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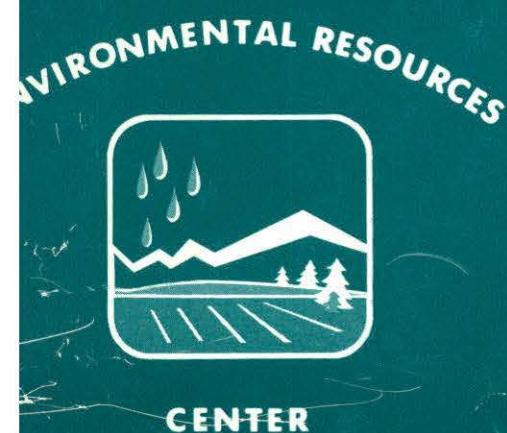
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PROCEEDINGS OF THE SYMPOSIUM ON
WATER POLICIES ON U.S. IRRIGATED AGRICULTURE:
ARE INCREASED ACREAGES NEEDED
TO MEET DOMESTIC OR
WORLD NEEDS?

compiled by
Victor A. Koelzer

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SOCIAL VALUES IN IRRIGATION
AND WATER DEVELOPMENT POLICY

by

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Introduction

Water is a resource that is involved with all of the functions of man. Not only as one of the necessary chemical ingredients used by the biological organism, but also as an integral element, along with land and space, in social behavior. As a factor in human culture it is required for the great engines of industry, for transportation, for waste disposal, for food production and for pleasure. Where there is land but no water, no society can develop. Man has learned to transport and store this renewable resource because its supply and quality affects his use of space and land. It responds to man's cultural demands, but it also is a critical factor in the dynamics of human ecology.

Physical and Social Aspects

Although water is an absolute in the physical system, it may also be a variable element. After a certain minimum quantity for man's existence it may vary in amount, its sources can vary, its uses can vary and it is subject to variation depending upon economic demand.

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The institutional means for supply, whether public or private, are culturally determined.

Some cultures use water supplies which are fortuitous natural gifts in rainfall or from streams. Other societies have invented great technological machinery and made heavy investments to develop water for urban, industrial and agricultural purposes.

The social behavioral forms for aquiring water for use have varied widely among different cultures, ranging from the work of family members, usually women or children, carrying water for household use, to water users cooperative associations, private corporations and public governmental utilities.

In the United States, when water has not been abundant or in the right place at the right time, this society has viewed water as a resource either to be developed by public effort through government agencies, by non-profit cooperative type groups, by public water districts, or by some combination of these. Private development in the United States, although present in some areas, has not predominated. Water has generally been viewed as a free gift, a common physical need and as an adjunct to other activities or needs, therefore the profit motive has been limited for this resource. Water development has economic costs but this cost is usually seen as a minimal cost of production price. In America, then, attitudes related to water may often be described in this way, that it is largely a free good to be used, and it is developed in cooperative social systems such as public or quasi-public agencies with a non-profit service motive. Also, society has become more and more formal and complex and water has become more difficult to develop, Americans have looked more and more to the government sector for development of this resource.

As government has become the means for dealing with water needs the role of government has expanded into areas of supply for municipal, industrial, recreational and agricultural uses, for control of floods, storage, transportation, drainage, into water quality, the function of water in natural ecology and into research related to water resource problems.

These changes in the pattern of social behavior in water development did not occur by themselves but are associated with several other changes. To provide some perspective it may be useful to identify them. These other changes have occurred in America within a physical framework of abundant land, water and other natural resources. The first is development of scientific and technological knowledge that has provided the bases for improvement in health, welfare and the economy and has diverted the exigencies of the Malthusian theory of population growth. That is, science has been able to make the technological break-throughs needed to maintain or raise the consumption standards of a growing population. The second is the development of agriculture production. The third change is also the result of the first, which is the rapid population growth and spread of the population over the space available. The fourth is the development of American industry and transportation. The fifth is the urbanization of American society. The sixth is development of mass and rapid communication as well as involvement in international interaction with resulting international interdependence. The seventh is reaching some resource limits, in this country at least, of the most available supplies as well as a discovery of ecological limitations. Perhaps the key to the next go-round in the spiral of change will again be developments of a new level of knowledge and technology, but this time it must include the added

ingredients of social impact discernment and ecological effects.

Government Policy and Water Resource Development

Government policy in water resources development has gone through several phases and changes over the years. Former Reclamation Commissioner Floyd E. Dominy (National Reclamation Association, 1966) stated in 1966:

"Reclamation has come to the crossroads of crisis rather regularly... one of these... back in 1932. At that time there was a growing national reluctance to undertake anything of such a sectional nature as the reclamation program."

He noted further that:

..."there are two more challenges in our future. One is the problem of conservation versus preservation. The other is the financing of reclamation.

I have always said that the keystone of reclamation success in a sectional program is the relatively large amount of hard cash returned to the Treasury in repayment. Around 90 percent of our total reclamation investment is repayable and being repaid."

These problems have now come around again, for some of the current challenges identified by the National Water Commission include, the issue of favoring one area over others and the mode of financing reclamation.

The process of developing a consciousness of need and social political pressure for irrigation water development grew out of other land use programs. As the Western frontier was settled programs assisting settlement and development of the arid Western region were fostered. These included the provision of free land in the early stages which was followed by water resource development assistance to provide for maintaining a stable productive population. Two goals were of major importance in national land policy, one, bring land into economic productivity, and two, put the land in the hands of the small land holder or so called family farm.

The policy of encouragement to Western development is reflected in the Federal laws that were passed relating to this area. The Homestead Act of 1862 provided that any person over 21, who was head of a family, ..."could obtain the title to 160 acres of public land if he lived on the land for five years and improved it or he could pay \$1.25 per acre in lieu of the five year residence requirement." The Homestead Act attracted thousands of settlers to the west from 1862 to 1900. It provided farms and new homes to an estimated 400 to 600 thousand families (World Book, 1960).

However, many of those who settled ran into difficulties because of low rainfall and the limited size of farms. Beginning about 1890 many of those who could not make a living abandoned or sold their lands.

C. C. Taylor (Rural Life, 1949: 45) notes that ..."in some places the limits of agricultural expansion had been reached by 1890, and population was withdrawing from many of the areas of low and uncertain rainfall..."

Lowry Nelson (Rural Soc., 1955:182) further describes the social effects of the Homestead law saying "The passage of the Act set the stage for the rapid settlement of the public domain in 160 acre tracts and the establishment of the family-farm as opposed to plantation agriculture."

As the struggle to survive on arid land became apparent along with the goal of land settlement, pressures grew to find relief and sustain the development of the West, Reclamation was one means to deal with these problems. The Reclamation Act of 1902 specifies the objective of encouraging settlement and development of Western lands.

In an explanatory note to the ACT (USDI, Fed. Reclamation, 1972:31-89) it states:

"Congress, in establishing a limitation on the size of entries on public lands under Section 3 of the Reclamation Act of 1902, and on the maximum acreage for which a water right could be acquired under Section 5 of the Act, had as its purpose to provide homes the arid lands of the West, the prevention of land monopoly, and the avoidance of land speculation."

The problems of stabilizing small family farms in areas of low rainfall, the needs for supplemental water in areas already under irrigation and the desire to develop more of the arid Western land resources stimulated further development of irrigation water. Much of the easiest water to reach was already under appropriation and that which was left required large storage structures and transporting facilities. So, over the years there evolved a program for dealing with this problem. This program was centered in the Bureau of Reclamation which works mainly in the Western States. Also important contributions have been added by the U.S. Army Corps of Engineers and the U.S. Department of Agriculture A.S.C.S. and S.C.S projects.

Irrigation and Agricultural Land

The total agricultural land in the U.S. (Statistical Abstracts, 1971: 578 is about 1,110,000,000 acres with 387 million acres of cropland. Total irrigated acres in the U.S. as shown in the National Water Commission Report (1973:126) was about 39 million acres in 1969. A total of 8.6 million acres were irrigated by Bureau of Reclamation water. Of the total irrigated lands 89 percent (34.8 million acres) were in the 17 Western States.

The National Water Commission (1973:135) reports that between 1961 and 1970 there was an average of 56 million acres of non-irrigated

land that had been withdrawn from production in soil banks or land retirement programs. The U.S.D.A. estimates as given in the report are that this land is only 80 to 90 percent as productive as crop-land in production.

SOCIAL IMPACTS OF IRRIGATION WATER DEVELOPMENT

In reviewing the social effects of irrigation water development in the Western region, the lack of region-wide data requires that this be reduced to case studies which show different types of areas and different types of problems. The selection of cases was not highly analytical. The cases shown were simply reports that were available and that illustrated various types of impacts. Some of these are recent and some from previous years.

Some Effects of Water Resource Development on Uintah County, Utah

This study of the Vernal Unit reclamation project (Andrews, Davis, et al, 1972) was made at Utah State University in relation to an exploratory study for identification and measurement of quality of life variables in relation to reclamation projects. The study as a whole included people in five counties and part of this work was a review of effects of the Steinaker Reservoir near Vernal, Utah. This study illustrates the effects of reclamation water on several social and economic factors.

Steinaker Reservoir, a moderately sized storage reservoir in Uintah County, was completed and began to deliver water in the 1962 water year. It provides irrigation and municipal and industrial water and recreation.

Estimates made by Unitah County bankers, businessmen and others were that Steinaker Reservoir had increased overall income on the average of 10 to 15 percent. Before 1962 the Federal Land Bank had a policy not to make farm loans in the Uintah Co. area to farms in certain irrigation companies because of the risk of crop failure. In 1970 farm loans were available in all areas. The major difference in agriculture for the region between 1960 and 1970 was the reservoir.

Much of the new home construction in the Vernal area is outside the city in the open country. A commonly expressed goal of many of these residents was to have a home with a few acres on which to keep a cow and horse. The increased availability of water in the area with extended water and sewer lines has made this possible. The result is an increase in quality of life for those able to achieve that goal. Most new sewer and water hookups are outside of the town.

The Agriculture census shows some remarkable changes for Unitah County. Farmers reporting 100 days or more of employment off the farm per year decreased dramatically by 26 percent from 1959 to 1969. The increased value of agricultural products from 1959 to 1969 for the state was 87 percent. In Unitah County the increase was 125 percent. The number of acres of farm land in the state decreased by 11 percent in this decade while in Unitah County farm acreage increased by 29 percent.

In Unitah County the sale of livestock, poultry, and their products was up 60 percent. The sale of calves and cattle rose 89 percent. While the sale of hogs decreased in the other counties studied, Uintah County increased 38 percent.

Corn has a high yield of consumable material per acre, but requires a great deal of water to mature. The number of acres of corn

produced in the state increased 44 percent while Unitah County increased 137 percent. Hay acreage in Unitah County increased 30 percent as compared to the state as a whole which decreased 3 percent.

It was expected that the development of additional water would likely affect several social variables as well as economic variables. The evidence shown above indicates this is true. Historical evidence indicated that there was usually a serious shortage of irrigation water in the Unitah area after the first of August. The additional water permitted adjustments that were soon noticeable. The well-being and stability of this area was significantly affected by the improved water resource. Since this area is in the region of oil shale lands it will likely have other future implications related to oil energy development.

Some Effects of Supplementary Water in the Colorado-Big Thompson Project

A second type of case is shown in a report on the effects of supplementing irrigation water in the farming activity of the Colorado-Big Thompson Project in Northern Colorado. In the case of this project no new land was to be brought under irrigation, only land already under existing canals.

There were several changes made in farm operations as a result of the development of a reclamation supplementary water supply. Previous water reclamation had developed a supply of 1.5 acre-feet per acre in the area of the Northern Colorado Water Conservancy District. This was inadequate to prevent shortages and costly crop failures. Average annual consumptive use per acre was computed. It determined the need to be just over 2 acre-feet per acre. So the supplementary water requirement was about one half acre-foot. Anderson

and Hartman (1965) report that the new project provided this half acre-foot per acre thus raising the average consumption to about 2 feet per acre during the first eight years of the project.

The affects of this supplemental water reportedly both changed management decisions and changed the investments farmers made. Many farmers made capital improvements after the addition of the supplemental water. These improvements averaged \$9,700 per farm and included improvements to land, irrigation systems and machinery. Fertilizer use was increased and yields were increased on all crops. More water was applied to all crops but particularly to row crops and alfalfa.

More high water requirement, intensive row crops were planted and fewer acres of low value short season crops were cultivated.

Seventy-eight percent of the supplemental water was used in increased applications to present crops, 11 percent was used on changes in crops grown and 10 percent on changes of both rates of application and crops grown.

With the extra water, there was some affect on additional dry land but this was relatively small. There was only a 6.7 percent increase in dry acres added. It would appear that this limited addition of new land is related to the accurate computation of the amount of water required for the land operated. The writer summarized this by saying, "Optimum adjustment is to use supplemental water to get higher returns by more intensive use of water on existing croplands."

This case illustrates the response in both agronomic and economic effects of reclamation development, as well as the function of planning decisions for effective supplemental water application.

The importance of this type of program for providing effective supply is illustrated again in a report on Utah Agriculture some years ago (Thomas, et.al., 1949:14). It was concluded that a "...weakness of Utah's agriculture is in its inability, because of inadequate irrigation water, to adjust the type of farming to meet the present demands of the markets that Utah farmers are in the most advantageous location to supply. The result of this affects not only farm income but also the well being of consumerism in the market."

Social Impacts of Water Resource Development in the Weber Basin

The Weber River Basin includes not only rural areas but the urban metropolitan area of Ogden, Utah. The project is therefore involved in a heavily urbanized and urbanizing area. Farming in the area is greatly affected by urbanization as is the water development project. The Weber Basin system involved seven moderate to small sized multi-purpose reservoirs, four of which were built previously. Two of the four were enlarged while three new ones were built for this project.

A post-facto study (Andrews, Madsen, and LeGaz, 1974) was made of the the Weber Basin Project after the first ten years of operation. A survey of both farm and non-farm residents was conducted in Weber and Davis counties of Utah which are between the Wasatch Mountain range and the east shore of the Great Salt Lake and constitute the main area served by the project. Some of the results given here show certain impacts or effects of the project. Almost all of the water presently being used for irrigation from the project is for supplementary water. However, the original plan included some new land. The new or previously unirrigated lands that were intended to be included have either not

been developed or private wells have been drilled and because of this the owners have not signed up for water.

This project is now under the over-all management of a conservancy district organization. There are numerous irrigation canal companies, municipalities and others who contract with the conservancy district for delivery of water.

Results of some of the effects of water development from this study were reported by both water managers and users. A random sample of farmers in the study area whose canal companies were purchasing some supplemental water from the Weber Basin project were asked open ended questions about the effects, if any, that the Weber Basin reclamation water has had on their farming operation. Tables 1 and 2 show the types of responses given.

Table 1. Positive impacts of Weber Basin irrigation water as perceived by farmers in Weber and Davis Counties, Utah.

<u>Effects</u>	<u>No.</u>
Provides sufficient supply of irrigation water	20
Increased farm crop production	8
Sense of security knowing water is available, dependable	7
Saves irrigation water through canal lining	6
Converted to a pressurized irrigation system	3
Increased income and value of land	3
Other responses	<u>11</u>
	<u>58</u>

Note: Respondents were able to identify more than one positive effect.

N = 95 farmers who were users of Weber Basin Water. Of these 41 or 43.2 percent identified specific positive effects. However, not all farmers were aware their canal company was purchasing supplementary Weber Basin water.

Positive farm irrigation impacts shown in Table 1 were largely related to a dependable, adequate supply available when it was needed with a concomitant reduction in anxiety for the farm operator.

Table 2. Negative impacts of Weber Basin irrigation water as perceived by farmers in Weber and Davis Counties, Utah.

<u>Effects</u>	<u>No.</u>
Price of irrigation too high	6
Made it easier for subdivisions, not farming	4
Less underground well water yields	4
Supply has been cut down several times	2
Problems with seepage of land	2
No carry over provision, have to pay for the water even if not used during year	2
Other responses	13
	33

Note: Respondents were able to identify more than one negative effect.

N = 95 farmers who were Weber Basin water users. Of these 24 or 25.3 percent identified specific negative effects.

The negative effects reported were scattered and few as shown in Table 2. Three fourths did not report any negative effects. The price of water was mentioned most.

In addition 38 of the major canal company officials in the area were also asked an open ended question as to what were the most important benefits or advantages with having Weber water. Their responses point up the following reasons:

1. Extends the water season for late crops and gardens.

2. Enabled the growth of higher yielding crops than before.
3. The supply is dependable.
4. Holds the workable stream level up.
5. Is available on demand.
6. Control quality of the water
7. Enabled conversion to a pressure system.

These reasons given by canal company managers indicate a reduction in risk and anxiety concerning water supply as well as improvements in production.

Recreational and Aesthetic Effects

This study also analyzed some non-irrigation benefits from the project. Both farm and non-farm respondents were asked their outdoor recreational preferences as well as their actual activities for two different time periods. The three most preferred activities for farm people on a three day outing period were found to be fishing, camping, and sightseeing. For a short period of three hours it would be fishing, sightseeing, and horseback riding. Actual participation over the year for farm people was mostly fishing, sightseeing, and hunting.

Non-farm, or urban people report preferences for camping, fishing, and sightseeing for a three day activity and fishing, sightseeing, and golf for the short term preferences. Urban residents were found to be actually participating most over the year in fishing, camping, hunting, and sightseeing. Preferred and actual activity for both occupational groups were very similar.

This behavior shows strong interest in water related recreation and the aesthetic experience of sightseeing.

Respondents were also asked about their recreation activity in relation to specific reservoirs in the Weber Basin. Participation was highest for the two reservoirs nearest the metropolitan population center, these were Willard Bay and Pineview reservoirs.

When asked about the particular aspect of the reservoir that was most enjoyable Table 3 shows both the aquatic related activities and aesthetic interest activities ranked high for farm and urban people.

Table 3. Response to the question, "In relation to your recreation interests, what particular aspect of this (Willard Bay or Pineview) reservoir makes it most enjoyable to you?" by urban and farm populations.

Activity	Willard Bay				Pineview			
	Urban		Farm		Urban		Farm	
	No.	%	No.	%	No.	%	No.	%
Sightseeing, scenery, setting	22	14.6	17	24.6	71	35.5	27	31.0
Fishing	25	16.6	15	21.7	34	17.0	18	20.7
Boating	18	11.9	17	24.6	12	6.0	12	13.8
Waterskiing	8	5.3	0	0.0	4	2.0	2	2.3
Swimming	0	0.0	0	0.0	12	6.0	0	0.0
Picnicking	2	1.3	2	3.0	13	6.5	10	11.5
Hunting	6	4.0	0	0.0	0	0.0	0	0.0
Close location	20	13.2	9	13.0	17	8.5	10	11.5
No particular aspect and general atmosphere & interest	28	18.6	2	3.0	8	4.0	2	2.3
Other	12	7.9	7	10.1	20	10.0	4	4.6
No Response	10	6.6	0	0.0	9	4.5	2	2.3
Total	151	100.0	69	100.0	200	100.0	87	100.0

N for the urban area = 250, of these 99 had not visited the Willard Bay area and 50 had not visited the Pineview area in the previous 3 years.

N for farmers = 128, of these 59 had not visited the Willard Bay area and 41 had not visited the Pineview area in the previous 3 years.

The results of the visits to Willard Bay reservoir shows that urban people went there mainly for general interest, for fishing, sightseeing, scenery, etc. followed by boating. Farm people went there mainly for sightseeing, boating and fishing.

Pineview reservoir is located in a small high mountain valley. Urban visitors to this location went there mainly for sightseeing, scenery, etc. and fishing. Farm people spoke mainly of sightseeing, fishing, boating, and picnicking at this reservoir.

It is useful to note the high value of aesthetic interest that is served by those reservoirs. A very high proportion of the people in this area value these areas for this purpose.

The data on recreation and aesthetic affects on almost all of these reservoirs has been grossly under-evaluated. This has been true not only in this project but virtually all reclamation projects.

Hoover Dam

The case study of Hoover Dam provides a view of a large project and its impact on a larger area. It illustrates how far reaching a few of the reclamation impacts are, impacts which are not necessarily considered in the benefit side of the ledger of present accounting procedures. The material for this comes from a Bureau of Reclamation Report (1966) titled: The Story of Hoover Dam. This report is summarized as follows.

Early explorers of the Colorado region in Arizona and New Mexico described the area in desolate terms. One such explorer for the United States Government was Lt. J. C. Ives. His letter of transmittal included a portrayal of the Colorado River region in the vicinity of the future Hoover Dam. Ives in part had this to say:

"The region last explored is, of course, altogether valueless. It can be approached only from the south, and after entering it there is nothing to do but to leave. Ours was the first, and will doubtless be the last, party of whites to visit this profitless locality. It seems intended by Nature that the Colorado River, along the greater portion of its lonely and majestic way, shall be forever unvisited and undisturbed."

(Bureau of Reclamation, 1966:5)

As time passed, the use of water for irrigation and the construction of dams for flood control became accomplished engineering facts. Eyes began to re-examine the Colorado River in its lonely chasm and minds to wonder at the possibility of harnessing the great river. Even after comprehensive feasibility reports were completed on the possibility of a dam in Boulder Canyon some people felt such an endeavor would be a financial white elephant. The belief was expressed that many years would elapse before the power market could absorb the energy to be produced.

Despite some prophecies of doom, the dam was built and as a result the following are some of the tangible benefits. Prior to 1935 and the initial operation of the Dam the river fluxuated from as high as 300,000 cubic feet per second discharge to 6,000 cubic feet per second. The low flat valleys of southwestern Arizona and southern California were at the mercy of Colorado River floods. Hoover Dam eliminates the flood damage previously experienced. Only conjecture can produce a dollar figure on the destruction that has not occurred.

Stable water supplies for irrigation have been established. A half a million new acres were brought into cultivation along the river valleys because of the dam. The supplemental water to the Imperial Valley alone has had dramatic effects. In 1934 before the dam, the river discharge was very low at just over 4 million acre-feet. A crop

valued at 10 million dollars was lost in the Imperial Valley in 1934 due to drought. In 1964 in the Imperial Valley with supplemental water from Hoover Dam, crops valued at more than 150 million dollars were harvested.

A dependable municipal water supply has resulted. Las Vegas and Los Angeles have both benefited from this developed water. Both cities had reached or were close to ceilings where the limited available water supply prohibited any further growth until Hoover Dam provided a new source.

Hundreds of millions of tons of sediment are dropped out of the river into Lake Mead each year. Before the dam construction, millions of dollars were spent annually in clearing canals and ditches of the river silt.

Lake Mead is a national play ground. In 1964 over seven and one half million people visited Lake Mead. Camping, swimming, boating, fishing and sightseeing are all major attractions. Hoover Dam is capable of producing more than 6 billion kilowatt hours per year. In the first year of operation it has been estimated that Hoover Dam energy saved Los Angeles consumers alone 1.3 million dollars in decreased electricity costs.

The light metals industry of Nevada would not have been possible without the dam. It is estimated that Hoover Dam annually saves 10 million barrels of oil that otherwise may have been used for power generation.

During World War II much of the United States' aluminum was refined using Hoover Dam power, and some wag has calculated that if

Hoover Dam shortened the war by 12 minutes that it paid for itself in saved war expense. (Bureau of Reclamation, 1968:2) These observations provide an overview of some of the economic effects of Hoover Dam.

The social effects have been equally profound. There has been a positive quality of life impact on people who no longer worry about floods or drought. Farm produce dramatically increased creating more jobs as well as greater abundance and seasonal variety of food which is distributed all over the United States. The dam site and lake are major recreational sites. Regional economic growth has been greatly stimulated. Better educational, occupational and social opportunities have resulted. Las Vegas developed from a small town to a major city because water became available for expansion.

The regional impacts of a project such as this are very important but also it has had effects on the nation as well.

If we look ahead and view the future we may see more clearly that the West is not won. There are important contributions that may yet be made to the region and the nation.

Ives observations that the region offered nothing were probably as prophetic and correct as present observations that the West has no more to offer with increased water development.

This review of the impacts of certain cases is not meant to be comprehensive, but only indicative of kinds of impacts past water reclamation policy has produces. One reason for this discussion is to point out the wide range of effects generated by water reclamation.

THE WATER RESOURCES PROBLEM

The basic problem of this discussion is to critique the two conclusions of the National Water Commission:

1. Additional irrigated agriculture and even all the present irrigated area is not needed to meet exports.
2. That subsidies for development of additional irrigation should be discontinued.

These conclusions as all such judgements are based upon a value system which is founded in a set of beliefs. Some of these beliefs are: that economic objectives are paramount, that financing should be based on a free market system, that the arid west has achieved development and that financing water resource development should be a market related function.

There is a second set of elements, also, that when built upon market place pricing and economic efficiency assumptions, lend credence to the Commission's conclusions. These elements are: first, the dilemma of paying crop subsidies while producing crop surpluses; second, developing more irrigated land while there is still crop land in retirement; and third, subsidizing more irrigation.

When you examine this sequence through the value system of the economic market place it is difficult to imagine conclusions other than those of the Commission's report. For many there are no other beliefs to consider. If those so convinced are making the decisions they will no doubt change the policy and programs exactly as proposed in the report.

It is hoped however, that other beliefs or other perspectives can be considered and it is likely that there will be a mix of

behavior in the real world because there are other basic beliefs that are also valid. Ingram, Roefs and Allee in their analysis recognized that there is a great diversity of viewpoints and convictions when it comes to water resource development. They said:

"However much the goals and objectives of the American people have changed in relation to water resources, there is little to indicate that we are more in agreement today than when the major water programs were initiated. Without some sort of concensus, the most efficient path toward any one set of goals is bound to create conflicts. The cost of conflict must be included in a realistic assessment of efficiency. There is a cost of change. Water development projects, the commission finds, are an inefficient means of stimulating regional economic development. Long practice, however, has made this kind of economic impetus politically acceptable and negotiable. Whatever the actual economic impact of the Central Arizona Project will be, many citizens in Tucson and Phoenix believe that it will insure continued prosperity and growth. It is unlikely they will be willing to accept some other medium, even if one were available.

The effectiveness of a solution ought to have some weight in determining efficiency" (Ingram, et. al., 1973: 7-8).

This view of political values and efficiencies identifies one different type of value. As Ingram, et. al. go on to say, concerning the National Water Commission's draft report, "Since the equity notions of the draft report require costing out of benefits, there is a clear preference in the draft report in favor of economic efficiency criterion and a reluctance to become enmeshed in quantifying and measuring other values" (Ingram, et. al, 1973: 10).

The assumption that all decisions to be based on an economic efficiency base is popular and provides a facade for legitimizing one's opinion. But in public matters, such a narrow perspective seldom provides an adequate basis for decision. For example if the government reasons that cost sharing is unfair in the West it might well be reasoned that it is unfair for the Federal government to continue to hold on to huge amounts of public land in this region. Also that the minerals in these lands should be released.

Certainly this land would provide assistance to state development. Energy resources in the West may well be the next great resource development as agriculture has been in previous years. Complete land use planning should be developed for the public lands followed by preserving those lands that have peculiar public value and permitting development of those that do not.

Land use planning appears to be the next wave of the future. Planning along with water and land development should be closely integrated. This may very well call for additional government subsidies. So to rule out subsidies or what ever it may be labeled, and base decisions on one category of values is not as rational as it would appear.

The West is far from developed. Other developmental programs are receiving strong support from the Congress. One of these is rural development. The West as well as other regions, has many struggling rural communities. The recommendation of the Commission would be counter productive to these efforts at this time. The Report states that water has not proven sufficient in the past to stimulate by itself local economies or population dispersal. That may well be so. Water has often been over rated in its ability to transform society. It is not sufficient in and of itself to generate great societal transformations. But because it is not alone sufficient to create these changes the Commission in affect seems to assume that it must therefore not be necessary. At least in the arid West water is necessary to any development or societal transformation. Water alone may not cause changes but developmental changes don't occur without it.

Assuming that a welfare objective, that is an objective to assist areas that are depressed or deprived, is equally important to the government as is a market place assumption, it might be highly useful to provide for the basic resources needed for development activity. This development may be related to several resources all of which would involve water. This might include agriculture, which undergirds the economy of many communities, or it might provide for mineral development, oil, coal, etc., or recreational development. All of these are basic possibilities for major future resource development in the region.

Another value framework which can provide a different perspective from the assumption of economic efficiency or maximum profits would be that of social well-being. This has its problems in definition, but given a specified set of parameters it is much broader in scope and permits more flexibility for dealing with the many issues and problems confronting planners. It is basically a systems approach rather than one from a specific focal point.

The ingredients here would include economic elements as well as welfare, environmental, and aesthetic considerations. All these are important in the wider scope of human needs. This would provide planners and policy makers with a breadth of perspective that permits the various social objectives sought in this complex society.

CRITIQUE OF THE MARKET SYSTEM AS CURE-ALL

There are many parts of the National Water Commission Report that will be of great importance of future legislation. However, the Report is replete with a dogma of market economics. A warning should be sounded against overemphasizing this concept. The Commission has

tended to fall back on narrow economic symbolism and safe, or so-called "sound," "market place" approaches to solving social problems.

Although these concepts have an important place it is not the only useful approach. In addition this perspective can be stifling to imaginative new approaches that are often needed for public planning and managing resources. Seldom, if ever, are public problems left only to an open market system.

The question of continuing present water reclamation policy is a social and political, as well as economic question. Failure to recognize this leaves little room for developing a choice of alternatives. There is a sense of inevitability in the Report that the market has decreed and therefore inaction is better than struggle to build. The approach promulgated here would have us believe that there is some kind of "natural law" controlling the economic market system. This smacks of the problem of reification of the system.

More adequate social theory is needed to deal with these complex problems. Greater effort is necessary by all social science disciplines for improving social theory on interrelated problems if we are to be able to adequately assist in the political decision process. It is now time for a reformation in social theory. An integration of theory is needed in order for overlapping social science problems to be dealt with adequately. Insufficient effort is being made by all disciplines and by funding agencies to develop coherent concepts that are interchangeable, and additive. Scientific resources in private foundations and the National Science Foundation should be turned to this problem in order that water, and

other natural or environmental resources, may be more adequately studied.

SOME RECOMMENDATIONS

Four recommendations may be suggested.

First, in several studies made at the Institute for Social Science Research on Natural Resources on the subject of water resources it has been found that one of the most agonizing, debilitating and limiting factors in many rural communities in the arid areas is the lack of a full and consistent water supply for the present agricultural industry. The major mission for water development in the West for the next two or three decades might well turn even more to the problem of supplemental water than it has already done. The case studies discussed here have clearly shown the feasibility of this objective and that it can be managed without introducing into production large amounts of new land. This type of development would help stabilize many rural communities and also provide the minimal basic water resource for any rural development needs.

Second, planning for rural water resources should include the feasibility of developing strategic center communities in the West. These communities would be developed as centers for a large hinterland to provide services for many satellite areas. The function of the center community would be to stimulate the development of resources in a large area. In many Western states there are large areas with struggling communities, none of which can provide adequate services. Without these services people leave and the area stagnates.

These can be stimulated by planning for their development in relation to all resources of an area, whether they are agriculture, oil shale, coal, power, or a combination of these and other resources.

Water resources, may not be the most critical ingredient for causing development, but it is a necessary one and making provision for these action communities should be made in federal and state water resource planning.

Third, as has been shown in studies of reservoir use, recreation has been greatly underestimated in the value of almost all reservoirs built. Much of the playground in Western American has been developing around these lakes.

Fourth there is a need for a definitive interdisciplinary model for well-being including more of the conditions involved than just economic and physical factors only. These might include the following:

- a. Land use aspects.
- b. Urbanization.
- c. Environmental impacts.
- d. Water resources.
- e. Aesthetic elements.
- f. Recreational aspects.
- g. Social services and institutions.
- h. Population distribution.
- i. Mobility and transportation.
- j. Employment opportunity and welfare.
- k. Income security and distribution of income.

SUMMARY AND CONCLUSION

The inclusion of social elements in water development policy adds another important dimension to any model for this resource. Major needs for water development in the West are for supplemental irrigation water to stabilize rural communities and rural development, for key service center development and recreation and aesthetic needs. Case studies shown demonstrated the need to include in a major sense these values of water resources in any future development. In addition there is a need for a broader theoretical approach to the analysis of water resource evaluation for planning and development purposes. This approach should include social as well as environmental, economic and physical aspects in a model.

LIST OF REFERENCES

Anderson, Raymond L. and L. M. Hartman. Introduction of Supplemental Irrigation Water: Agricultural Response to an Increased Water Supply in Northeastern Colorado. Technical Bulletin 76, Colorado Agr. Exp. Sta., Colorado State University at Fort Collins Colorado. June, 1965.

Andrews, W. J., A. B. Davis, K. S. Lyon, G. E. Madsen, R. W. Roskelley, B. L. Brower; Identification and Measurement of Quality Of Life Elements In Planning for Water Resources Development: An Exploratory Study; Institute for Social Science Research on Natural Resources; Utah State University; Research Report #2; 1972.

Andrews, Wade H., Gary E. Madsen, and Gregory LeGaz, of the Institute for Social Science Research on Natural Resources, of Utah State University, are making a study of the Weber River Basin. The complete Report is expected to be in print in June of 1974.

Bureau of Reclamation, The Story of Hoover Dam. U.S. Govt. Printing Office, Washington, 1966.

Bureau of Reclamation, Statues at Hoover Dam. Washington, Govt. Printing Office, 1968.

Ingram, Helen, T. G. Roefs, and D. J. Allee. The National Water Commission Report: A Review. Institute Series No. 14. Institute of Government Research, University of Arizona, Tucson, Arizona. May, 1973.

National Reclamation Association proceedings of the Annual Convention, Albuquerque, New Mexico, November 18, 1966.

National Water Commission, Water Policies For the Future, Final Report to the President and the Congress of the United States. U.S. Govt. Printing Office, Washington, 1973.

Nelson, Lowry. Rural Sociology, Second Edition. American Book Co., New York, 1955.

Statistical Abstracts of the United States. U.S. Govt. Printing Office, Washington, 1971.

Taylor, C. C. et al. Rural Life in the United States, Alfred A. Knopf, New York, 1949.

Thomas, W. P., G. T. Blanch, O. W. Israelsen, Dean F. Petersen, D. S. Jennings. Colorado River and Utah's Agriculture. Utah State University, Logan, Utah. 1949.

United States Department of the Interior. Federal Reclamation and Related Laws Annotated Vol. I through 1942. U. S. Government Printing Office, Washington, D. C., 1972. p. (31-89)

World Book Encyclopedia, Vol. H, Field Enterprises Educational Corp., Chicago, 1960.