Total cost of the project was \$4,851,946. The water is totally used for irrigation purposes, both rural and residential. Since its beginning, the land use has steadily changed from agricultural to residential. The Bureau has allotted 2.9 acre-feet of water per acre irrigated and water is distributed by an acre-foot or proportion thereof to the users. The area served now includes 6000 acres. Cost of water varies according to whether or not the land is classified as agricultural or residential. The present charges are \$6.00 per acre-foot for water plus a \$15.50 plot charge that is used to retire the loan plus a charge for operation and maintenance of the system. Property of eight acres or over is considered to be agricultural land and is assessed at \$7.00 per acre-foot with no plot charge. Some comparative annual charges are:

Lot Size	Water Cost	Plot Charge	O&M	Total	Cost per acre-foot
1/4 acre	\$ 4.35	\$15.50	\$ 4.90	\$24.75	\$34.14
1/2 acre	\$ 8.70	\$15.50	\$ 8.80	\$33.00	\$22.76
1 acre	\$17.40	\$15.50	\$13.35	\$46.25	\$15.95

One acre of land receives 2.9 acre-feet of water.

Price of domestic water. In Table 3 cost figures for all of the institutions furnishing water to domestic users including municipal water companies, special improvement districts, conservancy districts, and private water utilities are compared. In cases where taxes were used to supplement revenue and could be identified as such, the cost to the user was figured as if that additional revenue were raised through water tolls. The additional taxes of the conservancy districts were not added in, but does represent other costs to the users.

The amount of water used by the company has been figured on the basis of the minimum sales rates. The actual diversion may be much more than this minimum and represents "free" water, leaks in the system, or water wasted over a storage overflow system.

The only water rates that are regulated by the Public Service Commission are those of the private utilities.

Table 3. Summary of water use and cost for domestic water systems.

Name	Source of Water	No. of connections	Water del. to consumer 1000 gal. ¹	Use rate per conn. Gal. /day	Income		Unit Cost to consumers		Minimum charge to consumers		Annual Income per connection \$	Average cost per month per connection \$	Cache County, Utah, 1970 Notes
					water sales \$	taxes \$	sales \$/1000gal	taxes \$/1000gal	\$/1000gal	\$/mo.			
Goasland Water Co.	1 spring	16	22,800		25.00	-	.001	-	-	-	1.56	0.13	Mutual Co. maint. costs come from int. earned on init. inv.
Cove Water Co.	1 spring	18	12,900	1963	300.00	-	.023	-	-	-	16.66	1.39	Mutual Co. shares assessed \$10/year
Mendon City	2 springs	137	115,600	2312	2,433	-	.021	-	-	2.08	17.75	1.48	Not metered, variable rate depends on extent of use
Clarkston City	2 springs	137	36,500	730	3,288	-	.090	-	-	1.78	24.00	2.00	Metered but not read
Nibley	4 springs	102	18,360	493	2,347	-	.133	-	.135	2.00	24.00	2.00	Meters installed 1971 use is based on income and 180,000 gal./year/connection
Millville	2 springs	137	29,180	584	4,192	-	.144	-	.133	2.00	30.69	2.55	
Wellsville	5 springs	376	110,000	801	12,906	-	.117	-	-	2.00	34.32	2.86	Not metered
Providence	1 spring 1 well	468	80,535	471	16,965	-	.216	-	.25	2.50	36.25	3.02	
Richmond	4 springs	346	109,788	869	12,934	-	.118	-	.133	2.50	37.16	3.10	
Amalga	3 wells	70	73,800	2889	2,953	-	.040	-	-	-0-	42.18	3.52	No minimum charge
River Heights	2 wells	250	96,760	1056	11,136	-	.116	-	.15	1.50	44.54	3.71	
Hyrum	3 springs 1 well	726	274,188	737	35,000	-	.128	-	.25	2.50	48.20	4.02	
Newton	6 springs	140	114,900	2249	6,865	-	.060	-	.117	1.16	49.03	4.08	
North Logan	2 springs	339	70,600	570	16,689	-	.232	-	.30	3.00	49.23	4.10	
Logan	1 spring 4 wells	5,300	1,697,518	877	264,637	-	.156	-	.50	1.50	49.93	4.16	
Paradise	2 springs 2 wells	120	36,770	839	6,053	-	.165	-	.32	2.40	50.44	4.20	
Cornish	2 springs 1 well	57	26,300	1264	1,611	1,859	.061	.071	.069	2.67	60.68	5.06	
Smithfield	4 springs 1 well	810	234,753	794	49,793	-	.212	-	.30	3.00	61.47	5.12	
Lewiston	4 springs	400	434,456	2976	18,941	7,311	.043	.017	-	5.32 4.65	65.63	5.47	Not metered.
Hyde Park	1 spring	174	41,700	657	6,956	10,123	.167	.243	.167	3.33	98.16	8.18	Number of connections estimated from minimum charge and total revenue collected
TOTAL		10,123	3,712,630 (11,394 ac. ft.)		476,024 \$495,317 (\$43.47/ac. ft)	19,293	.128	.005	-	-	48.93	4.08	

¹Delivery to consumers has been estimated as the minimum needed to produce the revenue reported.

Table 3. Continued.

Name	Source of Water	No. of connections	Water divy. to consumer 1000 gal. ¹	Use rate per conn. Gal./day	Income		Unit Cost to consumers		Minimum charge to consumers		Annual Income per connection \$	Average cost per month per connection \$	Davis County, Utah Notes
					water sales \$	taxes \$	sales \$/1000gl	taxes \$/1000gl	\$/1000gl	\$/mo.			
South Weber	1 well WBWCD 140 acre-feet	215	39,800	688	9,279	-	.233	-	.233	3.50	43.16	3.60	
Bountiful	7 wells WBWCD 1,000 acre-feet	6177	1,037,736	491	277,933		.251		.300	3.00	44.99	3.75	
Syracuse	2 wells WBWCD 225 acre-feet	510	81,325	437	25,445		.313		.350	3.50	49.89	4.16	
Woods Cross	2 wells WBWCD 100 acre-feet	697	153,238	602	35,666		.233		.25	3.00	51.17	4.26	
Fruit Heights	2 springs WBWCD 34 acre-feet	190	27,325	394	7,296	2,578	.267	.094	.267	3.20	51.97	4.33	About 3 mil tax
West Point	3 wells	275	51,490	513	14,500		.282		.291	3.50	52.73	4.39	
Kaysville	950 acre-feet WBWCD	1,650	388,330	645	87,566				.250	2.50	53.07	4.42	Some general obligation bonds not shown in cost
Centerville	2 wells WBWCD 450 acre-feet	705	84,600	328	38,277		.450		.45	4.50	54.29	4.52	
Sunset	1 well WBWCD 1,300 acre-feet	1450	353,400	526	84,658		.240		.250	2.50	58.38	4.87	
Clearfield	3 wells WBWCD 1,550 acre-feet	2200	554,400	690	133,166		.240		.300	3.00	60.53	5.04	
Layton	2 wells WBWCD 2,000 acre-feet	3640	804,480	605	230,774		.287		.4285	3.00	63.40	5.28	
Clinton	WBWCD 245 acre-feet	550	79,200	379	26,400	9,316	.333	.117	.333	4.00	64.94	5.41	General obligation bonds 5.5 mil tax
E. Layton	2 springs WBWCD 50 acre-feet	142 m	17,090	330	9,400		.550		.550	5.50	66.20	5.51	General obligation bonds not shown in cost
No. Salt Lake	1 spring 2 wells 70 acre-feet WBWCD	498	141,000	776	36,374		.258		.3125	2.50	73.04	6.08	General obligation bonds not shown in cost
So. Davis Imp. Dist.	1 spring 2 wells 360 acre-feet WBWCD	1446	197,182	374	86,760	26,440	.440	.134	.44	5.00	76.33	6.36	4 mil tax

Table 3. Continued.

Name	Source of Water	No. of connections	Water divy. to consumer 1000 gal. ¹	Use rate per conn. Gal. /day	Income		Unit Cost to consumers		Minimum charge to consumers		Annual Income per connection \$	Average cost per month per connection \$	Salt Lake County Notes
					water sales \$	taxes \$	sales \$/1000g1	taxes \$/1000g1	\$/1000g1	\$/mo.			
Silver Lake Water Co.	mine spring	165	-	-	2,150	-	-	-			13.03	1.09	Recreation area
Midvale	3 wells 4 springs	2,086	413,000	542	68,531		0.166		.200	2.00	32.85	2.74	
Murray	1 spring 6 wells 140 acre-feet	6,312	1,378,400	772	245,723		.178		.182	1.50	38.94	3.24	
Riverton	1 spring 2 wells	1,050	113,400	296	46,144		.407		.600	3.00	43.94	3.66	Portion of system financed by general obligation bonds not shown in cost.
So. Salt Lake	5 wells 100 acre-feet SLCWCD	2,530	547,045	592	120,316		.220		.25	3.00	47.56	3.96	
Union Jordan	1 spring 5 wells	1,998	416,000	570	93,303		.224		.3125	2.50	46.70	3.89	
Sandy	9 wells	2,620	579,345	606	115,869	13,307	.200	.023	.20	2.00	49.30	4.11	
West Jordan	1 well 354 acre-feet	1,425	241,229	464	73,230		.303		.375	3.00	51.39	4.28	
White City	4 wells	1,353	328,000	664	71,506		.218		.240	1.75	52.85	4.40	
Herriman	1 spring 2 wells	125	20,000	438	7,000		.350		.60	3.00	56.00	4.67	
Salt Lake City	6 springs 17 wells 6836 a. f. SLCMWD	67,052	20,392,765	919	3843,704		.188		.1928	1.25	57.32	4.78	
County Water System	2 springs 10 wells a. f. SLCWCD	3,024	741,465	672	187,286		.252		.260	2.00	61.93	5.16	
So. Jordan	370 a. f. SLCWCD	650	255,965	502	43,116		.168		.1458	3.50	66.33	5.53	Water rate increases with usage
Magna	1 well	2,386	556,400	639	105,295	53,714	.189	.096	.28125	2.25	66.64	5.55	
Holladay	creek, 3 wells	2,740	769,816	772	192,454		.250		.250		70.83	5.90	
Salt Lake Cn. Wat. Cons. Dt.	2 springs 13 wells 10,000 acre-feet SLCMWD	4,992	1,280,922	703	303,053	61,505	.236	.048	.250	3.00	73.03	6.09	
Chesterfield Imp. District	250 acre-feet SLCWCD	543	68,697	347	22,899	20,919	.333	.305	.333	4.00	80.69	6.72	11 mil tax

Name	Source of Water	No. of connections	Water dlvy. to consumer 1000 gal. ¹	Use rate per conn. Gal. /day	Income		Unit Cost to consumers		Minimum charge to consumers		Annual Income per connection \$	Average cost per month per connection \$	Utah County Notes	
					water sales \$	taxes \$	sales \$/1000gl	taxes \$/1000gl	\$/1000gl	\$/mo.				
Genola	1 well - purchase from Santaquin	125	30,000	658	3,000		.10		.10	2.00	24.00	2.00		
Payson	12 springs 2 wells	1442	173,130	329	51,939				.30	3.00	36.02	3.00	1442 connections based on minimum income	
Spanish Fork	2 springs 4 wells	2948	533,230	496	106,161		.20		.20	3.00	36.01	3.00		
Mapleton	4 springs 2 wells	550	113,600	566	21,260		.187		.20	3.00	38.65	3.22		
Springville	3 springs 3 wells	2800	687,367	541	122,804		.179		.20	3.00	43.86	3.65		
Pleasant Grove	8 springs 5 wells	1470	200,100	373	60,060		.30		.30	1.50	40.86	3.40		
American Fork	2 springs 3 wells	2270	503,390	608	107,488		.213		.225	2.25	47.35	3.95		
Lehi	1 spring 3 wells	1513	251,915	682	77,617		.308		.40	3.00	51.30	4.28		
Santaquin	springs 1 well	374	147,847	1,083	19,642		.133		.30	3.00	52.52	4.38		
Salem	3 springs 1 well	332	92,922	767	16,065	2,295	.173	.025	.194	3.50	55.30	4.61		4 1/4 mil equivalent tax
Provo	springs 5 wells	9575	3,212,235	919	558,000		.174		.20	1.50	58.27	4.86		
Alpine	2 springs 1 well	250	49,269	482	14,786		.30		.30	-	59.14	4.93		
Orem	3 springs 4 wells OMWD	6200	1,520,147	672	384,262		.252		.325	3.90	61.98	5.16		
Lindon	1 spring 3 wells	383	75,084	536	25,665		.342		.40	4.00	67.01	5.58		
Goshen	1 spring	150	37,490	685	10,349		.276		.375	5.00	68.99	5.75		
TOTAL		30,382	7,627,726 (23,409 acre-feet)	688	1,579,098 1,581,393 \$67.55/acre-feet	2,295	.207		-	-	52.05	4.34		

¹ Delivery to consumer has been estimated as the minimum amount needed to produce the revenue reported.

Table 3. Continued.

Name	Source of Water	No. of connections	Water dlvy. to consumer 1000 gal. ¹	Use rate per conn. Gal./day	Income		Unit Cost to consumers		Minimum charge to consumers		Annual Income per connection \$	Average cost per month per connection \$	Weber County Notes
					water sales \$	taxes \$	sales \$/1000gl	taxes \$/1000gl	\$/1000gl	\$/mo.			
So. Ogden	1 well, 700 acre-feet WBWCD	2608	468,650	492	93,730		.200		.200	2.00	35.94	3.00	Some general obligation bonds not shown in cost.
Eden Water Company	2 springs	90	39,600	1,205	3,600		.091		.09	3.00	40.00	3.08	
Uintah	2 springs 100 acre-feet WBWCD	108	12,969	329	4,215		.325		.325	3.25	38.32	3.19	Some contribution from city corporation not shown in cost.
Washington Terrace	2 wells 200 acre-feet WBWCD	1750	266,485	451	79,301		.275		.325	3.25	45.31	3.78	
Huntsville	3 springs	186	58,738	865	8,611		.1466		.1666	2.50	46.30	3.86	
Riverdale	1 well 625 acre-feet WBWCD	658	201,839	730	40,867		.202		.225	2.25	48.65	4.05	
Roy	2 wells 32 acre-feet WBWCD	3500	928,047	726	191,029		.206		.225	2.25	54.58	4.55	
No. Ogden	3 springs 3 wells	1205	226,572	515	67,389		.297		.333	4.00	55.92	4.66	
Pleasant View	creek spring well	425	64,237	414	24,165		.376		.375	4.50	56.86	4.74	
Ogden	stream 48 wells 12,100 acre-feet WBWCD 5,500 acre-feet ORWUA	19,097	3,419,200	490	1,135,515		.332		.3584	4.05	59.46	4.96	Estimated on 3/4" connection basis, service charge + minimum + toll
Taylor-West Weber Imp. District	2 wells	403	58,000	395	36,270		.625		.625	7.50	90.00	7.50	No tax - discount if paid by 10th. WBWCD
Hooper Imp District	purchase from Taylor-Weber	340	48,980	395	34,680		.708		.708	8.50	102.00	8.50	
Bona Vista Imp. Dist.	1 spring 1 well 1,210 acre-feet WBWCD	1239	266,814	590	86,164	76,830	.323	.288	.333	5.00	131.55	10.96	8 mil tax + WBWCD of 1 mil., conservancy district tax not included in cost.

Table 3. Continued.

Name	Source of Water	No. of connections	Water divy. to consumer 1000 gal. ¹	Use rate per conn. Gal. / day	Income		Unit Cost to consumers		Minimum charge to consumers		Annual Income per connection \$	Average cost per month per connection \$	Weber County (cont.) Notes
					water sales \$	taxes \$	sales \$/1000gl	taxes \$/1000gl	\$/1000gl	\$/mo.			
Uinta-Highland Imp. District	40 acre-feet WBWCD	65	9,360	395	6,630	5,884	.708	.629	.708	8.50	192.52	16.04	12 mil tax+ WBWCD tax of 1 mil., c. d. tax not included in cost.
Roy Sub-Cons. District		Just being organized --											
TOTAL		31,674	6,069,491 (18,627 acre-feet)	525	\$ 1,812,166	82,714	.299	.014	.312		59.82 (64.28)	4.99 (5.36)	WBWCD adds \$141,000 to cost. Average \$0.37 per month per connection Cost with conservancy district shown in parenthesis.
Grand Total (All Counties)		\$205,933	\$53,053,388	\$706	\$11,973,313						\$58.05	\$4.84	

¹Delivery to consumer has been estimated as the minimum amount needed to produce the revenue reported.

SUMMARY AND CONCLUSIONS

The first article in the Utah law on water and irrigation (73-1-15 UCA 1953) declares that "all waters in this state, whether above or under the ground are hereby declared to be the property of the public" This section does not vest title to water in the state, but does maintain that water is community property available only upon compliance with law. Water "rights" are vested interests and enjoy much of the same status as property rights, although the "right" is not in the corpus of the water but is usufructuary in the stream. Physically, water is a dynamic and ever changing resource, the "corpus" of which cannot long be restrained and still retain value. Water sealed in a bottle and left on a shelf has no value. To be of value, water has to move--to exit from the great circulating system, accomplishing its intended purpose, and re-enter the cycle. It should be society's job to control those portions of the cycle that can be controlled and to manipulate the system to the end that the greatest public benefit is attained. Planning for this type of public use should not be restrained by laws or by organizations that are created to be the manipulators. Present practice in the State of Utah does not permit this type of planning and is far from achieving all the goals that are desirable.

The mutual irrigation companies "own" the largest percentage of water rights to surface flow, but as a vehicle for developing and distributing water to meet the public needs, it is inefficient. It has limited ability to raise funds for capital expenditures and for this reason it has not found success in other states where new development was required. In Utah, it became successful as the operator of already existing distribution systems, but has not been able to improve upon the existing system, nor has it been flexible in providing for changing uses. The company has normally been small, limited to users on one canal system or portion of a canal system. The mutual nature of the company, that is the shareholder supported structure, actually operates more like a partnership than what is normally considered a corporation. Each shareholder feels he "owns" an interest in the company, and since the company does not operate for a profit, the shareholder must protect his interest by giving support only to those practices which bring him personal benefit. Funds have never been made available to hire professional managers, but their use would be ineffective without the freedom to consolidate ditches, or companies and to expend monies on improved distribution systems. The motivation to properly develop and distribute water for the best public interest, without waste and inefficiency, is completely lacking in a mutual irrigation company. The fault does not lie with the individuals who are shareholders in the

company, but with the structure of the mutual organization. Eliminating the "mutual" aspect by making the shares of stock non-assessable, and introducing a profit motive through the sale of water (the "corpus" not the "right") would force the company into good management and efficiencies of operation. It would also build into the company the flexibility to meet changing uses such as the shift from rural farms to suburban or urban living. The alternative to such a change in organization is to abandon the mutual company and have the functions of the company replaced by a special improvement district, a conservancy district, or municipal or private corporation. The costs in such a shift need to be carefully analyzed and weighed against the first alternative.

Irrigation districts in the Wasatch Front area are not really a restraint to water resource planning for the simple fact that except for two in Weber County, there are none. Interpretation of the law regarding special taxes and benefits as applied to irrigation districts probably is one of the chief reasons for district failure in Utah. The two survivors have side-stepped this interpretation by making long-term commitments with the United States through the Bureau of Reclamation which binds both the district and the landowners. The districts are thus obligated to a specific project, are bound geographically, and are limited to a specific use of water. The district can make efficiencies in use because of good management and it can raise funds for necessary improvements but it does have restraints imposed by the Bureau and as a separate entity it cannot transfer water and uses and develop new sources or customers which might disenchant the "project." Motivation for water development is strongly linked to the project and whatever might have initially motivated the project. Perpetuation and improvement is motivated largely by project repayment, and although the end user is probably benefited the costs associated with these benefits are higher than they would be under a less project-binding set of circumstances.

A special improvement district is a modification of the irrigation district with authority stemming from the county government but with added freedom to develop water for all uses and without the individual property tax lien problem of the irrigation district. There are several successful special improvement districts operating in Salt Lake County but are restricted from reaching full potential by the geographic boundary restraint imposed upon them. In Weber and Davis County, the special improvement districts have relinquished many of their freedoms to the Bureau of Reclamation through loans and contracts.

Municipal water companies perform the same functions as special improvement districts but have additional freedoms. In most cases, the water company operates as a department of municipal government and has all of the resources of the city to draw upon including general obligation bonds and general fund tax revenue. The water business is generally lucrative enough, however, that the water department contributes to the fund rather than withdraws from it. The chief inhibiting factors to limit the city as a developer of public supply is the geographical boundary restraint and in Utah at least a constitutional provision that prevents any municipality from selling water rights. Also, the periodic political change in municipal administration may hamper water development. The United States through the Bureau of Reclamation has not contracted directly with municipal governments to repay large reclamation projects.

The conservancy district comes closest to being the type of agency needed for full development of a water resource. There are a couple of restraining elements however that are serious deterrents to overall state water planning. The first of these is the shackle placed upon the district by the long-term contracts of the federal agency. The district is not a free agent but becomes an agent of the federal agency. Consider that the United States owns all the real estate and rights of way associated with the project; and that because money was advanced by the United States it now holds a long-term mortgage on all property in the district. Further, the officers and directors of the district are appointed by a district judge, the most shielded of elected public officials, and that in essence the board perpetuates itself by recommending its own successors. The conservancy district is thus a permanent pawn of the Bureau of Reclamation.

The normal sequence of events for a large reclamation project is as follows. First, the project is conceived and planned, second the district is organized and committed to repayment, and finally the construction begins. It is difficult if not impossible, for a change to be effected if, 10 or 20 years down the line, it is determined that the project or parts thereof were not needed in the first place or that changes in the life style since conception of the project dictate a different type of development. In any event, the autonomy and strength of a conservancy district connected inseparably to a federal project is a block in the path of a state or regional planner.

Private water companies have potential for being the proper vehicle for water development and distribution, but so far have not met the challenge. The numbers of private companies organized, however, is increasing. The

private companies organized to date have primarily been promoted by land developers to serve their own subdivisions. Consequently, they have been small and have not tried to grow beyond their initial service areas.

To achieve optimum water development and a just and proper allocation of the resource to the public there must be two forces supplied. First, there must be motivation. For the mutual irrigation company, the motivation is to maximize the benefits to each shareholder—a goal contrary to public good unless all are shareholders. For municipalities and the quasi-governmental districts the motivation is that associated with “keeping the peace.” For the private company the motivation is maximizing profit—an expression that may turn the ears of the ungreedy, but a process which has made America the greatest developer of good-living products and services in the world today. The second force that must be supplied to a resource development program is that which rations the resource to the users. There are two ways in which a resource can be rationed. One is by arbitrary legislative rule. This is the most prominent way water is rationed in today’s society and is exemplified by the Bureau of Reclamation’s methods of assigning amounts of water to land, making the water appurtenant to the land, and arbitrarily pricing the project repayment to the users by the type of use and repayment capability. Agricultural water has been heavily subsidized at the expense of municipal and industrial use. The other type of rationing is the free market method of rationing by price. A free water market does not exist in America today and has not been allowed to exist by the institutional structure.

The type of institutional arrangements that are made to accomplish social tasks do affect the type of output and accomplishments of the organization. Quasi-governmental types of organizations such as conservancy districts, special improvement districts, and municipal governments tend to limit individual performance and restrain creativity. Project bound organizations tend to overlook alternatives which do not enhance the “project.” None have a broad enough concept or tolerance of each other to lock arms under a state or regional planning organization. This is in strict contrast to what has been accomplished by other public service organizations such as the electric utility, the telephone company or the gas company. Perhaps the modern business corporation with its demand for high individual performance and its capability for releasing the inherent creativity in people, operating in a free market, might provide the greatest institution yet for managing public water supplies.

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