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The Function of Social Behavior in Water Resource Development

By Wade H. Andrews and Dennis C. Geersten



Research Report No. 1
December 1970

Institute for Social Science Research on Natural Resources
and Center for Water Resources Research

Utah State University
Logan, Utah 84321

**THE FUNCTION OF SOCIAL BEHAVIOR IN WATER
RESOURCE DEVELOPMENT**

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**Research Report No. 1
December, 1970
of the**

**Institute for Social Science Research
On Natural Resources**

In cooperation with the

**Center for Water Resources Research
of
Utah State University
Logan, Utah 84321**

Cover Photo: Area immediately above the proposed site of the High Oneida Dam.

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The project has been carried out in three phases, the first of which was by Dr. Bylund with the assistance of others, the second phase largely by the senior author and the third phase by both authors of this report. The authors are indebted to several graduate students, technicians and secretaries, a few of whom include James L. Gillings, Jergen Schwermer, and Thomas Atkins.

Wade H. Andrews
and
Dennis C. Geertsen

PREFACE

This report is an analysis of a social survey of the middle and lower Bear River Basin of southeastern Idaho and northern Utah concerning the problem of water resource development in a semiarid region of the Western United States. The survey part of the study, carried out in the summer of 1966, dealt with both general social factors and a specific proposal made by the Bureau of Reclamation for developing water resources of the Bear River. In many respects this proposal and the resulting behavior is typical of other western river basin projects, in some ways, however, it is also unique. It is expected that the broad exploratory nature of this study will provide a useful background for other studies with more specialized and limited goals. The limited application of research to the behavioral problems of water resources research has guided the wide focus of this problem.

This monograph reports a considerable amount of data. *It is recommended that the reader interested in less detail might well confine himself to the chapter summaries and the final chapter on conclusions.*

In some cases, in concluding or projecting, the writers have taken the liberty to speculate beyond the strict confines of the data, including some perspectives they have obtained in the process of the study. These occasions are indicated for the reader.

TABLE OF CONTENTS

| Chapter | | Page |
|---------|---|------|
| 1 | INTRODUCTION | 1 |
| | Previous Work and Present Outlook | 2 |
| | Objectives | 3 |
| | Methodology | 3 |
| | Gathering of data | 3 |
| | Statistics | 5 |
| | Description of the area and the project proposal | 5 |
| | The area | 5 |
| | The project proposal | 6 |
| | Some Major Categories in the Study | 7 |
| | Characteristics of the People | 8 |
| | Footnotes | 12 |
| 2 | ATTITUDES TOWARD BASIC ISSUES RELATED TO WATER USE, LAND USE, AND CONSERVATION | 15 |
| | Attitudes Regarding Water Use | 15 |
| | River basin transfers | 15 |
| | Irrigation use versus other choices | 17 |
| | Attitudes Regarding Land Use and Conservation | 20 |
| | Summary | 26 |
| | Footnotes | 28 |
| 3 | SOCIAL CHANGE AND WATER USE | 29 |
| | Some Types of Change | 29 |
| | General change | 29 |
| | Affect of urban changes on water | 30 |
| | Attitudes toward industrial change | 31 |
| | Non-farm perception of changes in water use | 32 |
| | Summary | 34 |
| | Footnotes | 34 |
| 4 | DIFFUSION OF IDEAS AND INFORMATION RELATED TO IRRIGATION | 35 |
| | Summary | 40 |
| | Footnotes | 40 |
| 5 | WATER INSTITUTIONS | 41 |
| | Water Rights | 42 |
| | Water Measurement | 50 |
| | Summary | 51 |
| | Footnotes | 52 |

TABLE OF CONTENTS (CONTINUED)

| Chapter | Page |
|---------|--|
| 6 | PERCEPTION OF WATER SUPPLY AND PATTERNS OF WATER USE BEHAVIOR 55 <ul style="list-style-type: none"> Perception and Behavior 55 <ul style="list-style-type: none"> Water supply 55 Water use patterns 59 Summary 60 Footnotes 61 |
| 7 | BASIC INSTITUTIONS, SOCIAL SYSTEMS AND THEIR PERCEIVED FUNCTIONS IN WATER RESOURCE DEVELOPMENT 63 <ul style="list-style-type: none"> Institutions, Social Systems and Functions 63 <ul style="list-style-type: none"> Local government and water 63 Politics and water 65 Educational systems and water 65 Religious social systems 67 Influential groups 69 Government agencies 72 Bureau of Reclamation 74 Summary 76 Footnotes 78 |
| 8 | KNOWLEDGE, BEHAVIOR, AND ATTITUDES RELATED TO THE RECLAMATION DEVELOPMENT PROPOSAL FOR THE BEAR RIVER 79 <ul style="list-style-type: none"> Orientations Regarding the Project 79 <ul style="list-style-type: none"> Awareness of the project 79 Knowledge level 80 Activity related to knowledge 82 Perception and attitudes 84 Attitudes toward the Bear River Project 86 Social Characteristics and Attitudes Toward the Project 95 <ul style="list-style-type: none"> Age 95 Education 95 Level of living 96 Interbasin transfer attitudes 96 Surplus water perception 98 Attitudes Toward Complete Development 99 Summary 102 Footnotes 106 |

TABLE OF CONTENTS (CONTINUED)

| Chapter | Page |
|--|------|
| 9 CONCLUSIONS AND RECOMMENDATIONS | 107 |
| Conclusions | 107 |
| Introduction | 107 |
| Attitudes and basic issues | 109 |
| Perception of change | 110 |
| Diffusion of ideas | 111 |
| Institutions | 112 |
| Perception of water supply | 113 |
| Social systems involved in water | 114 |
| The survey as a methodological tool | 115 |
| The Bear River Proposal | 116 |
| Functions of the opposition | 116 |
| Factors affecting behavior | 117 |
| Boundary expansion | 118 |
| Problems for Further Research | 119 |
| BIBLIOGRAPHY | 121 |
| APPENDIXES | 125 |
| Appendix 1 Project Statistical Summary | 127 |
| Appendix 2 Alternate Proposals | 133 |
| Appendix 3 Publications and Papers | 135 |

LIST OF FIGURES

| Figure | Page |
|--|------|
| 1 The Bear River Basin | xii |
| 2 A summary of phases and steps in the process of institutionalization of appropriative water rights in Utah | 44 |

LIST OF TABLES

| Table | Page |
|-------|---|
| 1 | Occupational category of respondents, by open country farm and non-farm, town farm and non-farm, and metropolitan-urban 9 |
| 2 | Marital status of respondents, by open country farm and non-farm, town farm and non-farm, and metropolitan-urban 10 |
| 3 | Educational background of respondents, by open country farm and non-farm, town farm and non-farm and metropolitan-urban 10 |
| 4 | Attitude toward interbasin transfer of water, by residence 16 |
| 5 | Attitude toward interbasin transfer of water, by middle and lower basin area of residence 17 |
| 6 | Most important uses for natural stream water resources, by residence categories 18 |
| 7 | Attitude regarding priority between use of land for mining and recreation, by residence categories 21 |
| 8 | Attitude regarding priority between forest use of land and grazing uses, by residence categories 23 |
| 9 | Attitude regarding priority between use of Bureau of Land Management and Forest Service land for private farming or ranching and public use, by residence categories 24 |
| 10 | Attitude toward public or private control of land for erosion and other runoff problems that affect the water supply, by residence 25 |
| 11 | How things are changing in their local area by frequency of mention, by all rural and by metropolitan-urban residence 30 |
| 12 | Attitudes toward whether or not the Great Basin should attempt to obtain more industry if this puts more pressure on the supply of water in the area, by residence 31 |
| 13 | Types of reasons given for belief that more industry would be good for the region, by frequency of mention 32 |
| 14 | Perception of types of important changes during the last twenty years in the use of water in the area, by rural non-farm and metropolitan-urban residence 33 |

LIST OF TABLES (CONTINUED)

| Table | Page |
|-------|--|
| 15 | First sources of new farm ideas used by farm respondents 36 |
| 16 | Farm journals regularly received or read by farmers, by frequency of mention 37 |
| 17 | Ideas about water use or equipment obtained from farm journals 39 |
| 18 | Formal and informal sources of learning about importance of water rights, by rural town and country and metro-urban 45 |
| 19 | Formal and informal sources of learning about importance of water rights, by type of residence 46 |
| 20 | Farmers who think the system of water rights has changed since the time of the early settlers, by county of residence 46 |
| 21 | Reported ways in which the system of water rights has changed since the time of the early settlers as perceived by farmers who felt that changes had occurred 47 |
| 22 | Possible future changes in the system of water rights as perceived by farmers who had stated they felt that changes could occur 49 |
| 23 | Perception of farmers as to the adequacy of their water supply, by state of residence 55 |
| 24 | Responses by farmers to the question: "Is the water you have adequate for your needs?" by county of residence 56 |
| 25 | How farmers reported they would get more water if they needed it, by state of residence 58 |
| 26 | Changes in irrigation methods made by farmers in the last 20 years, by state of residence 59 |
| 27 | County or town government involvement with water resources, by county or metropolitan-urban place of residence 64 |
| 28 | Political involvement with water, by county or metropolitan-urban place of residence 66 |
| 29 | Religious system involvement with water, by county or metropolitan-urban place of residence 68 |

LIST OF TABLES (CONTINUED)

| Table | Page |
|-------|--|
| 30 | Types of social systems listed as most influential in water use and development and the functions they fulfill 70 |
| 31 | Social systems most frequently mentioned and specific functions they fulfill related to water use and development 71 |
| 32 | Types of government agencies identified as important in relation to water resources, by frequency of mention 73 |
| 33 | Evaluation of activities of government agencies, by type of residence 74 |
| 34 | Specific government agencies in the area that are believed to be important in relation to water resources, by frequency of mention 75 |
| 35 | Perceived functions of the Bureau of Reclamation, by frequency of mention 76 |
| 36 | Farmer's level of knowledge of the Bear River Project, by state 81 |
| 37 | Attendance at one or more meetings at which the Bear River Project was the major topic of discussion, by residence 82 |
| 38 | Types of individuals and groups who sponsored meetings according to those who attended the meetings, by frequency of mention 83 |
| 39 | Type of action engaged in to become better informed about the Bear River Project, by frequency of mention 84 |
| 40 | Types of reasons believed responsible for Bear River Project being held up, by frequency of mention 85 |
| 41 | Belief that some areas of the river basin are to get more water than others in the proposed project, by county or metropolitan-urban area 87 |
| 42 | Belief that certain areas would receive more water than others in the Bear River Project proposal, by residence 88 |
| 43 | Factors that influenced attitudes toward the Bear River Project 88 |

LIST OF TABLES (CONTINUED)

| Table | Page |
|-------|---|
| 44 | Belief that the Bear River Project would or would not hurt them individually, by residence 89 |
| 45 | Belief that the Bear River Project would or would not hurt them individually, by county and metropolitan-urban area 90 |
| 46 | Attitude toward the Bear River Project as to whether it would help or hinder the water situation in the area, by residence 91 |
| 47 | Attitude toward the Bear River Project as to whether it would help or hinder the water situation in the area, by county and metropolitan-urban place of residence 92 |
| 48 | Reasons given for belief that the Bear River Project would help the water situation in their area 93 |
| 49 | Reasons given for belief that the Bear River Project would hinder the water situation in their area, by frequency of mention 94 |
| 50 | Attitude toward the Bear River Project as to whether it would help or hinder the water situation in the area, by age 95 |
| 51 | Attitude toward the Bear River Project as to whether it would help or hinder the water situation in the area, by educational background 96 |
| 52 | Attitude toward the Bear River Project as to whether it would help or hinder the water situation in the area, by attitude toward interbasin transfer 97 |
| 53 | Attitude toward interbasin transfer of water, by major areas in the Bear River Basin 97 |
| 54 | Attitude toward the Bear River Project as to whether it would help or hinder the water situation in the area, by respondent's belief or non-belief that surplus water exists in the Bear River 99 |
| 55 | Attitudes toward complete planning and development of the Bear River, by residence 100 |

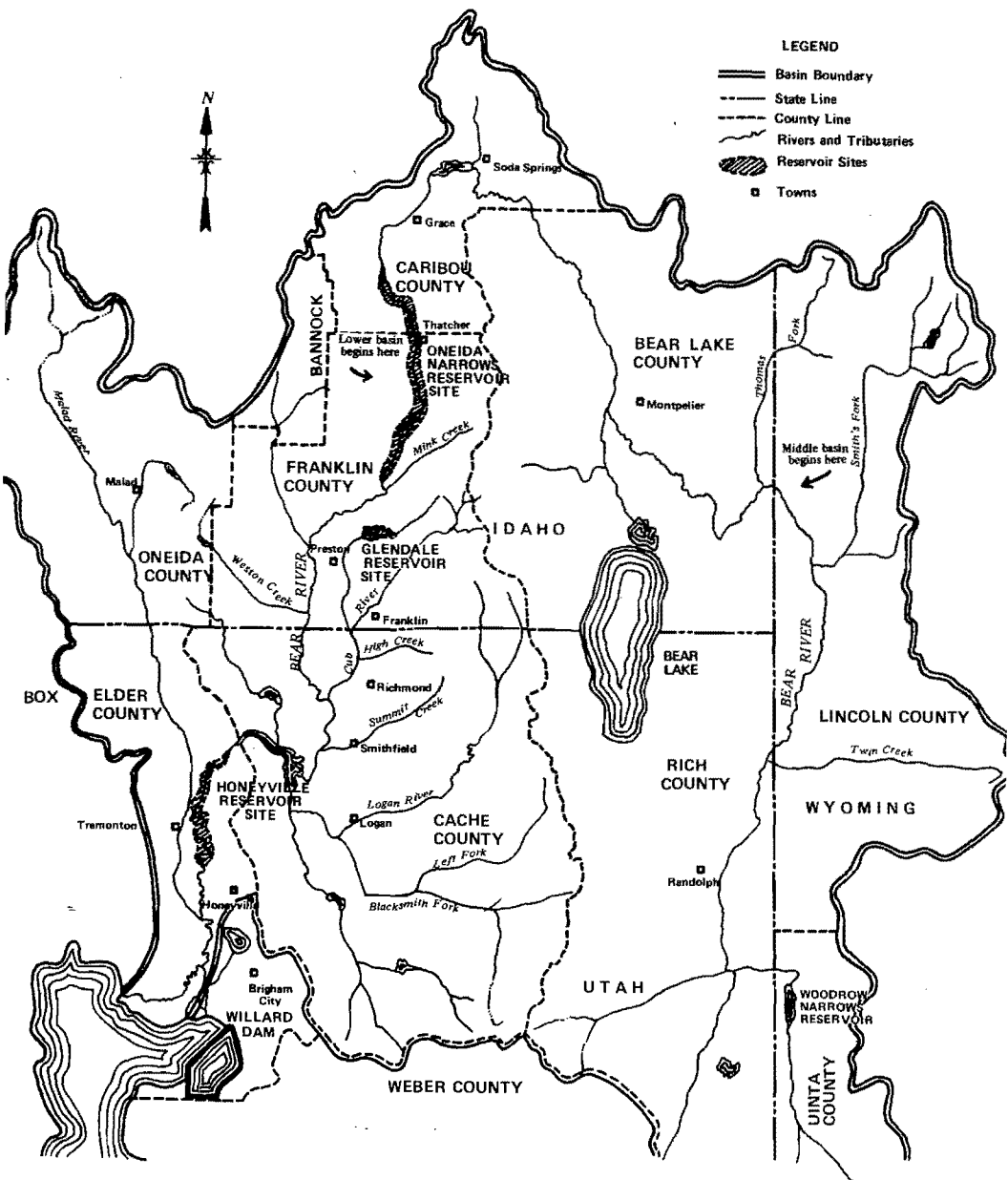


Figure 1. The Bear River Basin.

CHAPTER 1

INTRODUCTION

An early writer on social change, William F. Ogburn, developed the theory that cultural change always lags behind technological change.¹ Whether or not one accepts Ogburn's whole premise, technological change does have a crucial impact upon human behavior. In recent years, the importance of social and psychological factors related to these changes have begun to be recognized by physical planners and the public. This recognition has resulted in new questions that engineers and others are asking about the social relevance of development of physical resources. These questions were forerunners of the present research.

Among the major problems of the United States and much of the world, which are accompanying rapid increases in population and industrialization, are those centering in the use of water and adequacy of water supplies. Up to the present, investigation of these problems has concentrated largely on the physical and economic aspects of water usage and development. From such research, water resource plans have been developed based upon benefit-cost relationships. However, plans founded only upon the basis of conventional benefit-cost ratios are seldom accepted. This result occurs because of cultural, social-organizational, and social-psychological forces which physical and economic research has been unable to take into account.

Recently many water resource engineers and planners have indicated that some of the most difficult problems in successful water resource development relate to social problems. These include decisions, acceptance, and the necessity of evaluation of social values and institutions in order that acceptance may be accomplished. These social constraints have been frustrating to water resource developers; however, they have grown accustomed to them and have come to accept them. This acceptance has foreclosed the pursuit of means to resolve the social constraints.

Social value alternatives such as conservation, aesthetics, and recreation are involved in the choices of development, but cannot be easily quantified in economic terms. Other behavior related to the feelings, traditions, sense of involvement, sense of power in decisions, locality loyalties, economic self-interest, and other individual or group forces affecting decisions are traditionally overlooked because they cannot be counted with the use of conventional procedures. Also, because the influence of these elements on water usage and development programs is generally not understood, the research project reported here proposes to take many of these factors into account in a general review of the social aspects of a water development proposal.

The present study deals with the effects of a proposal for the technological development of a water resource. The Bureau of Reclamation of the United States Department of the Interior has conducted feasibility studies to determine both the economic benefits derivable from the development of the Bear River in southern

Idaho and northern Utah, and the physical structures necessary to accomplish the task. These analyses have resulted in a proposal to build storage dams, canals, and other related structures on the Bear River system. The Bear River Project proposal of 1962, as contained in the Feasibility Report,² would provide water largely for irrigation, but also would provide water for municipal, industrial, and recreational uses. From a technological standpoint, engineers do not consider the proposed physical construction to be unusually difficult. However, planners are not always aware that the reactions of people involved in such a plan are important and highly complex.

Over the years one of the many human problems encountered is that of resistance to change. Although public resistance can, and often does, lead to clarifications and alterations in the direction of greater efficiency and social satisfaction, other types of resistance are frequently based upon fear, ignorance or other non-rational orientations. To the extent that human resistance is based upon factors that prevent the realization of commonly accepted public goals, either for greater efficiency or for other public satisfaction, it is assumed to be non-functional or detrimental to society. Resistance to change, therefore, is one of the major social problems or constraints examined in this study. Answering the question of why people resist change requires the investigation of other major social questions. The purpose of this study, therefore, is to investigate some of the cultural, social-organizational and social-psychological factors associated with proposed changes in water usage patterns.

Results from this case study of the Bear River should be of both theoretical and practical value. From a theoretical standpoint, the results should yield insight into the functional and dynamic relationship of cultural values, social organization or structure, and interpersonal interaction in enhancing and impeding social change, particularly as it is associated with the human management of a natural resource. From a practical point of view, study results should provide a better understanding of the human element in water usage and development. In turn, a more adequate basis can be laid for public and private decisions in planning and management of water, an important and increasingly scarce resource. Such information will not only be of practical use in the local geographic area of the study, but principles involved will have value in similar situations both in other parts of America and abroad.

Previous Work and Present Outlook

Social scientists and sociologists in particular, have been slow in assuming responsibilities for research on problems of control and development of natural resources. This was pointed out as early as 1953 by Ostrum³ and there has been relatively little work since that time. Only in very recent years has the effort increased. This pattern is true for work on water resources as well as other resources.

Research by social scientists in the general area of natural resources has largely focused on outdoor recreation, leisure, and forest management. Research in outdoor recreation and leisure has been done by Burch,⁴ Hines,⁵ Ingman,⁶ Taves, Hathaway and Bultena,⁷ South, Hansbrough and Bertrand,⁸ Slocum and Empey,⁹ and Hendee, Steinburn, and Catton,¹⁰ while research in forest management problems such as forest policies and forest fire behavior has been done by Bultena,¹¹ Christiansen and Folkman,¹² as well as Jones, Taylor, and Bertrand.¹³

Sociological research in the area of water resources has been done by Spaulding¹⁴ (household water use and social status), Andrews^{15,16} (sociological and social-psychological factors related to water resources), Firey¹⁷ (theory of water resource use), Selznick¹⁸ (TVA and formal organization), Ibsen and Ballweg¹⁹ (public perception of water resource problems), and Bylund²⁰ (human factors in water usage changes). The research by Bylund has been especially useful to the writers as it dealt with observations made in an earlier phase of the present study.

Several publications and papers have been produced by Kenneth P. Wilkinson and his associates at the Social Science Research Center at Mississippi State University on community action, attitudes, and behavior related to watershed development.²¹ Some social research and other papers on water problems in arid land areas were also reported at a symposium held at New Mexico State University in 1966.²²

Studies at other universities and by individuals, either completed or in process, were reported in the "Proceedings of the Workshop for Sociological Aspects of Water Resources Research" held at Utah State University in 1968.²³ Types of research reported dealt with social factors in watershed development,²⁴ collective stress associated with water related disasters,²⁵ and social factors in water consumption.²⁶

Sociologists, anthropologists, and social psychologists have been concerned with the basic ideas of social change, acceptance of ideas, and the diffusion of innovations. The state of the art is not totally lacking in relevant works. There are a number of books which treat the general idea of social change, from which some theories are applicable to this problem.²⁷ An example of other references with some application is an extensive bibliography²⁸ which contains citations of studies in the area of change and acceptance of new ideas and practices. These studies, however, have been concentrated in areas other than water resources, but some contain theory and techniques applicable to the present study.

Objectives

The broad objectives that have guided this exploratory work are:

1. To determine the social-psychological value patterns that enhance or impede the development and use of water as a resource.
2. To determine how basic cultural and social organizational arrangements are interrelated in motivations and attitudes and are instrumental in enhancing or impeding the development and use of water.

Methodology

Gathering of data

The major method used in gathering data for this report was a random sample survey of household heads in the middle and lower Bear River Basin as well as of the neighboring Ogden area. This survey included 1070 interviews, with an interview schedule of over 150 open-end and structured type questions.

Three different residential categories were studied, namely, metropolitan-urban, small town, and open country. For sampling purposes the method used was basically a map segment technique²⁹ administered as nearly alike as possible in the three different types of residential areas. This technique was essentially a stratified random sample of each of the three categories.

Parts of the following five counties were included in the study: Bear Lake, Caribou and Franklin counties in Idaho, and northern Cache and eastern Box Elder counties in Utah. (See Figure 1.) Interviews were made only in those parts of the counties which are included within the drainage basin of the Bear River. The data have been analyzed on the basis of three separate categories in some cases and in others by combining the open country and town categories. Although the sampling was not exactly on the same basis, the two rural categories of open country and small town were judged to be near enough alike to be usefully dealt with jointly where county level and sub-basin analysis was used. The metropolitan-urban category, however, was not combined in this way because the relatively small sample did not provide for proportionate representation.



Interviewing on the Bear River Basin.

Statistics

The non-parametric χ^2 test of independence was used to determine if the observed differences between categories were significant. This information is included in many tables. For example, a χ^2 of 36.95 with 8 degrees of freedom and a P of .001, which is the case in Table 4, means that the percentages in that table differed from computed expectations (not shown) to such an extent as to produce a χ^2 value of 36.95. With 8 degrees of freedom a P of .001 means that differences this large could have occurred by chance less than one time in a thousand. The reason that a small chance still exists is because the findings are based upon a sample of respondents rather than upon all respondents, which always introduces the unknown possibility that the part may be different from the whole. Nevertheless, large differences increase the degree of confidence (99.9% in this case) that the inferred relationship between variables actually exists in the study area.

Description of the Area and the Project Proposal

The area

The Bear River rises in the Uinta Mountains of northeastern Utah, and flows north through western Wyoming and part of Utah before turning westward into Bear Lake County of Idaho. Here it continues on a northward course into Caribou County, then makes a horseshoe turn around the end of the Wasatch and Bear River range. From there it flows generally south and west through Franklin County, Idaho, Cache County and Box Elder County in Utah, where it finally reaches its destination in Great Salt Lake. Although the airline distance is only 90 miles from the source to its mouth, the river flows about 500 miles, and it has the distinction of being the largest stream in the Western Hemisphere that does not reach the ocean.³⁰ The Bear River runs through a succession of valleys, separated by narrow canyons.

For comparative purposes, the metropolitan area of Ogden, Weber County, Utah, was included in the study. This area is not actually in the Bear River Basin, but is adjacent to it. It was also included in the study because it was proposed in the Feasibility Report that a portion of the Bear River waters be diverted into Weber County and, therefore, the Bear River Project would have some affect upon the water use and planning in that area. For purposes of this study, the area in the counties of Bear Lake, Caribou, and a small part of upper Franklin County, is referred to here as the "middle basin" and the larger part of Franklin, Cache, and Box Elder counties, is referred to as the "lower basin."

The major sub-culture characteristics in this area are the predominance of agriculture and the Latter-day Saint religion, although there are some other industries and numerous other religions also present. The Great Basin area, of which the Bear River is a tributary, is somewhat physically independent from other large urban influences as is much of the Rocky Mountain Region. The particular areas in the sample population are largely rural by U.S. census definition (most places being below 2,500). The larger cities which are in the lower part of the river basin in Utah are Logan (population about 25,000), a university city and farming trade center, and Brigham City (population about 12,000), a traditional agricultural trade center which has in recent years had a major defense industry come into a nearby area, and is also

located only 20 miles from the larger metropolitan center of Ogden. Most of the farms fill the valleys around the small towns located in each of the five counties.

The project proposal

The 1962 Feasibility Report describes the project in a summary as shown below. The statistical summary is shown in Appendix I.

By means of storage regulation, distribution works, and water exchanges, the Oneida division would increase the usable water supply of Bear River and its Cache Valley tributaries, Cub River and Mink Creek, for irrigation, municipal and industrial uses, and fish and wildlife propagation. Project reservoirs would also provide recreation and flood control benefits. Irrigation supplies would be increased by an average of 202,900 acre-feet annually. The water would be used on 109,008 acres of land in Idaho and Utah, including 49,766 acres of full service land and 59,242 acres of supplemental service land. The division would provide municipal and industrial water supplies averaging 23,000 acre-feet annually to communities in Utah. Approximately 88,000 acre-feet of water annually would be provided to existing and potential wildlife refuges and to improve an existing reservoir fishery.

Main stem segment

The 375,000-acre-foot capacity Oneida Narrows Reservoir would be formed by a dam on Bear River 10 miles northeast of Preston, Idaho. The Oneida Canal would head at the reservoir at a point about 250 feet above streambed at the dam, and would extend 105 miles along the northern and western edges of Cache Valley and into Malad Valley. The Oneida Canal would deliver water to existing irrigation systems, some of which would be modified, and to the planned Coulam Waterfowl Management unit in northern Cache Valley. It would also deliver water to improve the fishery at the existing Newton Reservoir. New irrigation laterals and drains would be provided as justified. Additional irrigation water would be diverted from Bear River for irrigation in the Grace, Idaho, area above the Oneida Narrows Reservoir in exchange for return flows from project lands usable by canals diverting from the existing Cutler Reservoir. Drain water from some project lands would improve the waterfowl habitat at the Utah Public Shooting Grounds.

The 120,000-acre-foot capacity Honeyville Reservoir would be formed by a dam on the lower Bear River at a point 4 miles southeast of Tremonton, Utah. Water would be released from the reservoir to improve the river fishery and for use at the Bear River Migratory Bird Refuge and on other wildlife lands. Part of the stored water and natural flow entering the reservoir would also be conveyed south 19.4 miles in the planned Honeyville Canal to the Willard Reservoir of the Weber Basin project, thus replacing Ogden River water which would then be used for municipal and industrial purposes in Ogden, Utah, and vicinity.

The site of the existing Oneida Powerplant of the Utah Power and Light Company would be inundated by the Oneida Narrows Reservoir. Power production at the company's Grace, Cove, and Cutler Powerplants would be reduced by project operation.

East Cache segment

The Glendale Reservoir on Worm Creek, 4 miles northeast of Preston, Idaho, would be enlarged to a capacity of 23,000 acre-feet. Additional water would be diverted to the reservoir from Cub River through an enlargement of the Cub-Worm Canal and from Mink Creek through the existing Mink Creek Canal. The East Cache Canal would be constructed from the Glendale Reser-

voir south 27 miles to Summit Creek near Smithfield, Utah. The canal would deliver project water to existing irrigation systems, some of which would be modified. Some lands above the canal would be served by exchanges. Part of the canal water would be used directly or by exchange for municipal purposes at Lewiston and Smithfield. 31

Some Major Categories in the Study

One of the objectives noted for this study was to determine the social value patterns that enhance or impede the development and use of water as a resource. To fulfill this objective a detailed analysis of the general characteristics of the sample was made to measure attitudes and values of individuals in groups or other aggregates, and to determine the relation of various social forces to attitudes and values. Occupation and residence are examples of some of these forces, and are used here as basic distinctions for analysis in this study.

Farmers are known to represent, in some ways, a fairly distinct cluster of attitudes. Although rural-urban differences in values are believed by some authors, such as Larson and Rogers, to be decreasing as America moves in the direction of a mass society,³² rural residence still makes communication between farmers a relatively simple matter and communication is assumed to be a major condition for attitude formation. In like fashion, rural non-farmers who are small town or village dwellers and open country non-farm residents, are influenced by their residence in a rural section as well as by their work in an urban atmosphere. Gillings³³ shows existing differences between metropolitan city and rural dwellers. His definition of rural included both farm and small town non-farm populations.

Communication and opinion exchange between farmers and non-farmers, and between rural non-farm and urban people is relatively common. Channels for this exchange often happen by indirect means. For example, a wide variety of people, such as salesmen traveling in rural areas, as shown by Vidich and Bensman,³⁴ act as diffusion agents or agents of contact which provide a link between the urban and rural areas. Although not in an interactive context, another influence which links urban and rural areas by means of a common stimulus is the mass media such as television, radio, and newspapers. In addition, people from the study area travel to the urban centers where they come in contact with many people there. In the geographic area of this study, Andrews³⁵ found that 64% of the residents of this river basin area had visited Salt Lake City in a one year span, 49% had visited Ogden, nearly 84% had visited Logan, and 32% had visited Pocatello one or more times. These were the main urban cities associated with the area. Despite the existence of linkage factors, there is still enough difference associated with residence and occupation to merit the use of distinct categories.

There were three types of residence and two general occupational categories which characterized the people in the study. These categories were: open country farm, open country non-farm, town farm, town non-farm, and metropolitan-urban. Ogden, Utah, the center city of a Standard Metropolitan Statistical Area, was the urban area examined in this study, while small towns and open country areas in the Bear River basin of northern Utah and southeastern Idaho were the various rural sectors included.

There were 431 respondents who did not live within the limits of a town of any size, whereas 445 respondents lived within the city limits of a town. The urban group contains 194 respondents from within the city limits of Ogden, Utah. In addition to these residential groupings, the open country and town categories were further broken down into farm and non-farm groupings. The criterion for classifying a respondent as a farmer was based upon his reporting that he received 50% or more of his family income from a farming operation. All farmers studied reported the use of irrigated land in their farm operation. Also included in the farm group were retired farmers of the same description. All others in the sample were simply classified as "non-farm." This left 254 open country farmers and 70 town farmers, compared with 177 non-farm people in an open country outside of towns and 375 that resided in towns as well as 194 non-farmers in the metropolitan-urban area. The characteristics of each group were examined.

Characteristics of the People

In the interview schedule, various questions were asked regarding personal characteristics of the people, such as: main occupational types, sex, marital status, age, years of education, and years of residence in the county in which they were living.

U.S. census categories of occupational types from the 1960 census were used³⁶ (Table 1). Of the 254 open country farm residents, 44 or 17.3% were retired compared to 23 or 32.9% of those farmers who lived in towns. This suggests that some farmers moved to town following retirement. For retired non-farm people, 9.3% lived in the metropolitan urban center, whereas 20.3% lived in small towns and 16.4% lived in the open country. Small towns have a considerably larger proportion of retired people.

In the manager, official, and proprietor category, as might be expected, there was a smaller percentage living in the open country than in the town and urban type areas. In the craftsman category the opposite was found, a smaller percentage resided in the towns than in the open country. However, for the urban city, a larger proportion, as would be expected, was shown to reside there. Craftsmen in the open country area also tended to be part-time farmers. The interview consisted of only household heads for the various residences that fell in the sample. Unless other conditions intervened, this was defined by the investigators as being the male head. Two intervening conditions were the absence of a male household head, and the physical or mental incapacity of the male household head. Examples of the former were women who never married, or who were widowed, divorced, or separated, or whose husbands were absent for extended periods.

Because there exists basic social and cultural differences between males and females, it is useful to indicate the number of women who fell in the sample. Of all open country farm operators, 1.2% were female, while none of the town farmers were female. There was a greater percentage of female household heads in the various non-farm groups (open country 13.0%, town 17.9% and urban 16.5%). This is to be expected, inasmuch as active farming is considered in the culture to be a masculine occupation, while a wide range of occupations suitable to women can be found among non-farm occupations. Despite the fact that some were female, over 82% in each group were male.

Table 1. Occupational category of respondents, by open country farm and non-farm, town farm and non-farm, and metropolitan-urban.

| | Open Country | | | | Town | | | | Metro- Urban | | Total No. |
|--|--------------|--------------|-----------------|--------------|-------------|--------------|-----------------|--------------|-----------------|--------------|--------------|
| | Farm No. | Pct. | Non-Farm No. | Pct. | Farm No. | Pct. | Non-Farm No. | Pct. | No. | Pct. | |
| Professional | --- | -- | 23 | 13.0 | --- | -- | 56 | 14.9 | 30 | 15.5 | 109 |
| Active farmers | 210 | 82.7 | --- | --- | 47 | 67.1 | --- | --- | --- | --- | 257 |
| Managers, officials, proprietors | --- | -- | 20 | 11.3 | --- | -- | 60 | 16.0 | 34 | 17.5 | 114 |
| Clerical sales | --- | -- | 16 | 9.1 | --- | -- | 28 | 7.5 | 18 | 9.3 | 62 |
| Craftsmen | --- | -- | 42 | 23.7 | --- | -- | 74 | 19.7 | 51 | 26.3 | 167 |
| Operatives & kindred | --- | -- | 17 | 9.6 | --- | -- | 29 | 7.7 | 8 | 4.1 | 54 |
| Service & household | --- | -- | 6 | 3.4 | --- | -- | 16 | 4.3 | 6 | 3.1 | 28 |
| Laborers | --- | -- | 14 | 7.9 | --- | -- | 18 | 4.8 | 9 | 4.6 | 41 |
| Retired | 44 | 17.3 | 29 | 16.4 | 23 | 32.9 | 76 | 20.3 | 18 | 9.3 | 190 |
| Other non- labor force | --- | -- | 5 | 2.8 | --- | -- | 11 | 2.9 | 16 | 8.2 | 32 |
| No answer | --- | -- | 5 | 2.8 | --- | -- | 7 | 1.9 | 4 | 2.1 | 16 |
| Total | 254 | 100.0 | 177 | 100.0 | 70 | 100.0 | 375 | 100.0 | 194 | 100.0 | 1070 |

Table 2 summarizes the marital status of those interviewed. Consistent with previous descriptions is the fact that a higher proportion of farmers were found to be married than were those in the non-farm groups. Metropolitan-urban residents were next highest in proportion married. The reason for lower proportions among non-farmers of open country and town residence was traced to the relatively large number who were widowed (15.8% and 17.6%, respectively). Separation by death was the major reason for respondents not being married. However, the great majority of respondents in the study were married.

Differences in age groupings are best seen when age groups are combined into two, those of 44 years and younger, and those 45 and older. There were significantly higher proportions of farm than non-farm respondents who fell into the older age group. This result is consistent with that found in Table 1 which shows high proportions of retired people among farmers.

The educational levels of various groups can be seen in Table 3. When a comparison was made between those who had completed 12 grades or less and those who had gone beyond high school in their formal education, it was found that the higher educational level was most common among the metropolitan-urban residents with 43.5%. This was followed by town non-farm (31.0%), open country non-farm (26.6%), open country farm (22.6%) and town farm with only 15.9%, who had gone beyond high school.

The educational pattern of farmers was also associated with the older average age of farmers. Older people did not complete as many years of school as did younger people. It was evident that for a majority of all respondents, a high school diploma was the general cut-off point for formal education. However, metropolitan-urban people had more schooling than either small town or farm residents.

When various residence groups were compared by categories of length of residence, it became apparent that differences existed between the farmers and the non-farmers regardless of type of residence. For instance, about 86% of the open

Table 2. Marital status of respondents, by open country farm and non-farm, town farm and non-farm, and metropolitan-urban.

| Marital Status | Open Country | | | | Town | | | | Metro-Urban | | Total No. |
|----------------|--------------|--------------|--------------|---------------|-----------|--------------|--------------|---------------|-------------|--------------|-------------|
| | Farm No. | Farm Pct. | Non-Farm No. | Non-Farm Pct. | Farm No. | Farm Pct. | Non-Farm No. | Non-Farm Pct. | No. | Pct. | |
| Married | 236 | 92.9 | 145 | 81.9 | 68 | 97.1 | 291 | 77.6 | 172 | 88.7 | 912 |
| Widowed | 9 | 3.5 | 28 | 15.8 | 2 | 2.9 | 66 | 17.6 | 14 | 7.2 | 119 |
| Divorced | 1 | .4 | 0 | 0.0 | 0 | 0.0 | 6 | 1.6 | 5 | 2.6 | 12 |
| Separated | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | .5 | 1 |
| Never married | 8 | 3.2 | 4 | 2.3 | 0 | 0.0 | 9 | 2.4 | 2 | 1.0 | 23 |
| No answer | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 3 | .8 | 0 | 0.0 | 3 |
| Total | 254 | 100.0 | 177 | 100.0 | 70 | 100.0 | 275 | 100.0 | 194 | 100.0 | 1070 |

Table 3. Educational background of respondents, by open country farm and non-farm, town farm and non-farm and metropolitan-urban.

| Education | Open Country | | | | Town | | | | Metro-Urban | | Total No. |
|------------------------------|--------------|--------------|--------------|---------------|-----------|--------------|--------------|---------------|-------------|--------------|--------------|
| | Farm No. | Farm Pct. | Non-Farm No. | Non-Farm Pct. | Farm No. | Farm Pct. | Non-Farm No. | Non-Farm Pct. | No. | Pct. | |
| High school graduate or less | 195 | 77.4 | 127 | 73.4 | 58 | 84.1 | 254 | 69.0 | 109 | 56.5 | 743 |
| Education beyond high school | 57 | 22.6 | 46 | 26.6 | 11 | 15.9 | 114 | 31.0 | 84 | 43.5 | 312 |
| Total | 252 | 100.0 | 173 | 100.0 | 69 | 100.0 | 368 | 100.0 | 193 | 100.0 | *1055 |

*There were 15 no answer responses which were not included in this table.

country farm residents and 81% of the town farmers had lived in the county more than 30 years, while only about 59% of the open country non-farm, 54% of the town non-farm and 36% of the metropolitan residents had lived there over 30 years.

The preceding data illustrate the fact that farmers were less mobile than non-farmers and therefore, were generally long term members of their communities, while those holding non-farm occupations were more often newcomers. There was an especially small proportion of long time residents in the metropolitan city area. This mobility pattern is similar to other like areas.



Smithfield, Utah, a typical rural community dependent on water resource development for its existence.

FOOTNOTES

- ¹William Fielding Ogburn, *Social Change* (New York: Delta Publishing Company, 1966).
- ²U.S. Department of the Interior, Bureau of Reclamation, *Feasibility Report, Part I, Oneida Division, Idaho and Utah, Region 4*, Salt Lake City, Utah, July 1962, p. 13.
- ³Vincent Ostrum, "The Social Scientist and the Control and Development of Natural Resources," *Land Economics*, Vol. 29 (May 1953), 105-116.
- ⁴William R. Burch, "The Play World of Camping: Research into the Social Meaning of Outdoor Recreation," *The American Journal of Sociology*, 72(5):604-612.
- ⁵Larry E. Hines, "The Relationship of Traditional Values to Outdoor Recreational Behavior" (unpublished M.S. thesis, Ohio State University, Columbus, Ohio, 1963).
- ⁶Stanley R. Ingman, "Private Outdoor Recreation Development: Factors Associated with Adoption" (unpublished M.S. thesis, Ohio State University, Columbus, Ohio, 1963).
- ⁷Marvin Taves, William Hathaway and Gordon Bultena, *Canoe Country Vacationers*, Misc. Report No. 39 (University of Michigan: Agriculture Experiment Station, 1960).
- ⁸Donald R. South, Thomas Hansbrough and Alvin L. Bertrand, *Factors Related to the Adoption of Woodland Management Practices*, Bulletin 603, U.S. Department of Agriculture, 1965.
- ⁹Walter Slocum and LaMar T. Empey, *The Role of the Farmer in Upland Game Production and Hunting in Whitman County*, Bulletin 552, Agriculture Experiment Station, Institute of Agriculture Sciences, State College of Washington, 1954.
- ¹⁰John C. Hendee, Thomas H. Stienburn and William R. Catton, Jr., "Wildernism—The Development, Dimensions and Use of an Attitude Scale" (paper presented at Rural Sociology Society Meeting, San Francisco, California, August 26, 1967).
- ¹¹Gordon L. Bultena, "Recreation, Research and Forest Policy" (paper presented at Rural Sociology Society Meeting, San Francisco, California, August 28, 1967).
- ¹²John R. Christiansen and William S. Folkman, "Factors Associated with Attitudes of Responsibility Toward Fire Prevention in National Forests" (paper presented at Rural Sociology Society Meeting, San Francisco, California, August 27, 1967).
- ¹³Arthur R. Jones, M. Lee Taylor and Alvin L. Bertrand, *Some Human Factors in Wood Burning*, Bulletin 601, Louisiana Agricultural Experiment Station, Louisiana State University and Agricultural Mechanical College, Baton Rouge, 1965.
- ¹⁴Irving A. Spaulding, *Household Water Use and Social Status*, Contribution 1237, University of Rhode Island Agriculture Experiment Station, 1967.
- ¹⁵Wade H. Andrews, "Toward the Sociological Analysis of Natural Resources" (Special Paper No. 1 presented to the Institute for Social Science Research on Natural Resources, Utah State University, Logan, Utah, September 1966).
- ¹⁶Wade H. Andrews, "Sociological and Social Psychological Factors Related to Metropolitan Water Resource Development" (Special Paper No. 2 presented to the Institute for Social Science Research on Natural Resources, Utah State University, Logan, Utah, November 1968).

¹⁷Walter Firey, *Man, Mind and Land: A Theory of Resource Use* (Glencoe, Illinois: The Free Press, 1960).

¹⁸Phillip Selznick, *TVA and the Grass Roots: A Study in the Sociology of Formal Organization* (Berkeley, California: University of California Press, 1949).

¹⁹Charles A. Ibsen and John A. Ballweg, *Public Perception of Water Resource Problems*. Blacksburg, Virginia: Water Resources Research Center, September 1969.

²⁰H. Bruce Bylund, "The Human Factor and Changes in Water Usage Patterns," *Water Resources Research*, 2(3):365-369, 1966.

²¹Mississippi State University Social Science Research Center Publications on Water Resources and Studies.

A. Social Science Research Center Publications

Kenneth P. Wilkinson, *Local Action and Acceptance of Watershed Development*, Preliminary Report 12, July 1966.

Satadal Dasgupta, *Attitudes of Local Residents Toward Watershed Development*, Preliminary Report 18, May 1967.

Kenneth P. Wilkinson and Lucy W. Cole, *Sociological Factors in Watershed Development*, Preliminary Report 20, July 1967.

R. N. Singh and Kenneth P. Wilkinson, *Sociological Studies of Selected Water Resource Problems*, Preliminary Report scheduled for publication July 1968.

²²John W. Bennett, ed. "Social Research in North America Moisture-Deficient Regions," The Committee on Desert and Arid Zones Research, Southwestern and Rocky Mountain Division, A.A.A.S. Contribution No. 9, New Mexico State University, 1966.

²³Institute for Social Science Research on Natural Resources, *Proceedings of the Workshop for Sociological Aspects of Water Resources Research*. (Utah State University, Logan, Utah, 1968).

²⁴Jenaro Collazo-Collazo, "Human Factors Involved in the Development of a Watershed Project in Yabucoa, Puerto Rico" (paper presented at Workshop for Sociological Aspects of Water Resources Research, Utah State University, Logan, Utah, 1968).

²⁵Russell R. Dynes, "Community Reaction to Water Resources Problems in Relation to Planning" (paper presented at Workshop for Sociological Aspects of Water Resources Research, Utah State University, Logan, Utah, 1968).

²⁶Daniel Kubat, "Water Resources Research in Florida" (paper presented at Workshop for Sociological Aspects of Water Resources Research, Utah State University, Logan, Utah, 1968).

²⁷Francis R. Allen, *Technological and Social Change* (New York: Appleton-Century-Crofts, Inc., 1957); Homer G. Barnett, *Innovation: The Basis of Cultural Change* (New York: McGraw Hill, 1953); Everett E. Hagen, *On the Theory of Social Change* (Homewood, Illinois: The Dorsey Press, Inc., 1962); Richard LaPiere, *Social Change* (New York: McGraw-Hill, 1965).

²⁸Everett M. Rogers, *Bibliography of Research on the Diffusion of Innovations*, Report No. 1, Department of Communication Research on the Diffusion of Innovations, Michigan State University, July 1964.

²⁹William G. Cochran, *Sampling Techniques* (2nd ed.; New York: John Wiley and Sons, 1963), p. 18-48.

³⁰U.S. Department of the Interior, Bureau of Reclamation, *Feasibility Report*, p. 1.

³¹*Ibid.*, p. 1-2.

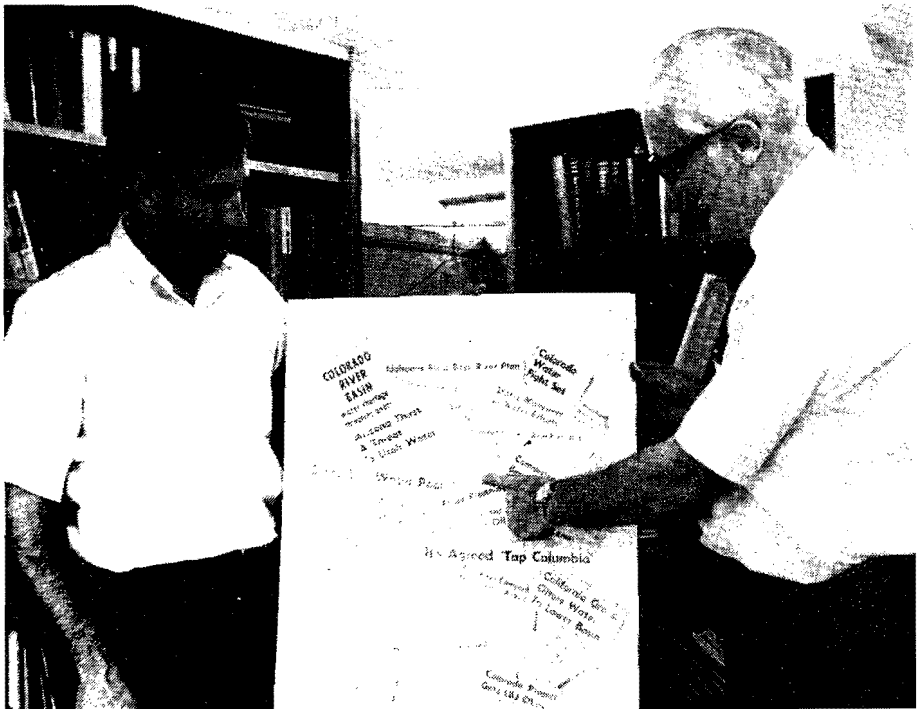
³²Olaf F. Larson and Everett M. Rogers, "Rural Society in Transition: The American Setting," in *Our Changing Rural Society*, ed. by James H. Copp (Ames, Iowa: Iowa State University Press, 1964), p. 53.

³³James L. Gillings, "Attitudes Toward Water Resource Development, Use and Control and the Rural Urban Differential in the Bear River Basin" (unpublished Ph.D. dissertation, Utah State University, 1969).

³⁴Arthur J. Vidich and Joseph Bensman, *Small Town in Mass Society* (Princeton, New Jersey: Princeton University Press, 1958), p. 83.

³⁵Wade H. Andrews, "Trade, Leisure and Institutional Center Behavior in a Tributary Area of the Great Basin" *Proceedings of the Utah Academy of Sciences, Arts, and Letters*, Vol. 45, Part 2, 1968.

³⁶U.S. Department of Commerce, Bureau of the Census, *United States Census of Population: 1960*.



Sociologists, Dennis C. Geertsen (left) and Dr. Wade H. Andrews (right) examine a collection of headlines dealing with social problems associated with water use and development.

CHAPTER 2

ATTITUDES TOWARD BASIC ISSUES RELATED TO WATER USE, LAND USE, AND CONSERVATION

The objectives of this study include an interest in the social psychological aspects of attitudes affecting the behavior of the people in the area studied.

Milton Rokeach defines an opinion as "... a verbal expression of some belief, attitude or value,"¹ and points out that the identification of the belief, attitude, or value is a matter of inference.² His definition of attitude is as follows: "An attitude is a relatively enduring organization of beliefs around an object or situation predisposing one to respond in some preferential manner."³ In this and other chapters attitudes will be inferred from the various opinions obtained in the social survey.

Attitudes Regarding Water Use

River basin transfers

Differences in opinion were examined between the four residence-occupation types of open country farm, open country non-farm, town farm, town non-farm, and metropolitan-urban residents. Several issues were dealt with concerning management and priorities of water usage. Table 4 illustrates how opinions in the five categories differed in relation to a question concerning the transfer of water from one river basin to another. The question was, "Do you think it is wrong to take water from its natural river basin and move it to another area?" The majority did not think inter-basin transfer of water was wrong, but there were some differences on this question within residence categories. The main percentage differences in this table were associated with residence rather than with occupation. Of those who lived in the open country, 35% to 40% thought it was wrong to move water, but only about one-fifth of town and metropolitan-urban residents felt this way.

Table 5 also revealed an interesting result associated with the question of moving water into new areas. There was a noticeable percentage difference between the responses of residents of the middle basin compared to those of the lower basin and the metropolitan-urban area concerning moving water from its natural river basin. Over one-half of those of the middle basin compared to less than one-fifth of those of the lower basin and metropolitan-urban area felt that it was wrong to move water.

One factor believed to be associated with this difference is that there was an active and organized opposition to development in Idaho counties. This opposition

Table 4. Attitude toward interbasin transfer of water, by residence.

| Response | Open Country | | | | Town | | | | Metro-Urban | | Total No. |
|-------------|--------------|-----------|--------------|---------------|----------|-----------|--------------|---------------|-------------|-------|-----------|
| | Farm No. | Farm Pct. | Non-Farm No. | Non-Farm Pct. | Farm No. | Farm Pct. | Non-Farm No. | Non-Farm Pct. | No. | Pct. | |
| Wrong | 96 | 37.8 | 61 | 34.5 | 13 | 18.6 | 86 | 22.9 | 33 | 17.0 | 289 |
| Not Wrong | 140 | 55.1 | 102 | 57.6 | 53 | 75.7 | 254 | 67.7 | 145 | 74.7 | 694 |
| *Don't know | 15 | 5.9 | 14 | 7.9 | 4 | 5.7 | 33 | 8.8 | 16 | 8.3 | 82 |
| No answer | 3 | 1.2 | 0 | 0.0 | 0 | 0.0 | 2 | .6 | 0 | 0.0 | 5 |
| Total | 254 | 100.0 | 177 | 100.0 | 70 | 100.0 | 375 | 100.0 | 194 | 100.0 | 1070 |

$\chi^2 = 36.95$, $df = 8$, $P = .001$

*Includes don't know and other qualified answers.

Table 5. Attitude toward interbasin transfer of water, by middle and lower basin area of residence.

| Response | Middle Basin No. | Middle Basin Pct. | Lower Basin No. | Lower Basin Pct. | Metro-Urban No. | Metro-Urban Pct. | Total No. |
|-------------|---------------------|----------------------|--------------------|---------------------|--------------------|---------------------|--------------|
| Wrong | 146 | 50.7 | 111 | 18.9 | 33 | 17.0 | 290 |
| Not Wrong | 116 | 40.3 | 431 | 73.3 | 145 | 74.7 | 692 |
| *Don't Know | 23 | 8.0 | 44 | 7.5 | 16 | 8.3 | 83 |
| No answer | 3 | 1.0 | 2 | .3 | 0 | 0.0 | 5 |
| Total | 288 | 100.0 | 588 | 100.0 | 194 | 100.0 | 1070 |

$\chi^2 = 117.89$ df = 4, P .001

*Includes don't know and other qualified answers.

emphasized as one of their arguments an anti-interbasin transfer attitude. This attitude was highly publicized. Specific objections were raised to the plan to include some water to aid development in the Weber Basin in Utah.

The attitude dealt with in Table 5 implies a strong difference of opinion by geographic area. Such an area-oriented attitudinal difference set the stage for an important impeding function in relation to the proposed action. Opposition of a significant proportion concentrated in an area can be more effective than opposition scattered more equally over the entire area. In addition, when the issue appears in a moral context of "right" or "wrong," behavior often takes an emotional pattern, highly charged and irrational. In this case, existence of the attitude of "wrongness" is much stronger among those of the middle basin, suggesting an association with local interests in the water.

Irrigation use versus other choices

How water should be used is a central issue in water resource planning. A series of questions on attitudes toward this subject was asked. Often, there were sharp differences in relation to this issue, and there seemed to be fundamental water uses upon which the controversy was based. Table 6 deals with the question, "What do you feel is the most important use for natural stream water resources in this area?" Respondents were asked to give only their first choice of any possible use of water. Primarily, two types were mentioned: irrigation for agriculture, and combined urban and household uses. Industry and recreation received very few mentions as first priorities and were placed in the "other" category along with various miscellaneous uses.

Table 6. Most important uses for natural stream water resources, by residence categories.

| Response | Open Country | | | | Town | | | | Metro-Urban | | Total No. |
|-----------------|--------------|--------------|--------------|---------------|-----------|--------------|--------------|---------------|-------------|--------------|-------------|
| | Farm No. | Farm Pct. | Non-Farm No. | Non-Farm Pct. | Farm No. | Farm Pct. | Non-Farm No. | Non-Farm Pct. | No. | Pct. | |
| Irrigation | 223 | 87.8 | 140 | 79.1 | 58 | 82.8 | 259 | 69.1 | 91 | 46.9 | 771 |
| Urban-Household | 25 | 9.8 | 23 | 13.0 | 9 | 12.9 | 85 | 22.7 | 77 | 39.7 | 219 |
| *Don't Know | 6 | 2.4 | 14 | 7.9 | 1 | 1.4 | 27 | 7.2 | 26 | 13.4 | 74 |
| No Answer | 0 | 0.0 | 0 | 0.0 | 2 | 2.9 | 4 | 1.0 | 0 | 0.0 | 6 |
| Total | 254 | 100.0 | 177 | 100.0 | 70 | 100.0 | 375 | 100.0 | 194 | 100.0 | 1070 |

$\chi^2 = 94.43$, $df = 8$, $P = .001$

*Includes don't know, industry, recreation, joint uses and other qualified answers.

Irrigation as the first priority use received the highest percentages by all types of respondents. The highest percentage supporting irrigation, about 88%, was by open country farmers, while 79% of the open country non-farmers and 83% of town farmers favored irrigation. Among other town people, 69% favored irrigation. The greatest difference occurred among the metropolitan-urban respondents with 47%, or less than half, inclined to rate irrigation as first priority. About 40% of the metropolitan-urban residents felt that urban and household uses should have first priority. Nearly one-fourth of the non-farm town people favored urban and household uses as first priority.

In short, most people in all groups and especially farmers, felt irrigation should have first priority use of stream water, although a strong minority of metropolitan-urban residents felt urban and household use should be of first importance. No group felt industry or recreation should have first priority use.

The preceding results to the hypothetical choices are important, because if water uses are proposed which are not deemed important to the public sector as shown above, opposition to these plans may be expected due to these established attitudes. Unless other factors intervene, one might expect almost all farmers and open country people to favor water development programs where irrigation uses are given first priority by the water resource planners. It should be noted that the question of priority of uses does not measure the strength or intensity of the conviction under actual circumstances, only the existence of the attitude.

Other questions investigated dealt with specific choices between the agriculture versus industry dichotomy. There are far-reaching implications associated with these two types of uses. In a country where the trend is toward becoming more industrialized as well as concerned with agricultural surpluses, one would expect official decisions related to these items to also be affected. Never before in history has so small a proportion of the population been occupied in the production of food. The distribution of attitudes concerning the priority of water use between industry and agriculture may be expected to affect the pattern of policy decisions. What has happened to these attitudes and what may be expected when people who represent urban-industrial backgrounds and interests are elected to public office? This question suggests a basic issue on a national level in which, since the preponderance of the voters are now urban, the results hold a great deal of significance for water resource development. However, the attitudinal situation in a local area is also an important factor in development since initiation of political action on water projects must come from local areas. Since attitudes affect action or decisions, the present study is concerned with examining industrial versus agriculture attitudes in rural and urban areas. A comparison is made between the Bear River Basin and the related metropolitan area.

When the question was asked: "Which should have priority for the use of water; industry or irrigation?" a strong majority, well over four-fifths in each group of all respondents, favored irrigation for agriculture. In this question, respondents were not confronted with the choice of urban-household uses, which seems to account for the increased irrigation preference of metropolitan-urban people. However, this result seems contrary to logic inasmuch as the metropolitan-urban segment is located in a city supported largely by industry. The strong vote for irrigation in preference to industry seems to be an idiosyncrasy of this subcultural area which has

a long history of dependence on irrigation. These results suggest that for the area involved there would be little general resistance from the urban sector against irrigation development.

Another choice taking a stronger position favoring agriculture was given the respondents by asking them, "Is it wrong to take water away from agriculture and use it for industry?" The main difference shown was that 30.4% of the metropolitan-urban residents did not think it wrong compared to smaller proportions of the rural groups. These are shown as follows: 13.4% of open country farmers, 18.6% of open country non-farm, 14.3% of town farmers and 16.3% of town non-farm people. The strong majority in each of the groups, however, thought it to be wrong to take water from agriculture to use it for industry. This question dealt with a fundamental problem which could be directly threatening to agricultural water users. It shows an important difference in proportionate conviction between the large metropolitan-urban center and the rural population.

A third question comparing industry and agriculture dealt with the view of economic competition for the water resource. The question was asked: "Industry can sometimes afford to pay more for water than can agriculture; should agriculture be left to compete, or should agriculture have priority?" The percentage differences recorded here were small and not significant. The pattern was consistent with previous findings, revealing that a strong majority of all categories felt that agriculture should not be required to compete with industry for water. The range of difference was 79.4% of metropolitan and 92.8% of town farm respondents who felt that agriculture should not be left to compete. Results of this question show agreement with the traditional policy to provide support to agriculture in water resource development.

Recreation has become a major use for water resources and for this reason respondents were given a further choice concerning priority of water use between irrigation and recreation. Less than 2% replied that recreation should have first priority. For a rural area strongly conscious of economic uses of water, recreation seems a remote necessity. The recreational needs of heavily populated areas having large numbers of people with extensive leisure time is not included in the perception of these people.

Attitudes Regarding Land Use and Conservation

Some of the priorities for use of water already have been examined. Because the problem of priorities is germane to the Bear River Project, this examination is continued in the present section although in some cases land rather than water is the object of focus. The public versus private issue, however, is also related to the Bear River Project and will be examined indirectly in this section.

First, respondents were asked, "If mining destroyed a recreational area, which use do you think should take priority, mining or recreation?" The results of the query are shown in Table 7. Mining was considered first priority among all groups, but especially among farm and small town people with approximately three-fourths favoring this use. Slightly less than two-thirds of the open country non-farmers

Table 7. Attitude regarding priority between use of land for mining and recreation, by residence categories.

| Priority | Open Country | | | | Town | | | | Metro-Urban | | Total No. |
|------------|--------------|-------|--------------|-------|----------|-------|--------------|-------|-------------|-------|-----------|
| | Farm No. | Pct. | Non-Farm No. | Pct. | Farm No. | Pct. | Non-Farm No. | Pct. | No. | Pct. | |
| Mining | 194 | 76.4 | 112 | 63.3 | 52 | 74.3 | 276 | 73.6 | 86 | 44.3 | 720 |
| Recreation | 25 | 9.8 | 30 | 16.9 | 9 | 12.9 | 47 | 12.5 | 56 | 28.9 | 167 |
| Don't Know | 29 | 11.4 | 34 | 19.2 | 7 | 10.0 | 45 | 12.0 | 51 | 26.3 | 166 |
| No Answer | 6 | 2.4 | 1 | .6 | 2 | 2.8 | 7 | 1.9 | 1 | .5 | 17 |
| Total | 254 | 100.0 | 177 | 100.0 | 70 | 100.0 | 375 | 100.0 | 194 | 100.0 | 1070 |

$\chi^2 = 67.62, df = 8, P .001$

avored mining, but the big difference was the small percentage (44.3%) of metropolitan-urban respondents who favored mining. While the metropolitan-urban group percentage was higher than the other groups in their preference for recreational uses (28.9%), they were also higher in the "Don't know" category with 26.9%. This result suggests that most respondents in each group have strong economically-oriented values about resource use rather than recreationally and aesthetically oriented values. It also shows that metropolitan-urban people are more oriented toward recreation than are the others. It is the opinion of various authors that changes are occurring in the Puritan Ethic from a work orientation toward a leisure orientation in urbanizing society. The higher proportion of recreational interest among the urban respondents is some indication that the non-economic value is significant and probably a changing one in the culture.

The second question dealing with land use priority was: "Which should have priority, forest or grazing uses?" Implied in this question is not only use, but public versus private use. In this area, forests are owned and operated by the federal government. Grazing use is by private operators with permits from the Forest Service or Bureau of Land Management. As shown in Table 8, one category, the open country farmers with 58.3%, had a majority favoring grazing. The metropolitan-urban respondents were the most favorable to forest use but were about evenly divided with 36.6% favoring forest uses and 38.6% favoring grazing.

Another question which dealt with a similar priority was: "Of the land held by the Bureau of Land Management and the Forest Service, which use should have priority, use of land for private farming and ranching or holding it for public use?" As can be seen in Table 9, farmers were most favorable toward private use with 46.5% of the open country farmers favoring private use and 36.2% favoring public use. On the other hand, 50.5% of the metropolitan-urban people favored public use and only 22.7% favored private use. Again, non-farm people tended to favor public use of these lands to a greater extent than did farmers. This shows once again the stronger private economic use orientation toward natural resources among farmers, and that the interest of urban people was more toward public use. This may also imply a favorability toward public control.

The question was asked, "Do you think that there should be public control of the use of land where erosion and other run-off problems affect the water supply, or should this control be left up to individual users?" The overall pattern shown in Table 10, reveals that substantial majorities of all groups favor public control rather than individual control of erosion and other runoff problems. However, consistent with other questions, farmers of both residential types are somewhat less favorable toward public control than are those of other groups.

A second question also compared respondent preference for public or private control of water. "What do you think about the choice between controlling the runoff of streams with public reservoirs and using the surplus for new uses or leaving this to private development?" The trend toward public control is similar to the one above. The differences are primarily between a smaller number percentage of open country farmers, 73.6% who favored public reservoirs, and a near unanimous percent (91.7%) of metropolitan-urban residents who favor public reservoirs.

Table 8. Attitude regarding priority between forest use of land and grazing uses, by residence categories.

| Priority | Open Country | | | | Town | | | | Metro-Urban | | Total No. |
|--------------|--------------|-------|----------|-------|------|-------|----------|-------|-------------|-------|-----------|
| | Farm | | Non-Farm | | Farm | | Non-Farm | | No. | Pct. | |
| | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. | | | |
| Forest Uses | 50 | 19.7 | 42 | 23.7 | 10 | 14.3 | 117 | 31.2 | 71 | 36.6 | 290 |
| Grazing Uses | 148 | 58.3 | 84 | 47.5 | 32 | 45.7 | 154 | 41.1 | 75 | 38.6 | 493 |
| Joint Uses | 22 | 8.6 | 19 | 10.7 | 19 | 27.1 | 48 | 12.8 | 24 | 12.4 | 132 |
| *Don't Know | 21 | 8.3 | 21 | 11.9 | 3 | 4.3 | 30 | 8.0 | 24 | 12.4 | 99 |
| No Answer | 13 | 5.1 | 11 | 6.2 | 6 | 8.6 | 26 | 6.9 | 0 | 0.0 | 56 |
| Total | 254 | 100.0 | 177 | 100.0 | 70 | 100.0 | 375 | 100.0 | 194 | 100.0 | 1070 |

$\chi^2 = 49.75$, $df = 12$, $P = .001$

*Includes don't know and qualified answers.

Table 9. Attitude regarding priority between use of Bureau of Land Management and Forest Service land for private farming or ranching and public use, by residence categories.

| Type of Use | Open Country | | | | Town | | | | Metro-Urban | | Total No. |
|--------------|--------------|--------------|--------------|---------------|-----------|--------------|--------------|---------------|-------------|--------------|-------------|
| | Farm No. | Farm Pct. | Non-Farm No. | Non-Farm Pct. | Farm No. | Farm Pct. | Non-Farm No. | Non-Farm Pct. | No. | Pct. | |
| Private Use | 118 | 46.5 | 66 | 37.3 | 29 | 41.4 | 132 | 35.2 | 44 | 22.7 | 389 |
| Public Use | 92 | 36.2 | 78 | 44.1 | 28 | 40.0 | 191 | 50.9 | 98 | 50.5 | 487 |
| Joint Use | 17 | 6.7 | 9 | 5.1 | 5 | 7.1 | 10 | 2.7 | 27 | 13.9 | 68 |
| Don't Know | 25 | 9.8 | 22 | 12.4 | 6 | 8.6 | 35 | 9.3 | 24 | 12.4 | 112 |
| No Answer | 2 | .8 | 2 | 1.1 | 2 | 2.9 | 7 | 1.9 | 1 | .5 | 14 |
| Total | 254 | 100.0 | 177 | 100.0 | 70 | 100.0 | 375 | 100.0 | 194 | 100.0 | 1070 |

$\chi^2 = 53.76, df = 12, P .001$

Table 10. Attitude toward public or private control of land for erosion and other runoff problems that affect the water supply, by residence.

| Response | Open Country | | | | Town | | | | Metro-Urban | | Total No. |
|------------------|--------------|-----------|--------------|---------------|----------|-----------|--------------|---------------|-------------|-------|-----------|
| | Farm No. | Farm Pct. | Non-Farm No. | Non-Farm Pct. | Farm No. | Farm Pct. | Non-Farm No. | Non-Farm Pct. | No. | Pct. | |
| Public Control | 175 | 68.9 | 143 | 80.8 | 52 | 74.3 | 303 | 80.8 | 168 | 86.6 | 841 |
| Individual Users | 55 | 21.7 | 20 | 11.3 | 10 | 14.3 | 42 | 11.2 | 14 | 7.2 | 141 |
| Don't Know | 24 | 9.4 | 14 | 7.9 | 6 | 8.6 | 25 | 6.7 | 12 | 6.2 | 81 |
| No Answer | 0 | 0.0 | 0 | 0.0 | 2 | 2.8 | 5 | 1.3 | 0 | 0.0 | 7 |
| Total | 254 | 100.0 | 177 | 100.0 | 70 | 100.0 | 375 | 100.0 | 194 | 100.0 | 1070 |

$\chi^2 = 28.05, df = 8, P .001$

While there was only a small percentage of town non-farmers (6.9%) and metropolitan-urban respondents (6.2%), who favored private development, there are larger percentages of the other groups who favored it, such as 12.9% of town farmers, and of the two open country groups, non-farmers showed 14.1% and farmers 20.1%.

A comparison between the middle and lower basin on respondents' preferences for public or private reservoirs revealed the same general pattern. That is, 73.6% of those in the middle basin favored public reservoirs and 83.0% in the lower basin indicated this preference.

The strong majority preference for public rather than for private reservoirs suggests that government development is preferred to private development, even though members of the opposition in one middle basin county (Caribou) are attempting to promote their own private development on the Bear River as an alternative to the Bureau of Reclamation development. That they may lack public support in their endeavor at both the local level and the entire basin seems apparent in this finding.

Summary

In summary, the majority in all groups did not feel it was wrong to move water from its natural river basin to another basin. It was found, however, that there were significant differences between the residence categories concerning this matter, with fewer of the metropolitan-urban and town people feeling it was wrong to make basin transfers than the open country people.

Important differences were also found when water transfer was analyzed by sub-basin area of residence. Slightly over half of the middle Bear River Basin felt it wrong to move water, while less than one-fifth of those of the lower basin and metropolitan-urban area felt this way. This attitude may reflect the influence of organized opposition to the Bear River Project in this part of the basin. A major point of objection of this group centers around the Bureau's idea of taking some water to Ogden, an area outside of the natural drainage basin. The concentration of the opposition magnifies their impact far beyond that of a randomly distributed opposition.

Regarding all possible uses of water, irrigation was the most frequently mentioned first priority use among all groups. However, there was a wide difference on this between metropolitan-urban and open country farm with the former having a lower proportion who favored irrigation first. However, town non-farmers were more nearly like the metropolitan-urban group than others. Other non-farm uses, including industry, were given only small percentages of first priority uses for water among all groups. Urbanizing forces are increasing and changes in policy toward the thinking of the urban population may be expected.

When industry and irrigation were compared specifically for priority use of water, well over four-fifths in each group indicated irrigation as first priority.

It was found that the strong majority in all groups thought it was wrong to take water away from agriculture and use it for industry. However, nearly one-third of the metropolitan-urban group thought it was not wrong, compared to one-seventh of the farm and about one-sixth of the other rural non-farm groups. There was a wide difference between rural and metropolitan-urban respondents, with considerably more of the latter choosing industry. With this difference there are indications that the conviction of urban people may not be as strongly fixed on this attitude as among other categories.

All farmers felt that agriculture should not be left to compete with industry for water. In fact, a strong majority in all groups agreed with this stand. When asked about irrigation versus recreational use, an even stronger majority in all groups favored irrigation.

Five items regarding land use and conservation opinions were analyzed. Mining was felt to be a higher priority use than recreation among all groups. Metropolitan-urban people, however, were higher than all others in their preference for recreational uses. On the issue of forest versus grazing uses of land, it was found that all groups favored grazing uses, but only one group, the open country farmers, had a clear majority but with large numbers undecided. Forest uses were nearly equal with grazing among metropolitan-urban respondents. This issue indicates clear ambivalence and shows less support for the private agricultural use.

Farmers favored private farming or ranching uses of public lands, while town non-farmers and metropolitan-urban respondents favored public uses.

Finally, two items concerned the issue of public versus private control in conservation behavior as it is related to water. It was found that three-fourths or more in each group except open country farmers favored public control of land erosion problems. However, a two-thirds majority of open country farmers also favored public control.

Three-fourths or more in all groups favored publicly-controlled water storage reservoirs rather than private development of surplus water. However, open country farmers were the most favorable toward private development with about one-fifth feeling this way.

On all items where priority of use was asked, the respondents from the open country and from the small towns strongly favored agricultural priorities. The metropolitan-urban respondents also generally favored agricultural uses, but not as strongly, and in one instance, with less than a majority.

On the land use priority questions, there was considerably less unanimity. Generally, economic uses were favored by rural people more than urban. Public use of federal lands was favored by all categories but more by urban people than by rural residents.

Concerning conservation items, public control on reservoirs was favored by all types of respondents, but again, more strongly by urban than rural people. Finally, farmers consistently showed a somewhat smaller support for public and governmental functions than did others.

FOOTNOTES

¹Milton Rokeach, *Beliefs Attitudes and Values* (San Francisco: Jossey-Bass, Inc., Publishers, 1968), p. 125.

²*Ibid.*

³*Ibid.*, p. 112.

CHAPTER 3

SOCIAL CHANGE AND WATER USE

Richard LaPiere points out that until the last three hundred years, stability in society has been normal while change has been abnormal, but the opposite assumption may be more explanatory of the last three centuries.¹ Robin Williams states that the problem is not to simply indicate that change is taking place, but rather to specify how American society is changing.² To indicate how social changes take place one must first understand what changes are occurring. The problem of this chapter will be to deal with what changes were taking place in the Bear River Basin both directly and indirectly related to water resources. Changes occurring in water resources use and development along with human behavior related to these changes were of interest in this study. Several questions in the survey dealt with the problems of change and perception of change.

Some Types of Change

General change

To begin with, respondents were asked a broad general question concerning perception of change. This question was: "Are things changing in this area?" Most respondents in all residence categories indicated that changes were occurring, but there were distinct variations. Of the metropolitan-urban people, 94.3% reported that they were aware of change. Town non-farm people were next most aware with 68.4%; open country non-farm had 60.5%, followed by open country farm at 58.3% and town farm with 57.1%. This could mean that either more change has taken place in the urban areas or that urban people are more cognizant of changes. No doubt these are related to each other and both are true, but rural change has generally been recognized to be slower.

Table 11 examines descriptive differences between the metropolitan-urban category and all other areas, identified as "all rural," concerning the question of how things are believed to be changing in their local area. Percentages in this table refer only to answers given and do not include those who gave no answers. Types of changes that were reported varied widely. They include not only physical changes, but social and economic changes as well.

In rural areas, industrial changes were reported most frequently, followed by changes in social and living conditions, local area changes, and economic changes. In the urban area, however, changes in social and living conditions were mentioned most, followed by industrial, local, and economic changes in that order. Rural

Table 11. How things are changing in their local area by frequency of mention, by all rural and by metropolitan-urban residence.

| Type of change | Frequency of Mention* | | | |
|--|-----------------------|--------------|--------------------|--------------|
| | All Rural No. | Pct. | Metro-Urban No. | Pct. |
| Industrial changes | 267 | 30.9 | 85 | 29.1 |
| Changes in social and living conditions | 182 | 21.0 | 111 | 38.0 |
| Town or local neighborhood changes | 141 | 16.3 | 28 | 9.6 |
| General economic changes | 107 | 12.4 | 11 | 3.8 |
| Farm changes | 77 | 8.9 | 3 | 1.0 |
| Construction | 21 | 2.4 | 20 | 6.9 |
| Other | 70 | 9.1 | 34 | 11.6 |
| Total changes reported** | 865 | 100.0 | 292 | 100.0 |

*More than one answer was given by some respondents and none by others. Percentages refer only to answers given.

**Total rural respondents were 874. Of these, 550 or 62.9% reported one or more changes; 324 rural respondents, or 37.1%, reported no change.

Total metro-urban respondents 194. Of these, 183 or 94.3% reported one or more changes; 11 urban respondents, or 5.7%, reported no change.

people, as would be expected, reported more town or local area changes and more farm type changes. But they also reported more general economic changes than did urban residents. The changes in industry in rural areas indicate some of the effect of decentralization and the spread of industrialization to new areas. This is an important prospect for future planning.

Affect of urban changes on water

Another question was directed toward measuring the respondents' perceptions of the possible changes that growing urbanization will have on the demand for water. Although less than a majority, more small town respondents than others felt that there would be no effect (town farm 45.7%, town non-farm 45.1%). There was little difference between other residence categories on this question with slightly over half of the respondents in the open country rural and the metropolitan-urban populations that felt there would be affects on the demand for water. In the various categories 10% to 15% did not know. Opinion seemed to be divided on this aspect of change.

In Table 11, consciousness of industrial changes were identified about equally by both rural people living in the Bear River Basin and by those in the metropolitan

city adjacent to the basin. In addition, about half the respondents in each residence category perceived that growing urbanization will have some effect on water supply in the future. With this in mind, further questions relating attitudes toward change in industrial expansion were explored.

Respondents were first asked, "Should the Great Basin attempt to obtain industry if this puts more pressure on the supply of water in the area?" The results of this question can be seen in Table 12. All residence categories showed favorable acceptance of industry. On the surface this may appear to contradict the previous finding that industry is a low priority use. However, in the previous case industry was compared with all possible choices of use, which is not so in the present case. Table 12 reveals that there was a variation in range from 60% to 78% between the lowest level of acceptance by the open country farmers and the highest by town non-farm respondents. Of all non-farm categories, the open country non-farm people were lowest in acceptance of more industry which may indicate an aesthetic preference for maintaining a rural pattern of living.

Attitudes toward industrial change

The next question, "Would more industry be a good thing for this region?" was aimed toward identifying a broader geographical area and in particular the Great Basin area of which the Bear River is a part. There was near unanimity in the responses to this question with nearly nine out of ten answering "yes" in all residence categories. Differences were not significant between the categories. In general, there was an overwhelming agreement among all groups that more industry would be a good thing for the region. When related directly to water, as shown in Table 12, there was strong support, but also some doubt expressed ranging from 16.5% among the town non-farm to 29.5% among the open country farm group. Therefore, there would probably be strong community support for future industrial expansion in the Great Basin, although this may not be equal in all parts.

Some qualifications of the preceding results appear to be necessary. It will be recalled from Chapter 2 that irrigation and urban-household uses of water appeared as first priorities over other uses. Since industry was one of the lower priority uses, it

Table 12. Attitudes toward whether or not the Great Basin should attempt to obtain more industry if this puts more pressure on the supply of water in the area, by residence.

| More Industry | Open Country | | | | Town | | | | Metro-Urban | | Total No. |
|--------------------------|--------------|-----------|--------------|---------------|----------|-----------|--------------|---------------|-------------|-------|-----------|
| | Farm No. | Farm Pct. | Non-Farm No. | Non-Farm Pct. | Farm No. | Farm Pct. | Non-Farm No. | Non-Farm Pct. | No. | Pct. | |
| Yes | 153 | 60.2 | 113 | 63.8 | 47 | 67.2 | 293 | 78.1 | 137 | 70.6 | 743 |
| No | 75 | 29.5 | 44 | 24.9 | 19 | 27.1 | 62 | 16.5 | 41 | 21.1 | 241 |
| Don't know and no answer | 26 | 10.3 | 20 | 11.3 | 4 | 5.7 | 20 | 5.4 | 16 | 8.3 | 86 |
| Total | 254 | 100.0 | 177 | 100.0 | 70 | 100.0 | 375 | 100.0 | 194 | 100.0 | 1070 |

$$\chi^2 = 28.60, \text{ df} = 8, \text{ P} .001$$

would seem that the present results must be qualified by the assumed phrase "as long as industry does not interfere with higher or ultimate priority uses." However, there was some evidence of indecision in these different questions which showed that the problem was not clear-cut in all respects. In looking at all questions, there would seem to be under certain circumstances some softness in the priority of agriculture over industry. However, where sufficient water would be available above the level required for ultimate needs for agriculture and household use, industry would have a high preference for its use in all areas.

A follow-up question was asked which described the various types of reasons why respondents felt that industry would be good for the region. Table 13 reveals that nearly three-fourths of the responses given were related to economic improvement. These responses included two types of reasons, employment advantages (48.5%) and general economic benefits (24.2%). Several other reasons were mentioned, but much less frequently, including first, civic, community, and social improvements; second, population growth; and third, development and use of natural resources. Clearly, economic improvement reasons are recognized in industrial development. Social or aesthetic improvements were not primarily in the foreground.

Non-farm perception of changes in water use

Concerning changes in water use, the question was asked of non-farm people, "Has there been any important change in the use of water in this area in the past twenty years?" The reference to area was interpreted to mean near their locality or community. The more urban the residence, the higher the positive response. The major difference was between the metropolitan-urban residents and both of the other rural non-farm categories. While 74.1% of the metropolitan-urban people had

Table 13. Types of reasons given for belief that more industry would be good for the region, by frequency of mention.

| Types of Reasons | Frequency of Mention | |
|--|----------------------|--------------|
| | No. | Pct. |
| Employment advantages | 688 | 48.5 |
| Better for the economy | 343 | 24.2 |
| Civic, Community and social improvements | 93 | 6.6 |
| Population growth | 83 | 5.9 |
| Development and use of natural resources | 44 | 3.1 |
| Other answers | 166 | 11.7 |
| Total | 1417* | 100.0 |

*More than one answer was possible from the 1070 respondents.

observed important changes only 44% among the open country non-farm and 52.3% among town non-farm. Metropolitan-urban residents were much more cognizant of changes related to water resources probably because the city was part of a water conservancy district which was just finishing a major water development project in the Weber Basin. This included dams that have been built in the last 20 years, such as the enlargement of Pineview Reservoir in Ogden Canyon above Ogden, Utah. Also Ogden City recently has had difficulty with old wells and is planning to drill new ones to avoid contamination of the municipal water supply.

Table 14 shows the specific types of changes reported that were related to water use. The two main types of changes reported most often were new or improved storage systems and more sprinkling systems. More metropolitan-urban dwellers were aware of the new dams and reservoirs while more rural dwellers showed awareness for

Table 14. Perception of types of important changes during the last twenty years in the use of water in the area, by rural non-farm and metropolitan-urban residence.

| Changes Reported | *Rural | | Metro-Urban | |
|---|------------|--------------|-------------|--------------|
| | No. | Pct. | No. | Pct. |
| New or improved storage systems | 52 | 11.8 | 107 | 42.1 |
| More sprinkling systems | 130 | 29.7 | 2 | .8 |
| More water is available and used | 77 | 17.6 | 33 | 13.0 |
| More irrigation use | 46 | 10.6 | 6 | 2.4 |
| Improved control and management of water | 31 | 7.0 | 11 | 4.3 |
| More industrial uses | 22 | 5.2 | 15 | 5.9 |
| New or better water transportation systems (canals, etc.) | 26 | 6.0 | 1 | .4 |
| More wells have been drilled | 0 | 0.0 | 27 | 10.6 |
| Increased costs of water | 6 | 1.3 | 15 | 5.9 |
| Improvements in water conservation | 17 | 3.9 | 3 | 1.2 |
| More and improved urban and culinary systems | 12 | 2.7 | 1 | .4 |
| Increased recreational uses | 2 | .4 | 9 | 3.5 |
| Improved quality of water | 2 | .4 | 7 | 2.8 |
| Improvements in equipment for measurement | 1 | .2 | 7 | 2.8 |
| Other | 14 | 3.2 | 10 | 3.9 |
| Total | 438 | 100.0 | 254 | 100.0 |

*Rural non-farm includes Town and Open Country residents.

Rural non-farm residence N = 552

Metro-urban residence N = 194 Total N = 746

changes in sprinkling. The metropolitan-urban as well as the rural-non-farm people identified several other specific changes shown in Table 14.

Summary

Awareness of general change in their area was considerably higher among metropolitan-urban people than among the rural categories.

The four types of changes mentioned most were industrial changes, changes in social and living conditions, town or local neighborhood changes, and general economic changes. Industrial changes were reported equally in both metropolitan-urban and rural areas, changes in social living conditions were noted mainly in the metropolitan-urban area, and town or local area changes and general economic changes were reported mainly in the rural areas.

When asked about the possible future effect of an increased water demand by large urban areas, almost half of the various types of respondents replied that they thought it would have some effect, while about four-tenths replied they thought there would be no effect.

When asked if they favored industrial expansion in the Great Basin even though increased pressure on the water supply would result, from six-tenths to over three-fourths in the different residence groups responded favorably regarding industrial expansion. Open country farm and non-farm residents showed the least acceptance. Lower acceptance by open country, non-farm residents would seem to indicate an aesthetic preference for maintaining their style of life. Nearly nine out of ten of the respondents in all categories believed that industry would be good for the region. Both of these results suggest that there would be strong community support of industrial expansion should it occur in the Ogden or Bear River Basin areas. However, since industrial uses were given lower priority than irrigation and urban-household uses (Chapter 2), industrial expansion would probably only be successful up to the point that it begins to exclude one of these higher priority uses.

The main reasons given for favoring industrial expansion were employment advantages and local economic benefits.

Important changes in the use of water were reported more frequently by urban residents than by rural non-farm residents. The types of changes most frequently mentioned were: (1) new or improved storage systems, largely mentioned by metropolitan-urban people, and (2) more sprinkling systems, mainly noted by rural people. The metropolitan-urban responses which related to storage systems were probably associated with the recent development of the Weber Conservancy District and the Weber Reclamation Project, such as Pineview Reservoir and others that have been built in the last 20 years in the Ogden area.

FOOTNOTES

¹Richard T. LaPiere, *Social Change* (New York: McGraw-Hill Book Company, Inc., 1965), p. 2.

²Robin M. Williams, Jr., "American Society in Transition: Trends and Emerging Developments in Social and Cultural Systems," in *Our Changing Rural Society*, ed. by James H. Copp (Ames, Iowa: Iowa State University Press, 1964), p. 3.

CHAPTER 4

DIFFUSION OF IDEAS AND INFORMATION RELATED TO IRRIGATION

Gordon Allport stated 20 years ago that "... all writers agree that attitudes are learned through the principles of learning..."¹ Sociologists use the concept of socialization to describe in a general sense the process of learning and adopting attitudes. Assumed in this theory is the process of diffusion, or dissemination, and spread of ideas and information. In the theory of the process of attitude formation, contact is made with ideas and facts from external sources before attitudes are definitely formed. When attitude formation results from such contact it frequently seems to be from either accepting or rejecting an idea, but in both cases ideas may generate other ideas.

As was pointed out in Chapter 1, research concerning the process of diffusion and adoption has been extensive. Much of this research has been done on diffusion in the rural sector of society as shown by the number of references (51) to diffusion in the "1965 Index of Rural Sociology."² Only one of these references, however, dealt directly with water resources. This chapter will examine diffusion of some ideas among farmers, including an exploration of diffusion of certain water resource ideas.

Bohlen outlines the stages of the diffusion process discovered for the adoption of agricultural practices and relates the media for diffusion to each stage as found in a synthesis of many diffusion-adoption studies. The model of the stages and most important sources of information are shown as follows:

- A. Awareness stage—
 - 1. Mass media (Magazine, newspapers, radio, TV)
 - 2. Agricultural agencies (Extension, Vo-Ag., etc.)
 - 3. Neighbors and friends
 - 4. Commercial (dealers and salesmen)
- B. Information seeking stage—
 - 1. Mass media
 - 2. Commercial
 - 3. Neighbors and friends
 - 4. Agricultural agencies
- C. Evaluation stage—
 - 1. Neighbors and friends
 - 2. Commercial
 - 3. Agricultural agencies
 - 4. Mass media
- D. Trial stage—
 - 1. Neighbors and friends
 - 2. Commercial

3. Agricultural agencies
 4. Mass media
- E. Adoption stage—
1. Neighbors and friends
 2. Commercial
 3. Agricultural agencies
 4. Mass media³

There are various sources by which ideas in general can be diffused. This is illustrated in the case of farm ideas in the Bear River Basin as Table 15 shows. The question was asked, "Of the new farm ideas you have used, where have you usually heard of them first?" By far the major source of first hearing of new farm ideas among farmers is farm journals, accounting for almost half of the answers given. Second in importance is the informal source "neighbors and friends," which accounts for almost one-fourth of the answers, followed by the Agricultural Extension Service with 18.5% of the answers. There is a possibility that neighbors and friends in reality are underestimated and technical sources are overestimated inasmuch as it may seem more creditable to list the latter. However, this is an hypothesis to be tested by future research. If this hypothesized effect had been controlled, it is still unlikely that changes in rank order would have occurred because of the great differences observed.

The first source of hearing of new farm ideas and practices in the present study would correspond to the first or awareness stage of the Bohlen model of the

Table 15. First sources of new farm ideas used by farm respondents.

| Source of Idea | Frequency of mention | Pct. |
|--|-------------------------|--------------|
| Farm Journals | 148 | 47.1 |
| Neighbors or friends | 78 | 24.8 |
| Agricultural Extension Service | 58 | 18.5 |
| Newspapers | 11 | 3.5 |
| Salesman | 9 | 2.9 |
| Other | 10 | 3.2 |
| TOTAL | *314 | 100.0 |

*Fifty-seven respondents gave two answers because they were not able to decide which was first. For fulltime farmers the N=257.

diffusion process. The discovery of farm magazines as the most important first source corresponds with the mass media source of the Bohlen model. Some slight differences in order occur with the second and third sources, the Agricultural Extension Service and neighbors and friends being in reverse order in the present study.

Similar results on the importance of farm journals as agents of diffusion in the first or awareness stage of the diffusion process have been found in several other studies.⁴ In order to clarify this further, the farmers were asked: "Which farm journal do you receive or read regularly?" Table 16 reveals the various types of journals that farmers read.

These journals are listed according to name, area or scope of circulation, and percent of farmers reporting in each state who read them. It is apparent that in Utah the *Utah Farmer*, a local or state publication, is the major journal in Utah as four-fifths of the Utah farmers read it. This is followed by *Farm Journal*, a national magazine, which is read by nearly two-thirds, and by *Hoard's Dairyman*, read by

Table 16. Farm journals regularly received or read by farmers, by frequency of mention.

| Name of Journal | Place of Publication | Idaho | | Utah | |
|------------------------------------|----------------------|-------|------|------|------|
| | | No. | Pct. | No. | Pct. |
| Farm Journal | Philadelphia, Penn. | 130 | 77.4 | 57 | 64.0 |
| Idaho Farmer | Boise, Idaho | 111 | 66.1 | --- | --- |
| Western Farm Life | Denver, Colorado | 84 | 50.0 | 26 | 29.2 |
| Utah Farmer | Salt Lake City, Utah | 7 | 4.2 | 71 | 79.8 |
| Hoard's Dairyman | Fort Atkinson, Wis. | 32 | 19.0 | 37 | 41.6 |
| Successful Farming | Des Moines, Iowa | 36 | 21.4 | 18 | 20.2 |
| Farm Quarterly | Cincinnati, Ohio | 39 | 23.2 | 2 | 2.2 |
| *Other Journals | | 32 | 19.0 | 23 | 25.8 |
| Total journals | | 471 | | 234 | |
| Total farmers | | 168 | | 89 | |
| Mean number of journals per farmer | | 2.80 | | 2.63 | |
| Overall average = 2.7 | | | | | |

Note: Percent is based upon the proportion of farmers in each state who take the respective journal.

*Some of these "other journals" that were mentioned 3 times or more include the following: "Intermountain Farmer" (n=8), "Cattleman" (n=5), "Western Dairy Journal" (n=5), "Western Livestock" (n=4), "Big Farmer" (n=3), "Nation's Agriculture" (n=3), and "Utah Farm and Home Science" (n=3).

slightly over four-tenths of these Utah farmers. In Idaho the major journals are *Farm Journal*, read by over three-fourths of the farmers, *Idaho Farmer*, read by about two-thirds, and *Western Farm Life*, read by half of the farmers in Idaho. Table 16 also points out that on the average more journals are read by Idaho farmers (mean = 2.80) than by Utah farmers (mean = 2.63).

The scope or area of circulation is important because it designates the potential for cosmopolitanism among farmers. For instance, those farmers who read magazines also read by other farmers over a wide geographic area are linked to those farmers by means of this common stimulus. To the extent that ideas diffused through these journals are accepted, similar attitudes might be expected among them on related matters. The long range effect of such an occurrence would be the lessening of sub-cultural and geographical differences between variously located farmers.

Results showed that of all farm respondents in the sample 85.6% were exposed to one or more of the nationally-diffused farm journals. This is an indication of how mass media might be effective in reducing geographical isolationism in an area. In addition to this exposure, there were 44.0% who read regional journals, those diffused only to the West or Intermountain region, while 71.6% regularly read state or local journals. These percentages show that national journals are more widely read than either regional or state and local journals.

Another measure that is of interest in diffusion is the number of journals that each farmer regularly reads. Only 3.5% have no exposure to journals, while 15.2% read only one journal. The greatest percentage (51.3%) read two to three journals while 30.0% read four or more. The total number of journals reported by the 257 farmers was 705. The mean number of journals read by each farmer is 2.7. This points out that exposure is broad and substantiates the observation that farmers are exposed to a wide range of ideas.

The following question was asked to establish the degree of diffusion of ideas related to water from journals: "Do you get any ideas about water use or equipment from farm journals?" Nearly three-fourths (74.7%) of the farmers reported that they obtained ideas about water use or equipment from farm journals. This result summarizes the importance of the wide diffusion of ideas from farm journals.

The various types of ideas given are identified in Table 17. Ideas regarding sprinkling systems were the most frequently mentioned, accounting for one-third of the answers given. Irrigation methods, lining ditches or canals, and efficient watering methods were the next most common ideas. Ideas of lesser importance that were noted include: soil conservation, headgates, information about equipment, water conservation, methods of measuring water, siphons or pumps, water storage, and pipes and culverts.

Regarding the Extension Service as a means of diffusion the question was asked, "During the last five years, how many times per year on the average have you had some kind of contact for information or educational purposes with the Extension Service?" Only 5.0% of the farmers had no contact with the Extension Service in the five year period. About one-third (33.1%) averaged only a few with between one and three contacts per year, 22.2% averaged four to six contacts per

Table 17. Ideas about water use or equipment obtained from farm journals.

| Idea Topic | Frequency of Mention | Percent |
|-----------------------------|----------------------|---------|
| Sprinkling systems | 98 | 33.3 |
| Irrigation methods | 43 | 14.6 |
| Lining ditches or canals | 30 | 10.2 |
| How to water efficiently | 30 | 10.2 |
| Soil Conservation | 15 | 5.1 |
| Headgates | 14 | 4.8 |
| Information about equipment | 10 | 3.4 |
| Water conservation | 9 | 3.1 |
| Methods of measuring | 9 | 3.1 |
| Siphons or pumps | 8 | 2.7 |
| Water storage | 7 | 2.4 |
| Pipes or culverts | 6 | 2.0 |
| Other | 15 | 5.1 |
| Total | 294 | 100.0 |

Note: The percentage is based upon total answers. Some respondents gave more than one answer while 72 gave no answer. N = 257.

year, 19.5% averaged seven to 24 and 20.2% averaged 25 or more contacts per year. This amounts to approximately one or more contacts every two weeks.

It is clearly apparent that the Extension Service having this type of widespread interaction with farmers is an important agent for diffusion of farm ideas. In addition, however, other studies have found that the key role of extension in the diffusion and adoption process is to provide advice which is crucial to the actual adoption or rejection of the new practice. This function is crucial in the actual change that is made.

Two other items were also studied in relation to the process of diffusion. Less than one-third (29.6%) of the farmers regularly listen to agricultural programs on TV or radio. However, practically all (93.4%) of those who do listen to this type of program find them instrumental in helping to form opinions. TV and radio apparently play a secondary and supporting role to other diffusion agents previously

noted, such as farm journals, friends and neighbors, and the Agricultural Extension Service.

It must be concluded, therefore, that farm journals are an important media for developing early ideas about water resource development and that the extension program and likely similar factual agencies are important in the acceptance and adoption stages.

Summary

The process by which ideas are spread is called diffusion. Diffusion is combined in the process with acceptance and adoption of ideas and practices. Almost half of the farmers in the Bear River Basin reported that new farm ideas came from reading the farm journals. Half the farmers surveyed read two to three journals; 30% read four or more. The scope of readership is broad showing that farmers are exposed to a wide range of ideas. National farm journals were more widely read than either regional or state journals.

Scope or area of journal circulation is important because it designates the potential for cosmopolitanism among farmers. To the extent that ideas diffused through these journals are accepted by the various farmers, one might find similar attitudes among them on related matters. Farmers are linked to other farmers over a wide geographical area by means of this common stimulus.

Three-fourths of the farmers reported that they obtained ideas about water use or equipment from farm journals. Neighbors or friends and the Agricultural Extension Service were also identified as major sources of new ideas.

The Extension Service provides more specific facts and information than are found in the farm journals, and provides advice which is crucial to the actual adoption or rejection of new practices. Radio and TV usually play a secondary and supporting role to other diffusion agents.

FOOTNOTES

¹Gordon W. Allport, "Prejudice: A Problem in Psychological and Social Causation," *Journal of Social Issues*, 1950; Supplemental Series No. 4, as quoted in Rokeach, *Beliefs, Attitudes and Values*.

²Sheldon G. Lowry and Nancy K. Hammond, compilers, *Supplement to Rural Sociology* 30, Cumulative Index, Vols. 21-30, 1956-65.

³Joe M. Bohlen, "The Adoption and Diffusion of Ideas in Agriculture," in *Our Changing Rural Society*, ed. James H. Copp (Ames, Iowa: Iowa State University Press, 1964).

⁴*Ibid.* See also: Rogers, *Social Change in Rural Society*; Wade H. Andrews and J. Ross Eshleman, *The New Community*, Research Bulletin 929, Ohio Agriculture Experiment Station, 1963.

⁵Bohlen, *The Adoption and Diffusion of Ideas in Agriculture*.

CHAPTER 5

WATER INSTITUTIONS

Essentially, there are four main usages of the word "institution." The most common usage by sociologists is the reference to major components of society such as economics, government, religion, family, and education. Definitions of this type are given by several sociologists.¹ A second usage refers to a complex bureaucratic organization which occupies a physical plant of some sort such as a university, an asylum, or a penitentiary.² A third usage is referred to by Sorokin as an organized interaction or a specific group without any special reference to buildings or type of group.³

A fourth usage is the one most appropriate for classifying the phenomena that will be studied in this chapter. Like the first usage, there are several definitions that might be applied. Berelson and Steiner see this usage as a complex normative pattern governing behavior in certain fundamental and recurring situations (e.g. marriage, communion, etc.), the distinctive feature being established, accepted, patterned procedure.⁴ While the first type of usage conceptualizes items such as family and religion as institutions, the fourth usage looks at standardized, accepted practices or rules as institutions.

Joseph Himes recognizes this latter usage when explaining an institution as being "sanctioned rules of social action (e.g. marriage, money, slavery), the stress on rules of relationship."⁵ Parsons, Davis and other sociologists also include relevant discussions on various aspects of the fourth usage in their writings.⁶ Common elements of the various definitions of the fourth usage include rules, procedures, norms and laws. One may call these "patterned institutions." Water rights and units of water measurement can each be classified as patterned institutions according to the fourth usage discussed, and will be considered as such in this chapter.

The usefulness of classifying water rights and water measuring methods as institutions becomes apparent if a related term is brought forward. This term is referred to as "institutionalize," and it is most often used in the past tense. Loomis says that "when the pertinent society or public has legitimized a mechanism or procedure as rightful it has been institutionalized."⁷ Glock and Stark indicate that "institutionalized" refers to an element which ". . . is a stable property of groups to such a degree that it will be maintained even though the personnel of the group continues (sic) to change."⁸ What is pertinent here is that "institutionalized" or that which has become an institution, is the result of a major process which Loomis refers to as "institutionalization." As Loomis says, "institutionalization is the process through which organizations are given structure and social action and interaction are made predictable."⁹ For every element which can be considered an institution, there was a process preceding it by which it became such. According to Loomis, the articulating processes of evaluation and the communication of sentiment are of great-

est importance.¹⁰ This process will be viewed here as it applies to water rights and water measurement.

Water Rights

The two systems of water rights that became institutionalized and prescribed by law in the United States are called "riparian" and "appropriative rights." The differences between these two doctrines are briefly summarized by Wells A. Hutchins, an agricultural economist:

The riparian doctrine accords to the owner of land by or across which a stream flows the right to use water of that stream on or in connection with his contiguous land. No riparian owner has priority over other owners by reason of having used the water first. The appropriation doctrine, on the contrary, accords priorities pursuant to the maxim that "The one who is first in time is the first in right," regardless of whether the water is used upon land contiguous to the source of supply or far removed from it.¹¹

Hutchins later explains that an important qualifying factor in the case of appropriative rights is that the water must be used beneficially. Riparian water rights are not common in Utah or Idaho, but appropriative water rights are, which makes a brief historical sketch about the latter more relevant here. Hutchins describes the origin of the appropriation doctrine:

According to some authorities, some form of appropriation was practiced by water users in the Southwest under Spanish and Mexican sovereignty, pursuant to principles recognized in ancient Mediterranean countries.

The way in which the appropriation doctrine originated in other parts of the West is well authenticated. The Mormons who entered Utah in 1847 began irrigating promptly in order to produce food to keep them alive. In the course of their development, they established a system of prior rights, of appropriating water. A few years after the first settlement in Utah, the gold miners of California, independently of the Spanish-Mexican and Mormon customs, established a similar doctrine of first come, first served, with respect to water needed for working mines, operating mills, and producing crops. The customs of the miners formed the basis of a number of early appropriation statutes in the Western states and territories. They were probably most influential in the spread of the appropriation doctrine throughout the West.¹²

Hutchins further indicates that:

The appropriative principle in the Western States was first expressed in the customs followed locally in the community. These customs were sanctioned by court decisions, and eventually they formed the basis of State or Territorial legislation.¹³

Others have also written about water development among the Mormons. Leonard Arrington points out that the subject of irrigation techniques was discussed in meetings of the Twelve Apostles in Nauvoo when plans were being made to settle in the Rocky Mountains.¹⁴ And, Thomas O'Dea, a sociologist, points out that Brigham Young, the pioneer Mormon leader, declared in a public statement the day after his arrival in the Salt Lake Valley that only public ownership of streams of water should exist.¹⁵ The Mormons, as well as others associated with water use,

readily accepted this policy, and these policies soon became institutionalized customs in the Mormon community.

O'Dea indicates three things upon which the use of water was predicted. First, one had to have land. (Also see Arrington.¹⁶) Secondly, one was entitled to use of water in an amount proportionate to the labor he and his draft animals had contributed to public construction of canals and other water works. Thirdly, unless water was used beneficially, the user forfeited his right to the use of the water.¹⁷ A great deal of cooperation was required to make irrigation water available to individuals, and this cooperation was supervised by bishops of territorial and organizational units called wards.¹⁸ O'Dea summarizes the subsequent development:

The first incorporation of irrigation companies was based upon a law passed by the territorial legislature in 1865. Changes in the law in 1880 gave more rights to private ownership. The Utah experience with water control in connection with arid agriculture was summarized and codified in the Water Code passed by the State Legislature in 1903. According to this law, which remains, with some subsequent changes, the basic water regulation, beneficial use is the "basis, the measure, and limit of the right" of water use . . . the 1903 legislation, laid down procedures to formalize . . . application while recognizing the previously existing rights.¹⁹

Three things are of particular importance in this description of O'Dea. First, this is the beginning of the legal aspects of water rights; second, the door is opened to private ownership of water rights; and third, previously existing rights to water use are recognized in the 1903 Water Code.

Essentially, this describes the process of development and institutionalizing the system of appropriative water rights found in the Bear River Basin of Utah and Idaho. Although most of the references have been to the State of Utah, the early Mormon influence had basically the same effect in much of the neighboring State of Idaho. However, later water development was also done by land speculators and investors in part of the Bear River Basin. Figure 2 summarizes some of the main points of this brief sketch as they relate to the process of institutionalization.

In order to understand the universality and degree of general understanding of the water rights institution, several questions were asked in the Bear River Survey concerning its social psychological aspects. The questions in this study on water rights measure such items as diffusion, degree of awareness, and attitude toward an institutional change. With the exception of the first, these questions were limited to irrigation farmers.

Assuming that most people had heard of water rights, the question was asked of all respondents, "Where did you learn about the importance of water rights?" The answers to this question were grouped into formal, informal, and both formal and informal sources. Formal sources are defined as those sources of communication which are structured either by an organization with established group norms or required to conform to conventional forms or rules. Organizations are considered formal because they are structured by group norms such as constitutions, bylaws, and on organization of leadership positions. These may include social structures such as schools, water companies, canal companies, etc. Printed matter and radio or TV is defined as formal media because it is produced by an organized system and conforms to standard patterns and rigid rules of form and English usage. Informal sources, on

PHASE ONE: Recognition of a problem and an idea

- 1) Discussion of irrigation methods by Mormon Church officials, the Quorum of Twelve Apostles in Nauvoo, Illinois prior to the trek West.

PHASE TWO: Customs are established by introduction, acceptance and practice of water procedures.

- 1) Public announcement by Brigham Young that streams and other natural resources should belong to the public.
- 2) Land given to people who applied for it by drawing lots.
- 3) Allocation of water based upon labor contributed to public irrigation works.
- 4) Beneficial use of water a necessary condition for maintaining its use for individual farms.
- 5) Acceptance of these procedures by the people.

PHASE THREE: Laws introduced governing the rights and obligations of groups and individuals.

- 1) Incorporation of canal companies (legalization and formalization of previously existing cooperative canal organization) in 1865.
- 2) Changes in the law in 1880 giving more rights to private ownership.

PHASE FOUR: Laws integrated into a formal water code.

- 1) Codification of appropriative water rights into the Utah Water Code of 1903, including the former custom of "beneficial use," and at the same time recognizing previously existing rights.

Figure 2. A summary of phases and steps in the process of institutionalization of appropriative water rights in Utah.

the other hand, lack the same degree of defined rules and structure. Examples of this are family, word-of-mouth communication from friends, neighbors or other farmers, and general farm-related experience.

Table 18 indicates that the method of learning about or diffusion of water rights is largely through informal sources, especially for those living in rural areas. For example, 93.6% of the rural town and country respondents listed sources classified as informal, whereas a smaller number (73.1%) of the metropolitan-urban respondents listed the same type of source. It will be recalled from Chapter 4 that informal sources were also important as diffusion agents of other general farm ideas. The predominance of informal sources provides some insight into what might be expected as to the precision of the knowledge in this subject.

Table 19 reveals that of the various types of informal sources, the one mentioned most by all groups is that of farm-related experience. This would suggest that many of the urban respondents have also had some farming contact or background. This fact undoubtedly contributes to the urban preference for irrigation as a top priority use. (See Chapter 2.)

Of the farmers in each state, 94% or more indicated that they have water rights. Since most of the respondents belonged to canal companies, and since many did not know the year(s) of their water right(s), it is likely that this percentage refers to water rights held collectively by these companies, as well as to private water rights. In either case, the high percentage is consistent with the expectation that farmers would have a reasonably high awareness of the technical and historical aspects of water rights. Contrary to this expectation, however, Table 20 and Table 21 provide evidence to suggest low awareness.

Few if any radical changes have occurred in the water rights system. (For further discussion on the system of water rights see Wells A. Hutchins.²⁰) The kinds of changes directly related to water rights which are known to have occurred have been of the evolutionary institutionalizing type which took place over many years.

Table 18. Formal and informal sources of learning about importance of water rights, by rural town and country and metro-urban.

| Source | Rural Town and Country | | Metro- Urban | | Total No. |
|----------|---------------------------|-------|-----------------|-------|--------------|
| | No. | Pct. | No. | Pct. | |
| Formal | 23 | 2.7 | 27 | 17.3 | 50 |
| Informal | 787 | 98.6 | 114 | 73.1 | 901 |
| Both | 31 | 3.7 | 15 | 9.6 | 46 |
| Total | 841 | 100.0 | 156 | 100.0 | 997 |

$\chi^2 = 71.90$, $df = 2$, $P .001$

Note: There were 73 "no answer" responses.

Table 19. Formal and informal sources of learning about importance of water rights, by type of residence.

| Type of Source | Rural Town and Country | | Metro- Urban | |
|-------------------------------------|---------------------------|-------|-----------------|-------|
| | No. | Pct. | No. | *Pct. |
| Formal Sources | | | | |
| Media | 10 | 1.1 | 28 | 12.7 |
| Organizations | 47 | 4.9 | 21 | 9.5 |
| Informal Sources | | | | |
| **Direct Farm-Related Experience | 678 | 71.5 | 58 | 26.2 |
| From Other Individuals Contacted | 56 | 5.9 | 27 | 12.2 |
| Non-Farm-Related Experience | 100 | 10.5 | 49 | 22.2 |
| Never Heard of Water Rights | 47 | 4.9 | 38 | 17.2 |
| No Answer | 11 | 1.2 | 0 | ---- |
| Total | 949 | 100.0 | 221 | 100.0 |

*Percent based upon proportion of total answers given.

**Family farm experience was the most frequently mentioned type of direct farm-related experience.

Table 20. Farmers who think the system of water rights has changed since the time of the early settlers, by county of residence.

| Response | Bear Lake | | Caribou | | Franklin | | Cache | | Box Elder | | Total No. |
|---------------------|-----------|-------|---------|-------|----------|-------|-------|-------|-----------|-------|--------------|
| | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. | |
| Yes | 3 | 9.7 | 17 | 29.3 | 25 | 32.9 | 16 | 25.4 | 7 | 26.9 | 68 |
| No or Don't Know | 28 | 90.3 | 41 | 70.7 | 51 | 67.1 | 47 | 74.6 | 19 | 73.1 | 186 |
| Totals | 31 | 100.0 | 58 | 100.0 | 76 | 100.0 | 63 | 100.0 | 26 | 100.0 | *254 |

$\chi^2 = 6.28$, $df = 4$, $P = .20$

*Three no answer responses were not included.

These kinds of changes have largely been discussed earlier in this chapter. The following changes can be identified: Changes from the early communal canal companies, with county-controlled water districts and publicly-elected officials,²¹ to independent corporate type canal companies established under state law; the development of laws which began to codify the traditional water rights, but increased private ownership emphasis on water rights; the instigation of a formal water code in Utah and court decrees further formalizing rights and defining interstate relationships and the relationship of industrial and agricultural rights or priorities; the development of a river basin compact further specifying interstate water distribution; and the filing on unappropriated, or so called surplus water by various groups and interests, both public and private.

However, these developments have continued to recognize the basic private appropriative water rights system. In addition to the evolution of laws directly related to water rights, water use and development patterns have evolved as well. The earliest use included small hand-dug ditches. These changed to larger canals built in the following few decades to expand the amount of land under irrigation.²² In that

Table 21. Reported ways in which the system of water rights has changed since the time of the early settlers as perceived by farmers who felt that changes had occurred.

| | No. |
|---|-----------|
| I. Relevant Social and Institutional Changes Reported | 8 |
| The legal decree has changed slightly in court | |
| The system has become more established | |
| The organizations of the system of water rights has been improved | |
| Water companies have been split up | |
| Government has entered the picture | |
| More control by the power company | |
| Culinary water has been traded for irrigation water | |
| II. Technological and Physical Changes Reported | 60 |
| Storage facilities | |
| More sprinkler systems | |
| Construction work on canals | |
| Use of pumps and underground pipe systems | |
| Improvements in measurement equipment | |
| Cement headgates installed | |
| Other improvements in canals (cleaning, lining, etc.) | |
| III. Irrelevant Responses | 21 |
| Total | 89 |

N = 68 Some respondents gave more than one answer.

period the basic pattern of the system was established which in the main still exists today.

The principal changes in water use patterns which have occurred in recent years have been associated with technology. There have been changes in some areas to sprinkling systems rather than flooding or ditch irrigation. Sprinklers require some differences in the system of water use and management that indirectly affect the traditional water rights institution. For instance, the institutionalized pattern of water turns must be changed to permit delivery of smaller quantities of water over longer periods. In some instances piped systems can be installed providing gravity pressure for delivering the water and operating the sprinklers.

In order to determine the degree of understanding of changes in the system of water rights, the farmers were asked, "Has it (the system of water rights) changed any since the time of the early settlers?" The results of this question can be seen in Table 20. Two-thirds or more of the farmers in each county indicated no change or that they did not know of any. Only one-third or less of the irrigation farmers indicated that there had been some changes, and this suggests that farmers have a low, though not unusual, awareness of the specific aspects of the historical development of water rights.

A follow-up question, probing for an explanation only from those who gave a "yes" answer to the previous question, was asked concerning the types of changes they had noted. Table 21 shows the type of changes reported. They are mainly illustrative of the perspective of the respondents on this factor. They are of such a nature as to cast further doubt upon the quality of knowledge of farmers about the history of water rights development. Only eight people were able to identify seemingly relevant institutional changes. Others gave physical or technological changes, one of which was sprinkling. As noted previously, the adoption of sprinkling, although it is a technological change, has required changes in traditional patterns of water management which indirectly affects the institution of water rights.

When asked the question, "Do you think this system of water rights could be changed in any way?" about one-third of the farmers (32.8%) indicated that changes could be made. The remainder (67.2%) either answered "no" or "don't know." Some differences by county are of interest. For instance, two counties, Franklin in Idaho and Box Elder in Utah, stand out as having extreme attitudes. Franklin County had 43.4% who felt that changes could be made, while Box Elder County had only 11.5% who felt this way. Caribou County with 22.8% was next lowest in the belief that there could be changes in the system. Bear Lake County showed 38.7% and Cache had 34.9% who felt that the system of water rights could be changed. Roughly one-third of the farmers felt that changes could be made in the water rights system.

A follow-up, open-end question was asked concerning how the water rights system could be changed. As with the question relating to changes since the time of the early settlers, this question also revealed few responses which were relevant to water rights. They are shown as suggestive types of changes, and these "change-ideas" can be seen in Table 22. The idea noted most often was redistribution or allocation changes. In order for this type of change to take place, it would be necessary to change the system of water rights and assign new priorities based upon criteria different from established custom and law.

Another idea given was to place water on a call system. This would make irrigation water available upon request rather than on turns. If adopted without qualification, it would also affect the present institutionalized system of water rights.

Other changes mentioned which are directly or indirectly related to water rights include: "Decrees should be made clearer," "Change from a first come, first serve system," and "Improve the storage rights system." The latter refers to water rights in stored water in lakes and reservoirs.

Also, the role of government in water rights was mentioned by a few, largely expressing anxiety toward unknown possible effects.

Table 22. Possible future changes in the system of water rights as perceived by farmers who had stated they felt that changes could occur.

| | No. |
|---|-----------|
| I. Relevant Social and Institutional Changes Reported | 26 |
| A. Most Relevant Responses | |
| Redistribution or allocation changes in water rights | |
| Call system | |
| Decrees should be made clearer | |
| Change from 1st come, 1st serve | |
| Improvements in the storage rights system | |
| B. Other Responses | |
| The Bureau of Reclamation plan (Bear River Project) may change things | |
| Government control will change everything | |
| The organization could be modernized a little | |
| II. Technological and Physical Changes | 50 |
| More dams or reservoirs or storage facilities | |
| Introduction of a sprinkling system plan or more sprinkling systems | |
| Canal construction or improvements | |
| Increased use of pipes | |
| More use of pumping | |
| Standardization of headgates | |
| III. Irrelevant Responses | 15 |
| Total | 91 |

Note: These responses are not direct institutional changes but are of interest as change ideas and may in some cases affect modification of the institution of water rights.

Physical changes in the system are noted most often. This is related to the need for more dams and storage facilities as well as for more sprinkling and distribution systems.

The data show only small numbers who think that changes could be made in the system of water rights. Thus, it is apparent that very few have given thought to such changes. Should changes be introduced or suggested, it is likely that attitudes of most farmers which have been set in one institutionalized pattern would be against water rights changes. Such an attitude would act as an institutional constraint on changes proposed. However, since the preponderance of evidence shows that little thought has been given to changes recently, it may also mean that new approaches might be considered through an educational program, if at the same time important rewards are obvious and threats to the security and interests of the respondents can in reality be eliminated.

Water Measurement

Water measurement has generally become an established institutionalized practice. "Cubic feet per second," or the second foot concept is the traditional unit of measurement. An understanding of units of measurement is enhanced by the following quotation from an Engineering Extension Service bulletin:

Water is measured under two conditions—at rest and in motion. Water at rest—that is, in reservoirs, ponds, soil and tanks—is measured in units of volume such as the gallon, cubic foot, acre-foot and acre-inch. Measurement of water in motion—that is flowing in rivers, canals, pipe lines, ditches and flumes—is expressed in rate of flow: gallons per minute (g.p.m.), cubic feet per second (c.f.s.), acre-feet per day, acre-inches per hour, and miner's inches. It is important that the distinction between a unit of volume and a unit rate of flow be kept in mind. For instance, a cubic foot is a definite volume of water such as would be held in a container 1 foot wide, 1 foot broad and 1 foot deep, whereas a cubic-foot per second is a flow which would fill the cubic-foot container once every second as long as the flow continued.²³

This analysis is concerned with units of water measurement concepts, and more particularly with viewing the acre foot unit as a case study in the problem of changing institutions. An acre foot is the amount of water upon one acre of surface one foot deep, equivalent to 43,560 cubic feet, and the second foot unit (cubic feet per second) is the discharge of one cubic foot of water per second of time. These two units of measurement are prescribed in Utah water law.²⁴

In the measurement of water it has become traditional and also nearly universal to think of it in terms of the concept of "second feet." Some extension irrigation specialists, however, have been recommending for over a decade that farmers also conceptualize the amount of water delivered in terms of acre feet or acre inches. The assumption given for this is that the use of a concept of volume of water, or the amount of water actually delivered, rather than a rate concept, or that of size of stream, helps the farmer to be more conscious of whether he is using more or less water than is needed on a particular land area. It was therefore considered worthwhile to measure the status of the use and understanding of the volume type concept

among farmers as an indication of a type of institutional change in water resources management.

Several questions were asked farmers concerning measurement. First, farmers were asked, "How do you measure the water you get?" The second foot unit was the most common measure given as 66.9% of all farmers indicated measuring their water in this manner. Less than one-twentieth (4.7%) indicated measurement by use of the acre foot concept. There were 28.2% of the farmers who gave other answers.

A few reported that they "don't measure" their water. The latter type of answer, suggests that informal systems still exist. This assumption is supported by a case in Bear Lake County as revealed by an interview with canal company officers in the Fall of 1969. One common system authorizes the water master to estimate the amount of water to go to each user. This particular method has caused considerable friction among water users, many of whom claim that the water master has shown favoritism. The water master denied such "absurd attacks against my integrity." It is easy to imagine the unavoidable difficulties that would attend such an informal procedure for dividing the water.

Respondents not reporting the use of the acre foot unit in reference to measurement were asked, "Have you heard of the use of acre feet?" There were 191 out of 230 farmers that had heard of this unit of measurement (82.6% in Idaho and 84.0% in Utah), indicating that awareness of the concept is rather widespread.

A final question was asked for the purpose of identifying the degree to which the goal of the use of the volume type or acre foot, concept was understood. The question asked of all those who had heard of the acre foot unit of measurement was: "How does the use of acre feet in irrigating affect the use of water?" As was noted earlier, it was assumed that the conscious use of this type of measurement was expected to improve the efficiency of water users in their management. However, no more than 48 respondents out of 257 gave any answers regarding effects. It is recognized that the question probably was difficult unless the respondent had specific understanding of the purposes which the irrigation specialists had in mind. The results of the question show that only a small number were likely to have been so informed. This limited use and understanding illustrates the difficulty of making changes in deep-seated patterns of institutional behavior.

The assumption of the irrigation specialists that an understanding of the acre foot unit of measurement will affect efficiency of water use in irrigation is not effectively measured in this set of questions, but the results indicate some interesting problems and provide the basis for hypotheses for further study. The above analysis is only a step into the important problem of institutional change in water resources, and should provide problems for important future research.

Summary

An institution was defined in this chapter as a complex normative pattern governing behavior in certain fundamental and recurring situations, perhaps better understood as traditional, accepted and established patterns of organization or proce-

ture. The process whereby the system of water rights became an institution was briefly sketched and shown in Figure 2.

It was found that the strong majority of all respondents first learned about the importance of water rights from informal sources. This was especially so with people in the rural town and country areas. Farm-related experience was most frequently mentioned as the specific type of informal source, suggesting that many of the urban respondents have also had some farming contact or background. This undoubtedly contributes to the urban preference for irrigation. About 95% of the farmers surveyed indicated that they have water rights, although there is some evidence to suggest that respondents may not have been clearly differentiating in their answers between collective water rights and individual water rights.

Few, if any, radical changes have occurred in the water rights system. However, evolutionary-type changes such as formalization and codification of water rights, emphasis on private ownership, and others have occurred which directly affect water rights. In addition, recent technological changes have been introduced, particularly sprinkling and water storage, which indirectly affect the traditional water rights institution.

Although these changes have been occurring, nearly three-fourths of the respondents did not recognize either present or historical changes. When the remaining one-fourth of the respondents were asked to designate the types of changes that had occurred, almost none of them were able to identify relevant historical institutional changes such as laws, decrees, and management organization.

Regarding the future, about one-third of the farmers felt that changes could be made in the present system of water rights. However, very few identified relevant institutional changes. Since few suggestions for changes were given, it is likely that most farmers would oppose changes in water rights.

Most farmers had heard of the acre foot unit of measurement but few indicated its meaning for water management. Diffusion of this recommended practice for water management of conceptualizing water in terms of volume of land rather than rate has not been successful.

In conclusion, the institution of water rights is one that farmers apparently have relatively little specific knowledge about, but strong institutional acceptance for, and have given little thought about changing. In this situation where very little definitive knowledge is held by the large majority, most people find themselves dependent upon the advice, counsel, or public statements of others. This state of knowledge will have further impact upon decision making among these people.

The level of knowledge will likely be inversely related to the level of emotionalism, fear of change and of the unknown. There will need to be a sound understanding of rights in order to provide the sense of security needed to change long-standing, patterned institutions. Assuming that farmers hold water rights to be sacred, the evidence in this chapter would suggest that this is not based upon a clear knowledge of water rights. The implications of this may well be that raising the level of knowledge could be a major force in the implementation of social change in water institutions.

FOOTNOTES

¹Bernard Berelson and Gary A. Steiner, *Human Behavior* (New York: Harcourt, Brace and World, Inc., 1964), p. 384; Constantine Panunzio, *Major Social Institutions* (New York: The Macmillan Company, 1939), p. 3; Joyce O. Hertzler, *Social Institutions* (New York: McGraw Hill Book Co., Alfred A. Knopf, Inc., 1965), p. 31; F. S. Chapin, *Contemporary American Institutions* (New York: Harper & Brothers Publishers, 1935), p. 412; *A Dictionary Of The Social Sciences*. (New York: Free Press, 1964), p. 338; and Joseph S. Himes, *The Study of Sociology* (Glenview, Illinois: Scott, Foresman and Company, 1968), p. 180-181.

²Definitions of this type of institution can be found in Himes, *The Study of Sociology*, p. 180; Henry Pratt Fairchild, ed., *Dictionary of Sociology* (Patterson, New Jersey: Littlefield, Adams & Co., Inc., 1962), p. 157.

³Pitirim Sorokin, *Society, Culture, and Personality* (New York: Harper Brothers, 1947), p. 70.

⁴Berelson and Steiner, *Human Behavior*, p. 384.

⁵Himes, *The Study of Sociology*, p. 180.

⁶Talcott Parsons, *The Social System* (Glencoe, Illinois: The Free Press, 1951), p. 39; Kingsley Davis, *Human Society* (New York: The Macmillan Company, 1949), p. 71; Walton H. Hamilton, *Encyclopedia of the Social Sciences*, Vol. 8 (New York: Macmillan, 1933), p. 84.

⁷Charles P. Loomis, *Social Systems* (New Jersey: D. Van Nostrand Company, Inc., 1960), p. 36.

⁸Charles Y. Glock and Rodney Stark, *Religion and Society in Tension* (Chicago: Rand McNally & Co., 1965), p. 4.

⁹Loomis, *Social Systems*, p. 36.

¹⁰*Ibid.*

¹¹Wells A. Hutchins, "A Comparison of Riparian and Appropriative Rights" (paper presented at the Southwestern Social Science Association meetings, Dallas, Texas, April 1955), p. 1.

¹²*Ibid.*, p. 2.

¹³*Ibid.*, p. 3.

¹⁴Leonard J. Arrington, *Great Basin Kingdom* (Cambridge: Harvard University Press, 1958), p. 41.

¹⁵Thomas O'Dea, *The Mormons* (Chicago: The University of Chicago, 1957), p. 198.

¹⁶Arrington, *Great Basin Kingdom*, p. 51, indicates that applications were taken from those interested in having land for farming, and lots were drawn to determine who received land and in what location.

¹⁷O'Dea, *The Mormons*, p. 203.

¹⁸*Ibid.*, p. 199.

¹⁹*Ibid.*, p. 203. (See also Title 100, Utah Code; Annotated 1943.)

²⁰Hutchins, "A Comparison of Riparian and Appropriative Rights"; Hutchins, "Mutual Irrigation Companies in California and Utah," Bulletin No. 8. Farm Credit Administration, Cooperative Div., Washington, D.C., October 1936.

²¹ Joel E. Ricks, ed., *The History of a Valley* (Cache Valley Centennial Commission, 1956), p. 92-93.

²² *Ibid.*, p. 148-149.

²³ Eldon M. Stock, "Measurement of Irrigation Water," Bulletin No. 5, Utah State Engineering Experiment Station and Utah Cooperative Extension Service, June 1955, p. 9. Another similar discussion can be found in Max C. Jensen and Mark R. Kulp, "Farm Water Measurement," Extension Bulletin No. 170, Extension Division of the College of Agriculture, University of Idaho, 1948, p. 3.

²⁴ Wayne D. Criddle and Dallin Jensen, compilers, *Water Laws of Utah and Interstate Compacts and Treaties* (2nd ed.; Salt Lake City, Utah: Office of State Engineer, 1964), p. 9.

CHAPTER 6

PERCEPTION OF WATER SUPPLY AND PATTERNS OF WATER USE BEHAVIOR

Perception and Behavior

Since water is recognized as the "life blood" of the area, the water supply, and changes in water use related to the supply, are two crucial problems associated with water resource development and management.

Water supply

When discussing water supply and use with farmers in an arid area, the question of adequate supply logically arises. The following question was asked of all irrigators: "Is the water you have adequate for your needs?" Table 23 shows how irrigating farmers compared on this question by state of residence. While only about half of the irrigators in Idaho think that their water supply is adequate, nearly three-fourths of the Utah irrigators responded this way, indicating a more pronounced consciousness about this matter in Idaho. This question was not aimed at the possibility of opening new areas of land to irrigation, but only at the land the respondents were operating.

A closer look at counties of Idaho and Utah in Table 24 reveals extreme differences between two counties, one in each state. Bear Lake County in Idaho had the smallest proportion (37.9%) who expressed the opinion that they had adequate water for their needs. On the other hand, 84.6% of the irrigators of Box Elder

Table 23. Perception of farmers as to the adequacy of their water supply, by state of residence.

| Response | Idaho | | Utah | | Total No. |
|----------|-------|-------|------|-------|--------------|
| | No. | Pct. | No. | Pct. | |
| Yes | 85 | 52.2 | 64 | 73.6 | 149 |
| No | 77 | 47.5 | 23 | 26.4 | 100 |
| Total | 162 | 100.0 | 87 | 100.0 | 249 |

$$\chi^2 = 10.48 \quad df = 1, \quad P .01$$

Note: Six "no answer" responses in Idaho and two in Utah were excluded from this table.

Table 24. Responses by farmers to the question: "Is the water you have adequate for your needs?" by county of residence.

| Response | Bear Lake | | Caribou | | Franklin | | Cache | | Box Elder | | Total No. |
|----------|-----------|-------|---------|-------|----------|-------|-------|-------|-----------|-------|--------------|
| | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. | |
| Yes | 11 | 37.9 | 32 | 56.1 | 42 | 55.3 | 42 | 68.8 | 22 | 84.6 | 149 |
| No | 18 | 62.1 | 25 | 43.9 | 34 | 44.7 | 19 | 31.2 | 4 | 15.4 | 100 |
| Total | 29 | 100.0 | 57 | 100.0 | 76 | 100.0 | 61 | 100.0 | 26 | 100.0 | 249 |

$\chi^2 = 15.48, df = 4, P .01$

Note: Eight "no answer" responses were excluded from this table.

County in Utah reported having sufficient water. Other counties fell between these extremes.

Table 23 deals only with farmers' perception of water shortage. In an objective sense there may be more water in Bear Lake than in Box Elder County, but it may appear differently to Bear Lake farmers because of factors such as inefficient use and different cropping patterns. For example, in Box Elder County water regulation is primarily the function of one centralized company, whereas in Bear Lake County many small independent companies exist and, in some cases, outmoded water measurement procedures prevail. As a result efficiency of use would likely be greater in Box Elder County. However, the subjective feeling or perception of individual water shortage is more important than the objective situation when it comes to human behavior. Mainly when the two correspond with each other, as when the objective situation is perceived and the problem is within the ability of the farmer to correct, is the objective situation important.

In an earlier report on this study, Geertsen found several factors associated with an inadequate water supply, and people reporting shortages showed a greater intensity of feeling about water. For instance, irrigation farmers who reported they needed water: (1) more often showed anxiety or worry about the water supply, (2) most often took legal action against others over water problems, and (3) reported more often that they felt it was wrong to move water out of its natural river basin to another.¹

The way the Bear River proposal was designed it would alleviate the problem of water supply anxiety, although Bear Lake County, where perceived needs are greatest, would not receive any project water. As shown in the proposal, the water was to be distributed between states in the following way:²

| | Idaho | Utah | Total |
|-----------------------------------|--------|--------|---------|
| Full service land (acres) | 12,956 | 36,810 | 49,766 |
| Supplemental service land (acres) | 47,943 | 11,299 | 59,242 |
| Total | 60,899 | 48,109 | 109,008 |

The higher number of supplemental service acres proposed for Idaho agrees with the survey which shows an important supplemental need. The proposed project would probably meet the needs of present land and relieve the anxiety for additional water for farmers below the Soda Reservoir for the foreseeable future.

A majority of irrigators in both states, 89.0% in Idaho and 79.5% in Utah, use all of the water available to them. Since only 40.2% expressed a need for more water, this indicates that a significant proportion of those whose water is adequate still use all of the water available to them. This suggests that a close margin exists even for those who report an adequate water supply. Slightly more farmers in Utah than in Idaho stated that they had some surplus water.

While most irrigators receive water from creeks and rivers, another common source of water in the Bear River Basin is underground water. Slightly more than one-third (34.3%) of the Idaho farmers have one or more wells compared to about one-fifth (19.3%) of the Utah farmers. A recently completed groundwater study of the Idaho part of the Bear River Basin by the Idaho Department of Reclamation

reveals some of the natural conditions that make wells an important resource in the State of Idaho. The report states:

Ground water occurs in the alluvium of the valleys, the basalt of Soda Creek basin and Gem Valley, the Salt Lake Formation, the fractured bedrock, and possibly in the Wasatch Formation. The basalt and alluvium are the most productive aquifers and are best able to support additional ground-water development. Reported wells yields are as high as 3,500 gpm from the basalt and 2,500 gpm from the alluvium. The principal sources of recharge to the aquifers include direct infiltration of precipitation, spring snowmelt and run-off seepage of irrigation water, and losses from irrigation canals. ³

Although the water supply of farmers may be adequate at one point in time, there is always a chance that this supply may be threatened by various conditions, under which all farmers would be confronted with the similar problem of getting more water. Table 25 shows what farmers reported they would do in such a situation. It will be recalled from Table 23 that the problem of individual water shortage was reported by fewer farmers in the State of Utah. However, as can be seen in Table 25, 51.7% of the Utah farmers indicate that if they needed water there is "no way to get more water," whereas only 32.1% of the Idaho farmers answered this way. This would suggest that in the case of a water shortage, the ultimate effect may be more nearly the same in each state than the results in Table 23 indicate. That is, although more farmers in Idaho report a need for more water, they nevertheless have more alternatives for fulfilling these needs. Whereas in the Utah area more farmers had adequate water but had no alternatives in time of shortage. The problem in Idaho would appear to be more of a chronic one than in Utah showing a need for supplemental supplies of water for present needs.

Table 25. How farmers reported they would get more water if they needed it, by state of residence.

| Action | Idaho | | Utah | |
|------------------------------|------------|--------------|-----------|--------------|
| | No. | *Pct. | No. | Pct. |
| No way to get more water . . | 54 | 32.1 | 46 | 51.7 |
| Buy, rent, or trade water . | 63 | 37.5 | 26 | 29.2 |
| Drill wells | 38 | 22.6 | 8 | 9.0 |
| Acquire more water stock . . | 11 | 6.5 | 2 | 2.2 |
| Take it | 5 | 3.0 | 6 | 6.7 |
| Build storage facilities . . | 9 | 5.4 | -- | --- |
| Totals | 180 | 100.0 | 88 | 100.0 |

*Percentages are based upon the proportion of total farmers in each state who gave the respective answer. There were 168 farmers in Idaho, 89 in Utah. Some respondents gave more than one answer.

As can be seen in Table 25 the most frequent alternative to obtain more water mentioned by farmers of both states is the category, "buy, rent or trade water." More than one-third of the Idaho farmers gave this answer compared to a somewhat smaller proportion of Utah farmers. Almost one-fourth of Idahoans said that they could "drill wells" compared to less than one-tenth (9.0%) of the Utahns, suggesting that wells are a potential source of water in Idaho. Other answers shown in Table 25 account for much smaller percentages. Some respondents in each state bluntly admitted that they would take water, that is, steal it if necessary. This type of behavior, along with other similar types, frequently results in conflict problems, both personal and legal.

Water use patterns

Farmers were asked if they had made any changes in their irrigation methods in the past 20 years. About two-thirds of the farmers in both states reported "that they had" made changes during this period of time.

The types of changes are shown in Table 26 where it is shown that 54.8% of the Idaho farmers mentioned sprinkling or use of piped systems while only 37.1% of the Utah farmers responded in similar fashion. This points out the importance of sprinkler irrigation as a recent technique in irrigating and its more rapid adoption by

Table 26. Changes in irrigation methods made by farmers in the last 20 years, by state of residence.

| | Idaho | | Utah | |
|--|-------|------|------|-------|
| | No. | Pct. | No. | *Pct. |
| Sprinkling or use of pipe system | 92 | 54.8 | 33 | 37.1 |
| Ditch and canal improvement | 24 | 14.3 | 19 | 21.3 |
| Land and water distribution changes . . | 17 | 10.1 | 22 | 24.7 |
| Development to make increased amount of irrigation water available (reservoirs, dams, wells) | 12 | 7.1 | 15 | 16.9 |
| Improvement and updating of methods or equipment for irrigation | 18 | 10.7 | 6 | 6.7 |
| Headgate improvement | 18 | 10.7 | 5 | 5.6 |
| Changes in methods of measuring water . | 3 | 1.8 | 0 | 0.0 |
| No changes | 53 | 31.5 | 30 | 33.7 |

Note: Some respondents gave more than one answer.

*Percentage is based upon proportion of total farmers in each state who gave the respective answer. There were 168 farmers in Idaho, 89 in Utah.

Idaho farmers. The proper topographical conditions and the existence of underground water frequently facilitate the change to sprinkling irrigation.

"Ditch and canal improvement" is another change that was frequently mentioned. There were 14.3% in Idaho who gave this answer, while a larger 21.3% in Utah responded this way. This was followed by "changes in land and water distribution" mentioned by about one-tenth of the Idaho farmers compared to a higher proportion of nearly one-fourth of Utah farmers. Next in order of frequency is development to make an increased amount of irrigation water available, including reservoirs, dams, and wells. There were 7.1% in Idaho compared to 16.9% in Utah who gave this answer. This type of change is followed by improvement and updating of methods or equipment for irrigating, which was given by 10.7% of Idahoans and by 6.7% of the Utahns. Last of the more frequently mentioned changes is headgate improvement, with 10.7% of the Idaho farmers and 5.6% of the Utah farmers answering in this fashion.

Summary

A significantly greater proportion of farmers in the Idaho area than in Utah reported that their individual water supply was inadequate for their irrigation needs, indicating a greater feeling of need for water in Idaho. Intercounty variations were wide with one-third of the farmers in Bear Lake County stating that their water supply was adequate, compared to over four-fifths of the farmers in Box Elder County. People who reported shortages showed significant differences in anxiety or worry about water supply and more often took legal action on water problems.

A strong majority of all irrigators use all water available, and only two-fifths expressed a need for water. It was concluded, therefore, that a close margin existed between need and no need for most farmers.

It was found that slightly over one-third of the Idaho farmers have one or more wells compared to only about one-fifth of the Utah farmers.

More alternatives for fulfilling water needs are perceived to exist in Idaho, as only about one-third indicated that there is no way to get more water compared to about half in Utah. Where water is available the most frequent alternatives mentioned were "buy, rent or trade water" followed by "drill wells." Both alternatives were more frequently mentioned by Idahoans. The availability of water through these various alternatives suggests that water shortage is primarily associated with numbers of individuals in an area than with the area as a whole.

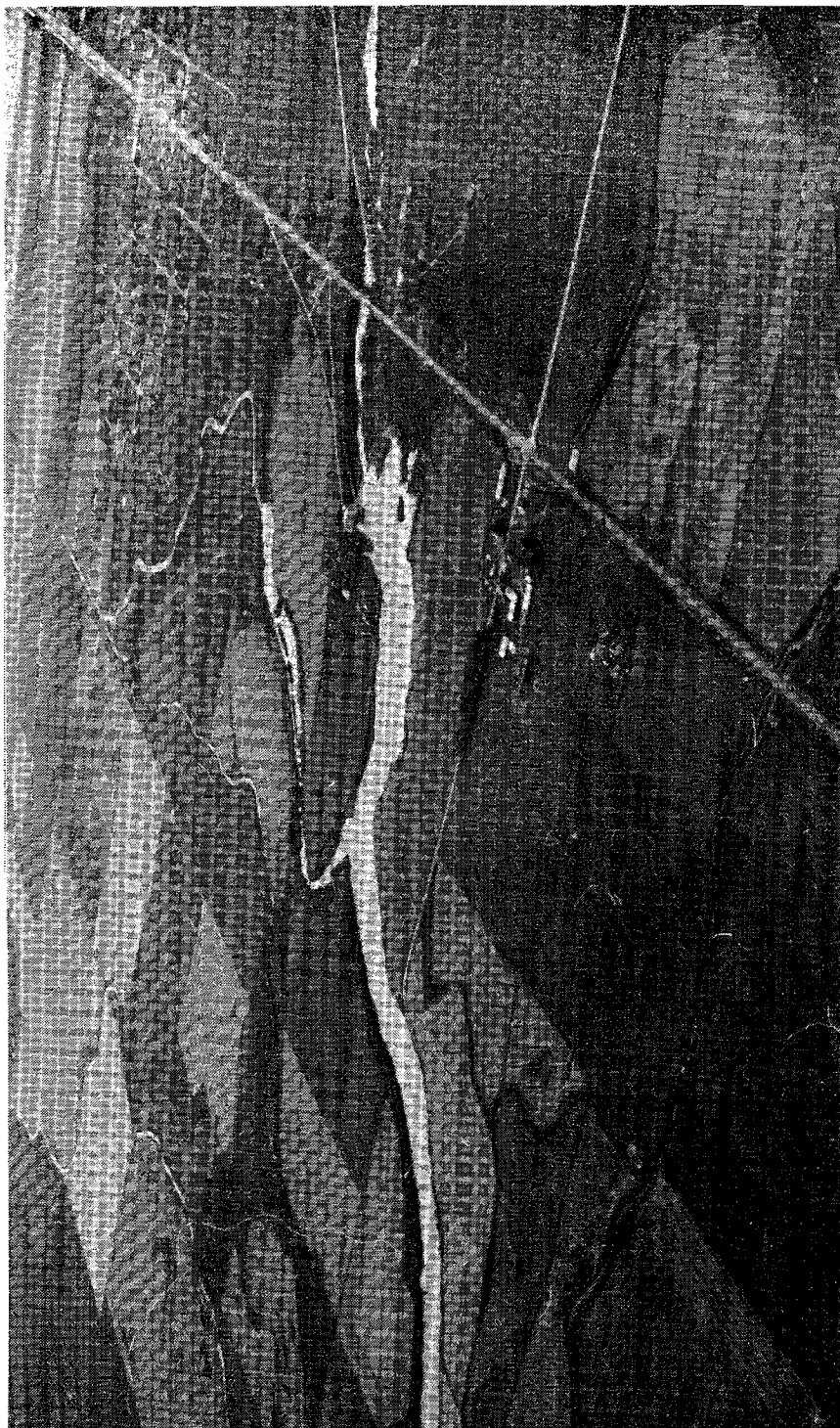
Two-thirds of the farmers in both states indicated that they had made changes in their irrigation methods in the past 20 years. The most frequent type of change was the use of sprinkling, which accounted for the changes of about one-half of the Idaho farmers and about one-third of the Utah farmers. Other changes of significance that were mentioned were "ditch and canal improvement," "development to make increased amount of irrigation water available (reservoirs, dams, wells)," "land and water distribution changes," "improvement and updating of methods or equipment for irrigating," and "headgate improvement."

FOOTNOTES

¹Dennis C. Geertsen, "The Effects of the Psycho-Social Need for Security on Irrigation Farmers' Behavior and Cognition Related to Water Resources" (unpublished M.S. thesis, Utah State University, 1969), p. 70.

²U.S. Department of the Interior, Bureau of Reclamation, *Feasibility Report*, p. 13.

³Idaho Department of Reclamation, "Hydrologic Reconnaissance of the Bear River Basin in Southeastern Idaho," Water Information Bulletin No. 13, October 1969, p. 46.



The Bear River at Grace, Idaho, in Caribou County.

CHAPTER 7

BASIC INSTITUTIONS, SOCIAL SYSTEMS AND THEIR PERCEIVED FUNCTIONS IN WATER RESOURCE DEVELOPMENT

Institutions, Social Systems and Functions

Social systems related to basic institutions are analyzed in this chapter as functional elements in the action process of water resource development. While introducing various definitions of the concept "institution" in Chapter 5, the first definition identified the major structural components of society as basic institutions. These components are the family, government, education, religion, and economics. When referring to specific groups or systems within these institutions, the term "social system" will be used. Charles P. Loomis indicates that a social system develops from interaction that tends to persist over time in uniform and orderly ways and in which specific interaction is more intense and more frequent between members than between members and non-members.¹ Specific social systems may vary from formally organized social structures to informal friendship groups.

Questions dealing with social systems relating to basic institutions and their functions were asked of all respondents in the study. The questions dealt with county and town government, political, educational and religious social systems and the water-related functions they fulfill. The questions regarding these variables provide a perspective of the degree of involvement in water problems of many of the various elements of society, assuming, of course, that the Bear River Basin is not atypical. This discussion will be mainly descriptive rather than analytical.

Local government and water

To begin with, the function of local government was explored in the question: "Does your county or town government deal with water or get involved with it in any way?" In order to examine differences within the Bear River Basin, county divisions are shown. Table 27 reveals important differences between counties on this question. About 30% of the respondents in Bear Lake County compared to over three-fourths of the Ogden City respondents (metropolitan-urban group) indicated positively that local government was involved with water. Roughly half of each of the other counties expressed agreement with this question. There were important percentages in three counties who responded "don't know," that is, 33.9% in Bear Lake, 29.9% in Caribou, and 30.8% in Box Elder. All local governments, either county or municipal, have some responsibility for some aspects of water. Since both "no" and "don't know" reflect incorrect knowledge, the positive answers demonstrate the level of knowledge of the people in the areas studied.

Table 27. County or town government involvement with water resources, by county or metropolitan-urban place of residence.

| Involved | Bear Lake | | Caribou | | Franklin | | Cache | | Box Elder | | Metro-Urban | | Total No. |
|------------|-----------|-------|---------|-------|----------|-------|-------|-------|-----------|-------|-------------|-------|--------------|
| | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. | |
| Yes | 36 | 30.4 | 81 | 52.6 | 105 | 47.5 | 109 | 55.9 | 93 | 49.5 | 151 | 77.8 | 575 |
| No | 41 | 34.8 | 27 | 17.5 | 66 | 29.9 | 45 | 23.1 | 33 | 17.6 | 9 | 4.7 | 221 |
| Don't Know | 40 | 33.9 | 46 | 29.9 | 50 | 22.6 | 40 | 20.5 | 58 | 30.8 | 34 | 17.5 | 268 |
| No Answer | 1 | .8 | 0 | 0.0 | 0 | 0.0 | 1 | .5 | 4 | 2.1 | 0 | 0.0 | 6 |
| Total | 118 | 100.0 | 154 | 100.0 | 221 | 100.0 | 195 | 100.0 | 188 | 100.0 | 194 | 100.0 | 1070 |

$\chi^2 = 98.16$ df = 10, P .001

Answers to the probing questions of how the institutions are involved in water are shown in some cases as numbers of times they were mentioned. This is mainly done because of the small number in many cases who answered the questions. These answers are useful only for a view of ideas that exist and are suggestive to water resources decisions. In addition, an idea of the frequency of the answers also adds some information that may be useful to the water resources manager.

Those persons who believed that their local governments were involved were asked to identify how they were involved with water. Out of 619 answers given, 467 or 75.4% identified management functions such as control and regulation of water use by either physical or economic means (e.g. operation of culinary water supply, metering and sale of water, and control of streams and springs). Several other categories of answers were mentioned but only a relatively few times. These were: development of water, including ways to make water more available or better use of existing water (mentioned by 60 people) favorable involvement with the Bear River Project (by 30) opposed to the Bear River Project (by 20), serving as a source of information (by 17) and competing for or conflict over water (by 13).

The most obvious image of local government in water resources was with the management aspects of control and regulation. However, the other answers, although given by only a few people seemed to require a more special or specific quality of knowledge. These items would seem to indicate that respondents giving them may have been closer to the problem or more interested in it than the large majority.

Politics and water

In connection with political involvement, a second question was asked: "Does water become involved in politics?" Table 28 indicates major differences between counties of the two states on this question. Comparatively larger proportions of people in Idaho counties perceived water as a political matter, with Bear Lake 42.4%, Caribou 45.5%, and Franklin 45.7%, compared to much smaller numbers in rural Utah Counties; Cache 11.3% and Box Elder 11.7%. Considerably more concern for these matters at political levels is shown in Idaho areas than in Utah. Again the larger percentages of "don't know" answers among all counties are noteworthy.

Although 325 respondents said that water was involved in politics, when asked how it was involved, 353 different answers were given, indicating that some gave more than one answer. The answers of most people fell in the broad category, a general political issue (254 times). Some other types of involvement that were mentioned fewer times included: pressure group activity (28 times), an issue or activity by individual political office holders (48 times), government involvement in water development as an issue (17 times), and interstate politics (6 times).

Educational systems and water

Educational systems were found to have only a few, 296 respondents out of a total of 1,020, who believed education was involved in water matters. Most did not know. The least educational involvement was reported in Bear Lake County with 11.9% and the highest in Caribou County with 41.6%. Other counties reported from 19% to 27%.

Table 28. Political involvement with water, by county or metropolitan-urban place of residence.

| Involved | Bear Lake | | Caribou | | Franklin | | Cache | | Box Elder | | Metro-Urban | | Total No. |
|------------|-----------|-------|---------|-------|----------|-------|-------|-------|-----------|-------|-------------|-------|--------------|
| | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. | |
| Yes | 50 | 42.4 | 70 | 45.5 | 101 | 45.7 | 22 | 11.3 | 22 | 11.7 | 61 | 31.5 | 326 |
| No | 12 | 10.2 | 22 | 14.3 | 43 | 19.5 | 55 | 28.2 | 47 | 25.0 | 47 | 24.2 | 226 |
| Don't Know | 52 | 44.0 | 60 | 38.9 | 75 | 33.9 | 116 | 59.5 | 112 | 59.6 | 85 | 43.8 | 500 |
| No Answer | 4 | 3.4 | 2 | 1.3 | 2 | .9 | 2 | 1.0 | 7 | 3.7 | 1 | .5 | 18 |
| Total | 118 | 100.0 | 154 | 100.0 | 221 | 100.0 | 195 | 100.0 | 188 | 100.0 | 194 | 100.0 | 1070 |

$\chi^2 = 121.99$ df = 10, P .001

Schools were perceived as being involved in water educational programs mainly through teaching and classwork, which means was mentioned 188 times out of a total of 225. This was followed by much smaller numbers for the category other school programs and projects (mentioned 31 times), and for college research (6). Among the school classes mentioned, agriculture was considered the most important in educating students about water resources. Respondents also noted several school topics that related to water. These were water problems in general, identified by 64 persons, and water in conservation by 54, water sports by 10 and importance of water by 8. The specific school program mentioned most frequently was Future Farmers of America with 14.

This identifies some of the functions of schools, but it was difficult to pinpoint any explicit program of education concerning water. This would seem to indicate little formal attention is given to water. From previous evidence in this study showing the level of incomplete knowledge of this resource, schools might play a more important role in improving the understanding of water and its place in relation to human society.

Religious social systems

The question regarding religious social systems was stated: "Does the church (or other religious groups) around here deal with water in any way?" Since the question is phrased "in any way," some answers referred to the consumption of water by churches, but most answers had reference to the larger question of public water involvement. Here far more people were specific about the answer. Table 29 reveals that involvement of religious systems in three counties is minimal. In Bear Lake County only 5% answered "yes"; in Cache, 7.7%; and in Box Elder, 8.0%. Although higher proportions of religious involvement were reported in the other three areas, Franklin (18.5%), Caribou (23.5%), and Ogden City (17.5%), it seems evident that religious systems do not play a major role in water resources discussion or action. As with most other results, Caribou County showed greater sensitivity and involvement.

Of the 147 people who believed religious systems were involved with water, the type of activity mentioned the most times (51 people) was "informal discussions about water before, during and after church meetings and other church activities." The main contribution of religious social systems appears to be an indirect one, that of providing an opportunity for people to get together and informally communicate on water problems. The informal nature of the discussions casts some doubt upon the supposition that churches officially sanction issues associated with water.

Five respondents reported that sometimes local church leaders intervene to settle water disputes. In the case of the Church of Jesus Christ of Latter-day Saints, such behavior is consistent with a Mormon bishop's traditional role as leader of the local congregation, inasmuch as he is expected to be concerned about the welfare and behavior of church members under his jurisdiction. Other types of responses were reported by so few that they are only suggestive and probably relate to rather isolated events.

Table 29. Religious system involvement with water, by county or metropolitan-urban place of residence.

| Involved | Bear Lake | | Caribou | | Franklin | | Cache | | Box Elder | | Metro-Urban | | Total No. |
|------------|-----------|-------|---------|-------|----------|-------|-------|-------|-----------|-------|-------------|-------|--------------|
| | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. | |
| Yes | 6 | 5.1 | 36 | 23.4 | 41 | 18.5 | 15 | 7.7 | 15 | 8.0 | 34 | 17.5 | 147 |
| No | 90 | 76.3 | 70 | 45.5 | 144 | 65.2 | 131 | 67.2 | 120 | 63.8 | 100 | 51.6 | 655 |
| Don't Know | 22 | 18.6 | 47 | 30.5 | 36 | 16.3 | 48 | 24.6 | 50 | 26.6 | 58 | 29.9 | 261 |
| No Answer | 0 | 0.0 | 1 | .6 | 0 | 0.0 | 1 | .5 | 3 | 1.6 | 2 | 1.0 | 7 |
| Total | 118 | 100.0 | 154 | 100.0 | 221 | 100.0 | 195 | 100.0 | 188 | 100.0 | 194 | 100.0 | 1070 |

$\chi^2 = 62.24$ df = 10, P .001

89

Influential groups

In order to identify the extent that the whole social structure is involved in water resource problems, the following two questions were asked: "What organizations or groups other than canal companies are most influential when it comes to water use or development?" To all who responded to this, a second related question was asked: "What do these groups do or why are they important with water resources?"

Table 30 shows that 400 answers were given to the first question identifying types of groups and types of functions that they thought were important to water resources. The category of social systems mentioned most frequently was civic and fraternal groups with 84. The major water-related type of function identified as being fulfilled by civic and fraternal groups was in category V, "development or improvement of water resources or usage." Other functions noted most were "serves as an information source," and "work to benefit private enterprise."

"Water Associations" (other than canal companies), were identified by 70 persons. Two functions were commonly mentioned for these associations. These were "control or regulation of water usage," and "development or improvement of water resources or usage."

"State and Local Agencies" were named by a total of 64 people as influential social systems. Most of these respondents identified their function as "control or regulate water usage." Other functions of note were "development or improvement of water resources or usage" and "work to benefit private enterprise."

Federal agencies were listed as influential by 51. Their main functions were seen as "conservation of natural resources," and "development or improvement of water resources."

Fifty-two people listed "private business" as types of social systems. Functions given were "development or improvement of water resources or usage" and "work to benefit private enterprise."

"Farm organizations" were listed by 36. They were seen as interested in "work to benefit agriculture" and "serve as an information source."

By definition, "Private Pressure Groups and Associations" listed by 35 people, were seen as mainly engaged in "pressure group activities."

The last type of group identified was "Local Sports and Recreation Groups." Only eight people noted groups of this type. Of these, six were concerned primarily with "conservation of natural resources."

Table 31 deals with the same questions as Table 30, but examines answers given for the specific systems that were most often mentioned. Such answers again can only be suggestive as to the perceptions the people have of the relationship of the system to water resources, but they identify aspects of attitudes and conceptions that exist in the population studied.

Table 30. Types of social systems listed as most influential in water use and development and the functions they fulfill.

| Type of Social System | Function Fulfilled* | | | | | | | | Totals |
|---|---------------------|-----------|------------|-----------|------------|-----------|-----------|----------|------------|
| | I | II | III | IV | V | VI | VII | VIII | |
| Civic and fraternal groups | | 3 | 7 | 5 | 34 | 13 | 17 | 5 | 84 |
| Water Associations | 1 | 2 | 39 | 5 | 23 | | | | 70 |
| State and Local Agencies | 1 | 1 | 31 | 11 | 16 | | 2 | 2 | 64 |
| Private Businesses | | 1 | 27 | | 4 | 17 | 3 | | 52 |
| Federal Agencies | 2 | 7 | 4 | 23 | 12 | 2 | 1 | | 51 |
| Farm Organizations | 14 | 2 | 1 | 4 | 4 | | 11 | | 36 |
| Private Pressure Groups and Associations | | 11 | 8 | 2 | 6 | | 8 | | 35 |
| Local Sports and Recreation Groups | | | | 6 | 2 | | | | 8 |
| Totals | 18 | 27 | 117 | 56 | 101 | 32 | 42 | 7 | 400 |

*Code of functions More than one group could be named by the respondents.

I Work to benefit agriculture

II Pressure group activities

III Control or regulate water usage

IV Conservation of Natural Resources

V Development or improvement of water
resources or usage

VI Work to benefit private enterprise

VII Serves as a source of information and influence

VIII Community and public service activity

Table 31 Social systems most frequently mentioned and specific functions they fulfill related to water use and development.

| Social Systems and Functions | | Number listing system | Number* listing function |
|--|--------|-----------------------|--------------------------|
| Local Chambers of Commerce (Service) | Totals | 41 | 49 |
| Promote water development | | | 21 |
| Sponsor water improvement projects | | | 6 |
| Gather information about water | | | 6 |
| Control city culinary water supply | | | 3 |
| Conservation of water | | | 3 |
| Represent water interests of people | | | 2 |
| Other | | | 8 |
| City Commissions and Councils (Local government) | Totals | 32 | 29 |
| Control and regulation of city water usage | | | 19 |
| Work to study and solve water problems | | | 3 |
| Sponsor water development projects | | | 2 |
| Other | | | 5 |
| Utah Power and Light Company (Private business) | Totals | 32 | 35 |
| Control and regulation of water usage | | | 10 |
| Other | | | 25 |
| Farm Bureau (Special interest, public) | Totals | 26 | 25 |
| Gather and diffuse information about water | | | 10 |
| Help farmers | | | 7 |
| Promote water development | | | 4 |
| Other | | | 4 |
| Bear River Protective Association (Special interest, private) | Totals | 24 | 31 |
| Actively oppose the Bear River Project | | | 10 |
| Protect individual and community water interests | | | 9 |
| Gather and diffuse information about water | | | 9 |
| Other | | | 3 |
| Pineview Water System (Local government water district) | Totals | 24 | 26 |
| Distribute irrigation water to the city for lawns | | | 10 |
| Build facilities for water storage and transportation | | | 6 |
| Control and develop city culinary water | | | 4 |
| Control and regulate use of Pineview water | | | 3 |
| Conservation of water | | | 2 |
| Other | | | 1 |

*Variations between the number listing systems and the number listing functions is because some respondents gave more than one answer and some did not report functions for certain systems.

Chambers of Commerce were the most frequently mentioned type of civic group and were listed by 41 people. The main function of Chambers of Commerce was "promotion of water development." City Commissions and Councils were reportedly concerned mainly with the function of "control and regulation." The Utah Power and Light Company was discerned as having only one relevant function, that of control and regulation of water usage.

Also apparent in Table 31 were the perceived functions of the Farm Bureau which was believed to "gather and diffuse information about water," "help farmers," and "promote water development." Farmers were the main recipients of this diffused information.

The Bear River Protective Association was perceived as having three major functions. First, to "actively oppose the Bear River Project," second, to "protect individual and community water interests," and third, to "gather and diffuse information about water."

In Ogden City, the Pineview Water System was listed and identified as "distributes irrigation water to the city for lawns," "builds facilities for water storage and transportation" and "controls and develops city culinary water." It is possible that the perceived functions by respondents may not be entirely accurate. This, too, is useful information in dealing with the imagery that affects the behavior of people.

Government agencies

The questions for Tables 30 and 31 were not restricted as to the type of social system listed, therefore in order to investigate the role of government other questions were asked that dealt with government agencies. The first question referring to the respondents' local area was: "Are there any government agencies that are important in relation to water resources in this area?" Large differences between counties occurred on this question. Two-thirds (66.5%) of the respondents in Ogden City indicated that important governmental agencies existed in their area, compared to about one-fourth in two other counties, Bear Lake (27.1%) and Box Elder (23.9%). About one-third (32.3%) of the respondents in Cache County recognized government agencies, compared with higher percentages in the remaining two counties: Franklin, 39.6% and Caribou, 47.1%. Of the rural areas Caribou continues to be the highest and Bear Lake the lowest in consciousness and perception of government involvement in water resources.

Another important result is the high proportion of "don't know" answers, especially in the rural counties, where between one-third and one-half answered this way. This is consistent with the conclusions of Chapter 5 where it was observed that farmers had a low level of knowledge regarding institutionalized changes in water rights. The present data illustrate a large proportion of people with a low knowledge level about social systems related to water for both farm and non-farm respondents.

The types of government agencies reported to be important in relation to water resources can be seen in Table 32. Of the 488 responses, the largest segment (232) listed several agencies that fall under the jurisdiction of the United States Department of Agriculture. There were 158 respondents who named important agencies within the United States Department of the Interior. Smaller numbers listed other

Table 32. Types of government agencies identified as important in relation to water resources, by frequency of mention.

| Type of Agency | Frequency |
|---|------------|
| Agencies of the U.S. Department of Agriculture | 232 |
| Agencies of the U.S. Department of the Interior | 158 |
| State Agencies | 51 |
| *Quasi-State and Federal Agencies | 26 |
| Other Federal Agencies | 13 |
| Local Agencies | 8 |
| Total | 488 |

*Included in this category is the Bear River Commission as well as various water conservancy and conservation districts.

types of agencies, including state (5), quasi-state and federal² (26), various other federal agencies (13), and local government agencies (8). These answers clearly indicate the people's perception of the deep involvement of the federal government in the area of water resources.

Not only were government agencies believed to be deeply involved in the area of water resources but this involvement was evaluated positively by a large majority of all people. Table 33 gives the results of the question: "What do you think of the activities of government agencies related to water development?" Answers were grouped according to whether they appeared to be positive or negative toward government. In Table 33 there is a direct relation shown between urbanism and positive attitudes. Although open country farmers were the least favorable of all groups in their evaluation of government agencies, over three-fourths (77.0%) of this group still evaluated these agencies positively. The proportion approving increased to over 90% for the metropolitan-urban residents.

Since the great majority of government agencies named in Table 32 were federal agencies, it is assumed that federal agencies were the main object of positive evaluations in Table 33. Such a result suggests that most people felt that government agencies, especially federal serve a useful function related to water development.

Table 34 lists specific government agencies that were mentioned most frequently as being important in relation to water resources. The best known agencies to respondents were the Soil Conservation Service, and the Bureau of Reclamation.

Table 33. Evaluation of activities of government agencies, by type of residence.

| Evaluation | Open Country | | | | Town | | | | Metro-Urban | | Total No. |
|------------------------|--------------|-------|----------|-------|------|-------|----------|-------|-------------|-------|--------------|
| | Farm | | Non-Farm | | Farm | | Non-Farm | | No. | Pct. | |
| | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. | | | |
| Positive Evaluation | 151 | 77.0 | 92 | 84.4 | 46 | 85.2 | 211 | 87.2 | 144 | 90.6 | 644 |
| Negative Evaluation | 45 | 23.0 | 17 | 15.6 | 8 | 14.8 | 31 | 12.8 | 15 | 9.4 | 116 |
| Total | 196 | 100.0 | 109 | 100.0 | 54 | 100.0 | 242 | 100.0 | 159 | 100.0 | 760 |

Note: There were 310 whose answers were not appropriate to an evaluative category and hence were excluded from this table (N = 760).

Three other prominent agencies received nearly equal mentions; U.S. Forest Service, Agricultural Stabilization and Conservation Service, and the Bureau of Land Management. In addition to these, the State Fish and Game Division, the Agricultural Extension Service, the Weber Basin Conservancy District, were named by several people. Also these show the relative cognizance of the respondents to particular agencies related to water resources.

Several types of functions relating to water resources were believed to be fulfilled by the various agencies. The two functions reported most often were: "conservation of natural resources" (145 times) and "development or improvement of water resources or usage" (137 times). Other functions or purposes were: "develop water resources for agriculture" (by 76 persons), "serve as a source of information" (55), "give financial aid" (44), "regulate and control water resources" (43), "work to benefit agriculture" (37), "develop land or forest resources" and "work to benefit private enterprise" (2).

Bureau of Reclamation

The most central government agency for the interests of this study is the Bureau of Reclamation, inasmuch as it is the agency which formulated the Bear River Project proposal. Respondents were asked to indicate the functions of the government agencies which they had identified as being important agencies in relation to water resources. The functions that were specifically related to the "Bureau" are shown in Table 35. The functions reported fell most often in the category of "research and survey work, and plan and build water resource development projects" with 49 out of 101 responses. The remaining functional types had relatively few responses. Second in importance with 18 was the function "develop, control, and regulate water and other natural resources." Other functions noted were "promote and/or provide information related to water resource development," "work concerning water conservation," "work related to canals, such as surveying, building, patrolling and maintaining," and "loan or provide funds for water resources development."

Table 34. Specific government agencies in the area that are believed to be important in relation to water resources, by frequency of mention.

| Agency | *Frequency |
|--|------------|
| Soil Conservation Service . .(USDA) | 119 |
| Bureau of Reclamation . .(USDI) | 95 |
| U. S. Forest Service . .(USDA) | 55 |
| Agricultural Stabilization and Conservation Service . .(USDA) | 52 |
| Bureau of Land Management . .(USDI) | 50 |
| State fish and game . .(State) | 22 |
| Agricultural Extension Service . .(State) | 18 |
| Weber Basin Conservancy District . .(quasi State- Federal) | 17 |
| U. S. Department of the Interior . .(USDI) | 6 |
| U. S. Department of Agriculture . .(USDA) | 4 |
| Idaho State Reclamation Association . .(State) . . | 4 |
| Soil Conservation District . .(quasi State- Federal) | 4 |
| Hill Air Force Base | 4 |
| Total | 450 |

*Those that received three or less mentions are not included in this table.

Table 35. Perceived functions of the Bureau of Reclamation, by frequency of mention.

| Perceived Function | Frequency |
|---|-------------|
| Research and survey work, plan and build water resource development projects (dams, etc.) . . | 49 |
| Develop, control and regulate water and other natural resources | 18 |
| Promote and/or provide information related to water resource development | 10 |
| Work concerning water conservation | 10 |
| Work related to canals, such as surveying, building, patrolling and maintaining | 8 |
| Loan or provide funds for water resources development | 4 |
| Other functions | 2 |
| Total | *101 |

*Some respondents gave more than one answer. N = 95

Summary

This chapter examines various social systems and their functions as observed by the respondents. On the question of whether the county or town governments were believed to be involved with water in some way, it was found that a wide variation existed between different areas in the study with three-fourths of those in the metropolitan-urban area with this belief compared to only one-third in Bear Lake County. About half in each of the other counties believed that local government involvement existed. Since most local governments are involved in some way this indicates a lack of knowledge on the part of nearly half the people in the sample. Control and regulation of water use was perceived as the main function fulfilled by local government.

The perception of political involvement with water was found to be much higher in Idaho counties, where a little less than half of the people in the three counties reported water was involved in politics, compared with only slightly more than one-tenth of those in the Utah rural counties and about one-third in Ogdan City. Almost half reported they did not know whether or not it was a political matter.

The majority of respondents indicated that water did not become explicitly involved in educational systems. However, where it did, the main function related water to teaching programs where agriculture and conservation were major topics. From evidence of the incomplete level of knowledge concerning water resources, the schools might play a more important role in improving the understanding of the function of this resource in society.

Religious social systems had little to do with water resources. In three of the areas (two counties and the urban center) interaction related to church activity, while less than one-tenth of the respondents in other counties responded this way. The nature of this involvement was reported as being the kind where churches provide a meeting place for informal discussions, incidental to regular church meetings and activities.

Several social systems were listed as influential in water resource matters. These types of social systems included: Civic and fraternal groups, water associations, state and local agencies, private businesses, federal agencies, farm organizations, private pressure groups and associations, and local sports and recreational groups. The two most common functions mentioned were: "control or regulation of water usage."

Specific social systems frequently mentioned were: Chamber of Commerce, City Commissions and Council, Pineview Water System, Farm Bureau, Bear River Protective Association, and Utah Power and Light Company.

It was found that federal government agencies were the most frequently identified as being related to water development. Agencies in the Department of Agriculture were named most often, with those in the Department of the Interior next. The two particular agencies named most often were the Soil Conservation Service and the Bureau of Reclamation. Others of importance were the Forest Service, the Agricultural Stabilization and Conservation Service, and the Bureau of Land Management. The two functions most often named for government agencies were: "Conservation of natural resources" and "development or improvement of water resources or usage."

The Bureau of Reclamation was analyzed separately because of its importance to the present study. The function most frequently visualized by the public for the Bureau of Reclamation was that they do "research and survey work, and plan and build water resource development projects." This function accounted for nearly half of the answers. The next highest function was "develop, control and regulate water and other natural resources." However, this accounted for less than one-fifth of the answers.

When asked to evaluate government agency involvement with water, it was found that approval of government agencies was generally high, but varied from about three-fourths of open-country farmers to nine out of ten of the metropolitan-urban residents. This result suggests that most people felt that government agencies, especially federal, serve a useful function related to water development.

FOOTNOTES

¹Loomis, *Social Systems*.

²Quasi-state and federal agencies refers to agencies having some properties of both federal and state or local government such as conservation districts and the Bear River Commission.

CHAPTER 8

KNOWLEDGE, BEHAVIOR, AND ATTITUDES RELATED TO THE RECLAMATION DEVELOPMENT PROPOSAL FOR THE BEAR RIVER

Orientations Regarding the Project

This chapter will discuss knowledge, behavior, and attitudes related directly to the proposed development of the Bear River. As explained in the introduction to this report, the intent of the proposal was to build storage dams, canals, and other related structures on the Bear River system for the purpose of providing water largely for irrigation, but also for municipal, industrial and recreational uses as well as flood control.¹

The patterns of perception of the people, the manner and extent of the way in which ideas are diffused among a population, the attitudes, expectations, and systems involved in establishing those attitudes are all fundamental social and psychological functions involved in the process of decisions and in action taken on decisions. The data in this chapter show several of these social and psychological elements related to the proposal.

Awareness of the project

First of the questions asked regarding the Bear River Project proposal was: "Have you heard of the Bear River Reclamation Project proposed for the development of the Bear River?" Political area breakdowns were used for comparison purposes based upon state and county geographical divisions. The amount of awareness was determined by the number answering "yes" to the question. For the most part, the data in the rest of this chapter will deal only with those who had heard of the project. The percent who answered "yes" was highest in the Idaho counties with Franklin County having 95.5%, followed by the counties in the middle valleys of the Bear River Basin, Bear Lake and Caribou combined with 83.1% and about three-fourths in the Utah rural counties, Cache and Box Elder combined with 76.0%. As might be expected, lowest awareness existed in the metropolitan-urban city with 61.3%. This relative lack of awareness is also indicative of a difference in interest, concern and involvement in other ways as shown in the responses to many of the questions. The previous question shows that awareness varies significantly using combined county breakdowns. It is not too surprising to see the greatest amount of awareness in Franklin County inasmuch as the major dam is proposed to be built in the northern part of this county.

One factor which may have affected the difference in general awareness of the project proposal can be identified. It is common knowledge among informed persons

of the area that organized opposition to the Bear River Project has existed in all Idaho counties in the Bear River Basin. This active group was reported by respondents to be the Bear River Protective Association. This group, although changing its membership and even name at different times, was described as consisting of 9 members, 3 in each Idaho county within the Bear River Basin. The main organizational strength has existed in Caribou and Bear Lake counties. At least one member has dropped out, but essentially its objectives have remained the same, the main one of which has been to oppose the Bear River Project.

It was also commonly reported that one of the main methods used in this opposition has been to widely and frequently publicize opinions opposing aspects of the Bear River Project. Information was collected, interpreted and distributed by this organization by way of circulars and news releases. Many people received personal copies of various circulars, some of which contained lengthy discussions purporting evidence about various aspects of the project. One respondent estimated that 2,000 circulars were diffused by the Bear River Protective Association at one time. Although exact figures are not known, it is known that materials were widely disseminated. Assuming that exposure to official publicity was about the same in both states, it is easy to see how more people in Idaho than Utah could have been made aware of the project on the basis of the publicity it received through this organization alone.

Although it can be seen that the contacts of the Bear River Protective Association were widespread, through the use of newspaper stories and information distributed, the general nature of the answers given to the survey questions does not allow for more specific analysis of the influence of the association as a diffusion agent. Further study of the extent and content of materials from this source would be useful to show more about its impact on the area to which it was largely directed.

The stages of adoption as discussed in Chapter 4 showed that the most important sources of information in the first or awareness stage was the mass media.² This model is confirmed in the present study. The major reported sources of how respondents first heard of the Bear River Project were mass media, particularly newspapers, accounting for 57.0% of the total answers given. Second in importance as a source of project awareness was "neighbors, friends and relatives," represented by 32.1% of the answers given. Government agencies accounted for 4.1%. Meetings as a source played a relatively small role in this first stage of the diffusion process, with only 3.4%. Only a few other sources were identified for 3.4%.

Knowledge level

Throughout the study farmers have shown more participation, interest and knowledge of water problems than any other category. In this respect it was desired to obtain some measure of the degree of accurate knowledge of what was being proposed in the Bear River Project that existed among farmers. Four levels of knowledge were established as categories. Four judges were used to assign each farm respondent to one of these categories. The basis for all knowledge categories was the accuracy of farmers' answers to the open-end question: "What are they proposing to do in the Bear River Project?" An attempt was made to have respondents understand that it was their opinions and perceptions of the situation which were of particular importance in this as well as the other questions in the study. The existence of very

good rapport in most interviews also increased the validity of using the above question as the basis for judged level of knowledge about the project. A group of four persons including three researchers and a representative of the Bureau of Reclamation acquainted with the project made these judgments. All of the judges had access to maps and project plans.

Respondents in the low level were those who had not heard of the proposal, those who had heard of it but did not know anything of its plans, or who gave incorrect, vague or irrelevant responses (e.g. "change the course of the river"). Those who showed partial knowledge but whose responses were too general were classed as having medium low knowledge. A medium high knowledge level was assigned those showing a greater degree of correctness and specificity. High knowledge was assigned those who were both specific and correct.

The results of this analysis of the farmers' levels of knowledge are shown in Table 36. The difference in these levels between states is very small. Of particular importance in this table, however, is that less than one-fourth of the Utah farmers and less than one-fifth of the Idaho farmers were considered as having a high level of knowledge about the Bear River Project.

Both farmers and non-farmers generally were not clearly informed or knowledgeable about the proposal. This has important implications for future proposals in two respects. First, partial or incorrect information leaves the public vulnerable to misleading or inaccurate information, and second, the public cannot make sound judgments and decisions without adequate knowledge.

Table 36. Farmer's level of knowledge of the Bear River Project, by state.

| Level | Idaho | | Utah | | Total No. |
|----------|-------|-------|------|-------|--------------|
| | No. | Pct. | No. | Pct. | |
| Low | 29 | 17.3 | 15 | 16.8 | 44 |
| Med Low | 35 | 20.8 | 12 | 13.5 | 47 |
| Med High | 74 | 44.0 | 41 | 46.1 | 115 |
| High | 30 | 17.9 | 21 | 23.6 | 51 |
| Total | 168 | 100.0 | 89 | 100.0 | 257 |

$\chi^2 = 2.748$ df = 3, P .50 (Not significantly different between states.)

*Each farmer was assigned to a level of knowledge based upon the judged accuracy and specificity of his responses to the open end question: "What are they proposing to do in the Bear River Project?" The categories low, medium low, medium high, and high reflect the degree of knowledge accuracy and specificity as discerned by four judges who were acquainted with the project plans.

Activity related to knowledge

The function of direct contact in the diffusion process through meetings was investigated by the question: "Have you attended any meetings in which the Bear River Project was the major topic of discussion?" It will be noted in Table 37 that the two farm categories were the main ones who attended meetings on this subject with about half in each group attending. In relation to this problem, meetings were more important to farmers in the information seeking and evaluation stages than in the earlier awareness stage of the diffusion process. The fact that fewer non-farmers attended meetings suggests that the depth of information for a large majority of the non-farm people seldom went beyond the mass media or other information which may have been distributed to the public. Although meetings were more important to farmers in the second and third stages than in the first or awareness stage, this does not mean that meetings were necessarily effective in diffusing high level knowledge. In fact, the previous finding on farm level of knowledge would suggest that meetings fell short of adequate in this regard.

In an earlier paper the writers reported that farmers who belonged to or owned shares in canal companies attended significantly more meetings about the Bear River Project than did those who did not belong.³ Inasmuch as the main use as well as the main objective of the Bear River Project proposal is providing for irrigation, the major interest would be expected from irrigators.

Table 38 lists the various types of sponsors of meetings regarding the Bear River Project. As can be seen, sponsorship varied considerably. Those kinds mentioned most were: federal government agencies, civic or community groups, water organizations, private interest organizations, and state and local government agencies. The kinds of sponsors of meetings may have important implications regarding the content of information diffused. For instance, technical agencies may be expected to focus upon technical aspects of development, while civic groups may be concerned primarily with community benefits, water organizations with management and use possibilities, and private interest groups with divising means of applying

Table 37. Attendance at one or more meetings at which the Bear River Project was the major topic of discussion, by residence.

| Attended Meetings | Open Country | | | | Town | | | | Metro-Urban | | Total No. |
|-------------------|--------------|--------------|------------|--------------|-----------|--------------|------------|--------------|-------------|--------------|------------|
| | Farm | | Non-Farm | | Farm | | Non-Farm | | No. | Pct. | |
| | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. | | | |
| Yes | 122 | 51.3 | 34 | 22.7 | 30 | 47.6 | 39 | 14.1 | --- | -- | 225 |
| No | 115 | 48.3 | 112 | 74.7 | 33 | 52.4 | 229 | 82.7 | 118 | 99.2 | 607 |
| No answer | 1 | .4 | 4 | 2.6 | --- | -- | 9 | 3.2 | 1 | .8 | 15 |
| Total | 238 | 100.0 | 150 | 100.0 | 63 | 100.0 | 277 | 100.0 | 119 | 100.0 | 847 |

$$\chi^2 = 205.84, \text{ df} = 4, \text{ P} = .001$$

Note: 223 who had not heard of the Bear River Project were not included in the table

pressure in promoting or opposing development. The percentages in Table 38 allow one to roughly ascertain the relative emphases that may have taken place in these meetings.

Further clarification as to the interest and activity shown by the population of an area on a public issue such as this project was demonstrated by answers to the question: "Did you actively try to become better informed about the Bear River Project?" The same basic differences between groups occurred on this question as were shown in the discussion on meeting attendance. There were 55.5% of the open country farmers and the same percentage of the town farmers who believed themselves to have been involved in active pursuit of knowledge about the project. This percentage was higher than all other residence groups who varied considerably as follows: 34.7% for open country non-farm, 22.7% for town non-farm, and 3.4% for metropolitan-urban residents. Percentages of respondents who actively pursued knowledge were slightly higher in each group than percentages in the same respective groups who attended meetings about the Bear River Project.

Table 38. Types of individuals and groups who sponsored meetings according to those who attended the meetings, by frequency of mention.

| Meeting Sponsors | Frequency | Pct. |
|--|------------|--------------|
| Federal government agencies and their leaders | 72 | 28.2 |
| Civic or community groups and their leaders | 51 | 20.0 |
| Water organizations, and water organization leaders | 44 | 17.3 |
| Private interest organizations and their leaders | 25 | 9.8 |
| State and local government agencies and their leaders | 21 | 8.2 |
| Farm Bureau | 12 | 4.7 |
| Private business | 8 | 3.2 |
| Other individuals | 22 | 8.6 |
| Total | 255 | 100.0 |

Percentages are for the total number of answers given. More than one answer was given in some cases. N = 225

Table 39 lists the types of activities that respondents engaged in to become better informed about the Bear River Project. Using the percentage of total answers given, the most important activity of respondents was reading, followed by meeting attendance and talking to people.

Regarding meeting attendance, as was concluded before, few of the non-farmers engaged in this activity and only about half of the farmers attended meetings. However, the findings of both Tables 37 and 39 indicate that for those who did attend meetings, such attendance was generally not merely for casual interest. It usually represented an active attempt to become better informed, that is, after once becoming aware of the project from other sources. To be more specific about the purposeful nature of this participation, of the 225 respondents who reported having attended meetings in Table 40, 133 of them or 59.1% in Table 39 indicated that such attendance was an active attempt to become better informed about the Bear River Project. Presumably the attendance of others whose purpose was not to become better informed was to oppose or support the project. Also, the fact that so few of the farmers had a high level of knowledge about the project, as previously pointed out, compared to the number who tried to become better informed suggests that sources of information may have been inadequate.

Perception and attitudes

Constraints, or factors inhibiting a change or the adoption of an idea as they are perceived by the groups involved are of considerable importance in understanding social behavior.

Table 40 lists the types of reasons given by respondents to the question: "What do you think is holding up the Bear River Project?" The listings in Table 40 represent

Table 39. Type of action engaged in to become better informed about the Bear River Project, by frequency of mention.

| Type of Action | Frequency | Pct.* |
|--|-----------|-------|
| Read Material | 144 | 40.2 |
| Attended Meetings | 133 | 37.1 |
| Talked to People | 69 | 19.3 |
| Went to Bureau of Reclamation to see maps | 10 | 2.8 |
| Listened to radio | 2 | .6 |
| Total | 358 | 100.0 |

*Percentages are for the total number of answers given. More than one answer was given in some cases. N = 286.

categories of perceptions expressed to this open-end question. To the extent that these beliefs accurately describe reality, they represent constraints to change. It will be noted that more answers fell into the category "political bickering" than any other single category (35.9%). This was viewed as the major constraint to this particular proposed change. However, this is a highly general category and does not specify the type or level of political behavior or the clarity with which the respondent sees what is going on in the decision process. It is indicative of the position of a large part of the population who do not participate directly in decisions, but rely on the opinion and knowledge of others. The understanding of these people is often vague and incomplete.

Much smaller proportions were reported in other categories such as opinions of special interest groups, state and local government and officials, local individuals or groups, interstate friction, federal government agencies and officials, lack of finances, private industry, and undesirable features of the proposal itself. According to these answers, the constraints vary widely. The categories with fewer responses, however, are much more specific. In understanding the constraints to the process it is felt that these are important functional types. Those who gave these types of answers showed more insight than those who gave the more general answer.

Table 40. Types of reasons believed responsible for Bear River Project being held up, by frequency of mention.

| Reasons | Frequency | Pct.* |
|---|-----------|-------|
| Political bickering or lack of agreement by leaders | 253 | 35.9 |
| Opinions of special groups | 108 | 15.3 |
| State and local government and officials | 77 | 10.9 |
| Local individuals or groups | 70 | 10.0 |
| Interstate friction | 60 | 8.5 |
| Federal government agencies and officials | 54 | 7.7 |
| Lack of finances | 42 | 6.0 |
| Private industry | 21 | 3.0 |
| Problems with project as it now stands | 19 | 2.7 |
| Total | 704 | 100.0 |

*Percentages are for the total number of answers given. More than one answer was given in some cases.

One of the elements expected to be acting as a constraint to the project proposal was the problem of locality or interstate interests which was mentioned in Table 40 above. Water as a basic resource would have important economic effects upon political areas. To obtain the degree of consciousness of this problem the question was asked: "Do you think any area is getting more than another in the proposed Bear River Project?"

On a state basis, Table 41 shows all Idaho counties with much higher percentages than those in Utah who felt that some areas would be getting more than others. Also, in Idaho the higher the county is upstream, the higher is the percentage who share this belief. The indications are that of those knowing about the project, a considerable number were also aware of the intended distribution of the proposed storage water which would mainly be downstream. Bear Lake County, the highest up the river, was not expected to be affected by the plan. Caribou would be less directly benefited than would Franklin and Cache. Box Elder County in Utah and Oneida County in Idaho, north of Box Elder, were to be important recipients of water for new irrigated land. In short, awareness of the proposed distribution of water is highest in those counties which would be receiving the least water.

It was reasoned that part of the reluctance for the proposed change may be related to the view that benefits would be going to other areas downstream. It might be felt that since Bear Lake County was not to be affected, it therefore was not threatened by the plan. However, in Bear Lake County as in some other areas there is not only some shortage of water on land presently irrigated, where supplementary water would be desired, but also there is unirrigated but arable land that local people claim could be more intensively used if irrigated. These irrigation possibilities appear as needs to the local economy. Also true is that with each development in any one area, the water resources are committed that much more for all areas. Thus there is less flexibility for possible future development. When that development occurs downstream it means less possibility upstream. So even though the water goes unused, many people particularly in upstream areas are reluctant to change their chances for possible future improvements.

In addition to interstate and local area differences it is of interest to see how cognizant people were of the proposed water distribution by type of residence and occupation (Table 42). In the metropolitan-urban group nearly eight out of ten did not know whether one area would benefit more than another from the project. Four-tenths of the open country farmers answered that some areas would get more of the water than others, while about one-fourth in each of the other rural categories answered this way.

Attitudes toward the Bear River Project

Table 43 shows some of the factors reported that influenced the respondent's decision to favor or oppose the Bear River Project. They were asked "How did you decide which way to feel on this (project)?" Here, as in other places in the report, answers on these open-end questions are often not of the same qualitative types. Some of these answers show "what," others indicate "reasons why," and still others are concerned with "how" or methods. However, since they illuminate the way the thinking of the public is influenced, the answers are shown. Of the categories of answers given, the most frequent type (37.2%) was a belief that development is a

Table 41. Belief that some areas of the river basin are to get more water than others in the proposed project, by county or metropolitan-urban area.

| Response | Bear Lake | | Caribou | | Franklin | | Cache | | Box Elder | | Metro-urban | | Total No. |
|-----------------------------|-----------|-------|---------|-------|----------|-------|-------|-------|-----------|-------|-------------|-------|-----------|
| | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. | |
| Yes | 62 | 66.0 | 63 | 47.7 | 72 | 34.1 | 14 | 9.1 | 11 | 8.0 | 6 | 5.0 | 228 |
| No | 5 | 5.3 | 17 | 12.9 | 58 | 27.5 | 55 | 35.7 | 63 | 46.0 | 20 | 16.8 | 218 |
| Don't know and no answer | 27 | 28.7 | 52 | 39.4 | 81 | 38.4 | 85 | 55.2 | 63 | 46.0 | 93 | 78.2 | 401 |
| Total | 94 | 100.0 | 132 | 100.0 | 211 | 100.0 | 154 | 100.0 | 137 | 100.0 | 119 | 100.0 | 847 |

$\chi^2 = 212.18$, $df = 10$, $P .001$

Note: 223 who had not heard of the Project who were not included in this table.

Table 42. Belief that certain areas would receive more water than others in the Bear River Project proposal, by residence.

| One area receive more? | Open Country | | | | Town | | | | Merto-Urban | | Total No. |
|---------------------------|--------------|--------------|--------------|---------------|-----------|--------------|--------------|---------------|-------------|--------------|------------|
| | Farm No. | Farm Pct. | Non-Farm No. | Non-Farm Pct. | Farm No. | Farm Pct. | Non-Farm No. | Non-Farm Pct. | No. | Pct. | |
| Yes | 94 | 39.5 | 41 | 27.3 | 15 | 23.8 | 72 | 26.0 | 6 | 5.0 | 228 |
| No | 56 | 23.5 | 35 | 23.3 | 26 | 41.3 | 81 | 29.2 | 20 | 16.8 | 218 |
| *Don't know and no answer | 88 | 37.0 | 74 | 49.4 | 22 | 34.9 | 124 | 44.8 | 93 | 78.2 | 401 |
| Total | 238 | 100.0 | 150 | 100.0 | 63 | 100.0 | 277 | 100.0 | 119 | 100.0 | 847 |

$\chi^2 = 61.66, df = 8, P .001$

*Includes 16 "no answer," 385 "don't know". There were 223 who had not heard of the Bear River Project who were not included in this table.

Table 43. Factors that influenced attitudes toward the Bear River Project.

| Influencing Factors | Frequency | Pct. |
|--|--------------|--------------|
| Belief that development is a necessity or an advantage (Those favoring the Bear River Project) | 292 | 37.2 |
| Personal interest, and personal work experience (largely farm) | 147 | 18.7 |
| Belief that development will hurt or is a disadvantage (Those against the Bear River Project) | 123 | 15.7 |
| Reading, study and radio | 122 | 15.6 |
| Contact with other persons and organizations . . . | 97 | 12.4 |
| Preference for private development | 3 | .4 |
| Total | * 787 | 100.0 |

*Some respondents gave more than one answer.

Note: While the above answers are not of the same qualitative type, they nevertheless illustrate various factors of influence. The question was left unstructured to determine these various orientations.

necessity or an advantage. This type of answer appeared among those who gave a favorable response toward the project. A second category was personal interest and personal work experience (18.7%). This came largely from farmers whose self interest and work experience were closely interrelated. The third largest category was an opposing type category, belief that it would hurt or be a disadvantage with 15.7%. These were followed by quite different answers including types of media and contact.

These data show that the respondents recognized the influence of previously set attitudes and values developed from past experience, interaction and the influence of others. They also recognized means of gaining information as factors that affected their attitudes.

In order to understand something about the conception of threat that a proposal of this kind has for the people of the area involved, the question was posed: "Do you think that the proposed Bear River Project will hurt you?" Responses are shown by residence and occupation in Table 44. Once again the metropolitan-urban group had a very small number who considered the project a threat. Slightly over one-third of the open country farmers and nearly one-fourth of the town farmers believed it was a threat, while 22.0% of the open country non-farmers and only 13.0% of the town non-farmers saw it this way. Although the majority in all groups felt that the project would not hurt them, this table clearly shows that perceived threat is largely found among the open country farmers.

From the standpoint of the area of residence there were definite differences in the belief that the project would hurt them individually (Table 45). The upriver counties in Idaho showed 43.6% in Bear Lake, 40.2% in Caribou, and 22.7% in Franklin County who believed that they would be damaged themselves. In Cache only 7.8% concurred, while 13.1% in Box Elder, and only 3.4% in Ogden were in agreement. Those who answered "no" in this instance are also illuminating. There were 33.0% in Bear Lake County who felt they would not be hurt; 46.2% in Caribou,

Table 44. Belief that the Bear River Project would or would not hurt them individually, by residence.

| Belief | Open Country | | | | Town | | | | Metro-Urban | | Total No. |
|---------------------------|--------------|---------------|--------------|-------|----------|---------------|--------------|-------|-------------|-------|-----------|
| | Farm No. | Non-Farm Pct. | Non-Farm No. | Pct. | Farm No. | Non-Farm Pct. | Non-Farm No. | Pct. | No. | Pct. | |
| Will hurt me | 88 | 37.0 | 33 | 22.0 | 15 | 23.8 | 36 | 13.0 | 4 | 3.4 | 176 |
| Will not hurt me | 129 | 54.2 | 97 | 64.7 | 44 | 69.8 | 197 | 71.1 | 79 | 66.4 | 546 |
| *Don't know and no answer | 21 | 8.8 | 20 | 13.3 | 4 | 6.4 | 44 | 15.9 | 36 | 30.2 | 125 |
| Total | 238 | 100.0 | 150 | 100.0 | 63 | 100.0 | 277 | 100.0 | 119 | 100.0 | 847 |

$\chi^2 = 84.79$, $df = 8$, $P .001$

*Includes 17 "no answer," and 108 "don't knows." There were 223 who had not heard of the Bear River Project who were not included in this table.

Table 45. Belief that the Bear River Project would or would not hurt them individually, by county and metropolitan-urban area.

| Response | Bear Lake | | Caribou | | Franklin | | Cache | | Box Elder | | Metro-urban | | Total No. |
|----------------------------|-----------|-------|---------|-------|----------|-------|-------|-------|-----------|-------|-------------|-------|--------------|
| | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. | |
| Yes | 41 | 43.6 | 53 | 40.2 | 48 | 22.7 | 12 | 7.8 | 18 | 13.1 | 4 | 3.4 | 176 |
| No | 31 | 33.0 | 61 | 46.2 | 151 | 71.6 | 125 | 81.2 | 99 | 72.3 | 79 | 66.4 | 546 |
| Don't Know or no answer | 22 | 23.4 | 18 | 13.6 | 12 | 5.7 | 17 | 11.0 | 20 | 14.6 | 36 | 30.2 | 125 |
| Total | 94 | 100.0 | 132 | 100.0 | 211 | 100.0 | 154 | 100.0 | 137 | 100.0 | 119 | 100.0 | 847 |

$\chi^2 = 149.80$ df = 10, P .001

71.6% in Franklin, 81.2% in Cache, 72.3% in Box Elder, and 66.5% in Ogden. Regarding "don't know" answers, Franklin County had the lowest proportion of all counties, suggesting once again a higher degree of knowledge in that county.

It is evident from these findings that Franklin County was the least threatened of Idaho counties. The counties in Utah, including the metropolitan-urban city, felt less threatened by the project. The results again indicate differences between the higher and lower locations on the river.

General opinions about the effect on the respondents area of the plan proposed in the Bureau of Reclamation Feasibility Report were solicited. Table 46 shows the responses to the question, "Overall, do you think that the proposed Bear River Project would help or hinder the water picture in this area?" In relation to the major groupings in this study, this table shows that a little more than one-third of the open country residents of both occupational types felt that the Bear River Project would help the water picture in the area, compared to about half of the town residents of both occupational types and more than half of the metropolitan-urban respondents. Open country farmers had the highest proportion (four-tenths) who felt that the result would be a hindrance compared to about one-fourth or less in all other groups. The metropolitan-urban group gave more "don't know" answers than did other groups. Open country farmers viewed harmful effects most frequently even though this group would be one of the prime beneficiaries of the Bear River Project. Based upon this and other questions, this group has consistently felt the most threatened. Conversely, the more urban or non-farm the residence, the less the project was viewed as a hindering factor.

Respondents were also compared by county of residence on the question regarding whether the project would help or hinder the water situation. It is in this comparison that the greatest differences become apparent as shown in Table 47.

Table 46. Attitude toward the Bear River Project as to whether it would help or hinder the water situation in the area, by residence.

| Perceived Affect | Open Country | | | | Town | | | | Metro-Urban | | Total No. |
|--------------------------|--------------|-----------|--------------|---------------|----------|-----------|--------------|---------------|-------------|-------|-----------|
| | Farm No. | Farm Pct. | Non-Farm No. | Non-Farm Pct. | Farm No. | Farm Pct. | Non-Farm No. | Non-Farm Pct. | No. | Pct. | |
| It will help | 90 | 37.8 | 56 | 37.3 | 33 | 52.4 | 137 | 49.4 | 66 | 55.5 | 382 |
| It will hinder | 93 | 39.1 | 40 | 26.7 | 14 | 22.2 | 60 | 21.7 | 0 | 0.0 | 207 |
| Don't Know or no opinion | 49 | 20.6 | 46 | 30.7 | 15 | 23.8 | 69 | 24.9 | 52 | 43.7 | 231 |
| No Answer | 6 | 2.5 | 8 | 5.3 | 1 | 1.6 | 11 | 4.0 | 1 | .8 | 27 |
| Total | 238 | 100.0 | 150 | 100.0 | 63 | 100.0 | 277 | 100.0 | 119 | 100.0 | 847 |

$\chi^2 = 77.69, df = 8, P .001$

Note: 223 who had not heard of the Bear River Project were not included in this table.

Table 47. Attitude toward the Bear River Project as to whether it would help or hinder the water situation in the area, by county and metropolitan-urban place of residence.

| Response | Bear Lake | | Caribou | | Franklin | | Cache | | Box Elder | | Metro-Urban | | Total No. |
|------------------------------|-----------|--------------|------------|--------------|------------|--------------|------------|--------------|------------|--------------|-------------|--------------|------------|
| | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. | |
| Help | 10 | 10.6 | 11 | 8.4 | 107 | 50.7 | 103 | 66.9 | 85 | 62.0 | 66 | 55.5 | 382 |
| Hinder | 62 | 66.0 | 77 | 58.3 | 44 | 20.9 | 11 | 7.1 | 13 | 9.5 | 0 | 0.0 | 207 |
| Don't Know and No Opinion | 19 | 20.2 | 35 | 26.5 | 52 | 24.6 | 37 | 24.0 | 35 | 25.6 | 53 | 44.5 | 231 |
| No Answer | 3 | 3.2 | 9 | 6.8 | 8 | 3.8 | 3 | 2.0 | 4 | 2.9 | 0 | 0.0 | 27 |
| Total | 94 | 100.0 | 132 | 100.0 | 211 | 100.0 | 154 | 100.0 | 137 | 100.0 | 119 | 100.0 | 847 |

$\chi^2 = 301.29$ df = 10, P .001

About one-tenth in both Bear Lake and Caribou counties felt that the project would help the water situation compared to over half of the respondents in each of the other counties and Ogden City. Also, considerably higher percentages in Bear Lake (66.0%) and Caribou (58.3%) felt that the project would hinder, against only one-fifth in Franklin, less than one-tenth in both Cache and Box Elder, and none in the metropolitan-urban area. This important result is consistent with other county differences in the study.

The findings in Table 47 reveal that opposition feelings were most prevalent in Bear Lake and Caribou counties where respondents largely had unfavorable attitudes toward the project, whereas in Cache and Box Elder counties respondents had favorable attitudes. Attitudes of residents in Franklin County, where the major dam was proposed to be built, were more similar to those of Utah residents than to those of other Idaho residents in Bear Lake and Caribou counties.

The next two tables, 48 and 49, show types of reasons given for the belief that the Bear River Project would either help or hinder the water situation. Table 48 categorizes the reasons given for favorable opinions of the Bear River Project. Only a few people (101) of the 382 who believed that the project would help consciously stated reasons why. This indicates that most people deal with these kinds of problems from an intuitive or internalized attitudinal level. Because of the small numbers the answers are only suggestive. The main reason given was to "provide more water through conservation and storage" which constituted over three-fourths of the answers given. The remaining types of answers in this table mentioned infrequently were "more control over water" and "community and area improvements." Conservation and storage were viewed as important by most of those answering. Quantity appears to be uppermost in the minds of the people of the area who favored the project.

Table 48. Reasons given for belief that the Bear River Project would help the water situation in their area.

| Response | Frequency |
|---|-----------|
| Provide more water through conservation and storage | 79 |
| More control over water | 8 |
| Provide for various community and area improvements | 7 |
| Other answers | 7 |
| Total | *101 |

*Of the 382 respondents who reported that the project would "help" only a part specified reasons for their belief.

Table 49 lists reasons why respondents felt that the Bear River Project would hinder the water situation. Three answers were most notable and dealt also with the general notion of water quantity: "it would provide less water" (23 of 92 answers), "take water from our state (Idaho) to Utah" (17) and "water would be diverted from this area to another" (17). Some of the other answers given by a few people include: "the Oneida Dam would cover farms," "taxes would be higher," "Idaho would have to pay for it," "water would be more expensive," "it would take water from farmers for industry," and "it would bring industry, which we don't want." Some of the same types of reasons were given for both favorable and unfavorable opinions of the Bear River Project, that is, the issue related to water quantity was most often mentioned.

Table 49. Reasons given for belief that the Bear River Project would hinder the water situation in their area, by frequency of mention.

| Responses | Frequency |
|---|-----------|
| It would provide less water | 23 |
| Take the water from our state (Idaho to Utah | 17 |
| Water would be diverted from this area to another | 17 |
| The Oneida Dam would cover farms | 6 |
| Taxes would be higher | 6 |
| Idaho would have to pay for it | 5 |
| Water would be more expensive | 4 |
| It would take water from farmers for industry | 4 |
| It would bring in industry, which we don't want | 3 |
| Other answers | 7 |
| Total | *92 |

*Of the 207 respondents who reported that the project would "hinder" only a part specified reasons for this belief.

Social Characteristics and Attitudes Toward the Project

Since the view that the project would either help or hinder is a key attitudinal factor in constraint or implementation of the proposal in the basin area, further analysis will focus on this question. For this purpose the Bear River Basin population, which does not include Ogden, is combined and this part of the analysis is largely limited to the basin population. The remaining part of this chapter will examine some of the characteristics and attitudes of those who felt that the Bear River Project would help, as well as of those who felt that it would hinder the water situation.

Age

Inasmuch as Berelson and Steiner indicate that age is associated with conservatism,⁴ Table 50 examines two adult categories of age in relation to opinion regarding the Bear River Project, a proposal for change. Those who indicated having favorable opinions regarding the Bear River Project were more frequently found to be in the 44-and-under age category (51.3%) than in the 45-and-over age group (41.8%). On the other hand, Table 50 reveals a greater number who had unfavorable opinions regarding the Bear River Project in the older age group (32.5%) than in the younger age group (23.3%). The oft-used hypothesis concerning old age and conservatism toward change is supported by this finding.

Education

Table 51 deals with another common variable, that of education. This table reveals a strong relationship between education and positive opinion toward the Bear River Project. For instance, there were 32.3% in the education category with eight or less grades completed who felt that the project would help, compared to 44.6% in the medium level education group and 55.4% in the high level education group. The relationship is just the opposite with those who felt that the Bear River Project would hinder. While 38.6% of those with low education felt that the project would

Table 50. Attitude toward the Bear River Project as to whether it would help or hinder the water situation in the area, by age.

| Attitude | 44-under | | 45-over | | Total | |
|------------|----------|-------|---------|-------|-------|-------|
| | No. | Pct. | No. | Pct. | No. | Pct. |
| Help | 121 | 51.3 | 192 | 41.8 | 313 | 45.0 |
| Hinder | 55 | 23.3 | 149 | 32.5 | 204 | 29.4 |
| Don't Know | 60 | 25.4 | 118 | 25.7 | 178 | 25.6 |
| Total | 236 | 100.0 | 459 | 100.0 | *695 | 100.0 |

$\chi^2 = 7.54$ df = 2, P .05

*N = 728, 33 "no answer" responses were not included in this table.

hinder, only 28.1% of the medium education respondents and 25.9% of those with high education felt this way. This shows that the more formally educated people tended to view the project favorably, while those with less formal education tended to be much less favorable in their opinions regarding the project. Older age is generally found to correlate highly with less education.

Level of living

A measure of "level of living"⁵ was another variable which was examined to determine its relationship to attitude toward the project. Level of living indices are commonly related to measures of social stratification or social class. There were no significant differences found between level of living and attitudes toward the project. Attitudes are distributed about equally in all social strata.

Interbasin transfer attitudes

Table 52 examines two important factors, attitude toward interbasin transfer of water and attitude toward the project. Respondents were asked, "Do you think it is wrong to take water away from one river basin and move it out of its natural area to another?" This table reveals that only about one-fifth of those who felt it was wrong to move water had favorable opinions regarding the project. A much higher percentage of those who did not think it was wrong had favorable opinions. On the other hand, over half of those who felt interbasin transfer was wrong also felt that the project would be a hindrance. About one-fifth of those who felt interbasin transfer was all right also felt the project would hinder the water situation.

Table 51. Attitude toward the Bear River Project as to whether it would help or hinder the water situation in the area, by educational background.

| Project Attitude | *Low Education | | *Medium Education | | *High Education | | Total | |
|------------------|----------------|-------|-------------------|-------|-----------------|-------|-------|-------|
| | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. |
| Help | 41 | 32.3 | 167 | 44.6 | 107 | 55.4 | 315 | 45.4 |
| Hinder | 49 | 38.6 | 105 | 28.1 | 50 | 25.9 | 204 | 29.4 |
| Don't Know | 37 | 29.1 | 102 | 27.3 | 36 | 18.7 | 175 | 25.2 |
| Total | 127 | 100.0 | 374 | 100.0 | 193 | 100.0 | **694 | 100.0 |

$$\chi^2 = 18.51 \text{ df} = 4, \text{ P} = .001$$

*Education Level Categories

Low = 8 grades or less completed

Medium = 9 thru 12 grades completed

High = one or more years of college completed

**Respondents from the metropolitan-urban area were not included in this and all but one of the subsequent tables. There were 34 "no answer" responses which were not included (N = 728).

Related to the same attitude of interbasin transfer, Table 53 shows that when the river basin is divided into three areas up and down stream, those who disagreed with interbasin transfer mainly resided in the upstream area of Bear Lake and Caribou counties. About half (50.7%) of the respondents in the upstream counties felt that it was wrong to move water from one river basin to another, while only 34.2% in Franklin County and 11.2% in the downstream area of Cache and Box Elder counties felt this way.

Table 52. Attitude toward the Bear River Project as to whether it would help or hinder the water situation in the area, by attitude toward interbasin transfer.

| Project Attitude | Wrong | | Not Wrong | | Don't Know | | Total | |
|------------------|-------|-------|-----------|-------|------------|-------|-------|-------|
| | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. |
| Help | 44 | 21.3 | 258 | 58.4 | 14 | 26.9 | 316 | 45.1 |
| Hinder | 112 | 54.1 | 80 | 18.1 | 15 | 28.9 | 207 | 29.5 |
| Don't Know | 51 | 24.6 | 104 | 23.5 | 23 | 44.2 | 178 | 25.4 |
| Total | 207 | 100.0 | 442 | 100.0 | 52 | 100.0 | 701 | 100.0 |

$$\chi^2 = 117.00 \quad df = 4, \quad P .001$$

Note: N = 728, 27 "no answer" responses were not included in this table.

Table 53. Attitude toward interbasin transfer of water, by major areas in the Bear River Basin.

| Attitude | Bear Lake-Caribou Counties | | Franklin County | | Cache-Box Elder Counties | | Total | |
|------------|----------------------------|-------|-----------------|-------|--------------------------|-------|-------|-------|
| | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. |
| Wrong | 137 | 50.7 | 75 | 34.2 | 43 | 11.2 | 255 | 29.3 |
| Not Wrong | 110 | 40.8 | 128 | 58.5 | 312 | 81.7 | 550 | 63.1 |
| Don't Know | 23 | 8.5 | 16 | 7.3 | 27 | 7.1 | 66 | 7.6 |
| Total | 270 | 100.0 | 219 | 100.0 | 382 | 100.0 | *871 | 100.0 |

$$\chi^2 = 130.16 \quad df = 4, \quad P .001$$

*All respondents were asked this question, but the metropolitan-urban category was not included in this table. There were 5 "no answer" responses in the five county area (N = 876).

There is some indication that people in the upstream counties were more conscious of the basin transfer issue. It is believed that the relationship between negative attitude regarding interbasin transfer and negative attitude toward the Bear River Project is due to a situation that has existed in the study area in the State of Idaho. The Bear River Protective Association has already been mentioned as giving leadership to the opposition in Idaho. One of the main contentions of some spokesmen from this group is that exportation of water is wrong and should be resisted.

That the views on exportation of water have been discussed is attested to in a letter to the Editor, printed in the Idaho Statesman, a Boise, Idaho newspaper, and released in January or February of 1966 by two local leaders, one of whom was a member of the Bear River Protective Association. Some excerpts from this letter indicate this concern with exportation from the river basin.

... We must view with the greatest alarm the subordination and exportation provision of 90 per cent of the Bear River Drainage Basin to the Salt Lake-Ogden area, and exportation by exchange to the Colorado Basin states.

... Standing today in Idaho is an application of Region 4 to store and divert water at the Oneida Narrows on Bear River in Idaho.

... Never in the history of water has there been so flagrant and treacherous water theft as perpetrated by Metropolitan Salt Lake City through the willingness and aid of the Utah Water and Power Board and Region 4 Bureau of Reclamation, Salt Lake City, against the citizens of Northern and Eastern Utah and states of Idaho and Wyoming, members of the Bear River Compact.

Opposition to interbasin transfer of water, as well as opposition to the Bear River Project, has been shown to exist primarily in Caribou and Bear Lake Counties. (See Table 53.)

The issue of interbasin transfer, however, is not clear-cut among the opposition inasmuch as they have also proposed interbasin transfer of water into the Snake River Basin. For example, a lengthy critical review of the Bear River Project Feasibility Report of 1962 written by one of the spokesmen for the opposition contains the following:

... to control the loss of water going down Bear River to Salt Lake, a short channel would re-establish the old bed of Bear River into the Portneuf River, and water could be diverted into the Snake River.

Surplus water perception

Another important belief associated with attitude toward the Bear River Project relates to knowledge of one aspect of the Bear River itself. The question was asked: "Do you think that there is any surplus water in the Bear River?" To begin with it is useful to see how this belief was distributed among residence groups. Surplus meant some water was going to waste or not being used for something besides running down the river and into Great Salt Lake. Significant differences by residence existed on this question. Of the open country farmers 62.2% reported a surplus, while 73.0% of the town farmers, 56.7% of the open country non-farm residents, 54.5% of the town non-farm and 62.2% of the metropolitan-urban respondents reported that a surplus existed.

In relating attitudes toward the project to surplus water Table 54 reveals a strong association between respondents who thought that a surplus existed and who also thought that the Bear River Project would help the water situation. Of those who thought that a surplus existed, 62.6% also felt that the project would help. This is compared to 14.5% who thought that no surplus existed and who also had a favorable attitude toward the project. On the other hand, only 17.6% of those who believed that a surplus existed thought that the project would hinder compared with 67.6% of those who felt that no surplus existed who felt it would hinder. According to this, the perception that an available surplus exists in the Bear River appears to be closely related to acceptance or rejection of the proposed Bear River Project.

Table 54. Attitude toward the Bear River Project as to whether it would help or hinder the water situation in the area, by respondent's belief or non-belief that surplus water exists in the Bear River.

| Project Attitude | Surplus Exists | | No Surplus Exists | | Other Answers* | | Total | |
|------------------|----------------|-------|-------------------|-------|----------------|-------|-------|-------|
| | No. | Pct. | No. | Pct. | No. | Pct. | No. | Pct. |
| Help | 262 | 62.2 | 25 | 14.5 | 29 | 27.1 | 316 | 45.1 |
| Hinder | 74 | 17.6 | 117 | 67.6 | 16 | 15.0 | 207 | 29.5 |
| *Don't Know | 85 | 20.2 | 31 | 17.9 | 62 | 57.9 | 178 | 25.4 |
| Total | 421 | 100.0 | 173 | 100.0 | 107 | 100.0 | **701 | 100.0 |

$$\chi^2 = 238.82 \quad df = 4, \quad P .001$$

*Includes don't know and other qualified answers.

**N = 728, 27 "no answer" responses were not included in this table.

Attitudes Toward Complete Development

Relating to development in general, the question was asked of all those who had heard of the Bear River Project proposal: "If those with water rights were assured of getting their water, do you think that there should be complete planning and development of the Bear River?" Table 55 shows that the majority of all groups favored development, but notably highest was the metropolitan-urban group with 87.4%. Town farmers, who were also usually older and retired, with 58.7% were the least favorable of the residence categories. Two-thirds in each of the other groups favored development. Only one respondent in the urban area did not favor development.

In comparing the results of the question in Table 55 on attitudes toward general development with the question in Table 46 on attitudes toward the proposed Bear River Project, some important differences appear. For instance, large propor-

Table 55. Attitudes toward complete planning and development of the Bear River, by residence.

| Favor Development | Open Country | | | | Town | | | | Metro-Urban | | Total No. |
|--------------------------|--------------|--------------|--------------|--------------|-----------|--------------|--------------|--------------|-------------|--------------|------------|
| | Farm No. | Pct. | Non-Farm No. | Pct. | Farm No. | Pct. | Non-Farm No. | Pct. | No. | Pct. | |
| Yes | 160 | 67.2 | 101 | 67.3 | 37 | 58.7 | 188 | 67.9 | 104 | 87.4 | 590 |
| No | 55 | 23.1 | 20 | 13.3 | 12 | 19.1 | 33 | 11.9 | 1 | .8 | 121 |
| Don't Know and No Answer | 23 | 9.7 | 29 | 19.4 | 14 | 22.2 | 56 | 20.2 | 14 | 11.8 | 136 |
| *Total | 238 | 100.0 | 150 | 100.0 | 63 | 100.0 | 277 | 100.0 | 119 | 100.0 | 847 |

$\chi^2 = 50.01$ $df = 8$, $P = .001$

*There were 223 who had not heard of the Bear River Project who were not included in this table.

tions in all categories indicated being favorable toward the idea of complete planning and development of the Bear River, whereas considerably smaller proportions favored the proposed Bear River Project. On the basis of residence, open country people appear to be the most critical of the project as only about one-third favored the proposal while over two-thirds of the same group favored complete development. For town non-farm and urban populations there were also considerable differences. Town farmers showed little difference on the two questions.

These results demonstrate some basic differences between the specific proposal of 1962 and general development. A substantial majority of residents in the river basin favored complete development but a much smaller plurality favored the specific proposal. The most logical alternative would seem to be to attempt to develop new proposals based upon various compromises with the hope of reducing opposition and increasing favorability to the point where action can begin. The alternative proposals of 1966 represented compromise attempts of the bureau to reduce opposition. It is likely that some opposition will continue to exist but it is possible that certain compromises may eventually make a project agreeable to more people. It is obvious that one could oppose the project proposal without opposing the idea of development, and the present data illustrate this point.

Although not all reasons have been consciously expressed some are inferred and concluded from experience with the study. Reasons for opposition range widely. Although not necessarily by order of importance, these include: being directly removed from and dispossessed of lands that would be flooded, changes in control of water, fear of change from traditional patterns or from lack of knowledge about new changes, reduction in future possibilities for water resources, loss of tax revenue from private lands and industry, fear of more taxes for the cost of development, belief that local development of industry would be inhibited, desire to protect one's local area to get a greater share of the water than the plan proposes for a local area or state, economic self interest, emotional and irrational feelings either about changes in the

water resource or toward persons or other areas, response to emotionally charged symbols such as interbasin transfer, feelings against government, and feelings against further pressure for more efficiency by water users that inevitably comes with more development and control over the water supply.

Some of these reasons for opposition may be variously classed as rational or irrational, conscious or unconscious, and may be based on either unfounded opinions or well known principles. However, as the different interests get together and compromises develop many reasons for opposition are eliminated and a balance may be achieved that will permit further action. Finding this balance of acceptability is the function of compromise.

Data given in the Feasibility Report show the expected economic gains for the basin area and the area adjacent to the basin. These gains include a virtually guaranteed adequate water supply for lands presently irrigated, except for the most extreme drought years in the Gentile Valley area of Caribou County and below. Also included is the development of extensive new irrigated lands in the basin which would have an important impact upon not only the economy of the whole area but also would bolster the social institutions of many dwindling and dying communities by stabilizing the population in the area, maintaining the schools, churches, businesses and local government services.

Undoubtedly inequities in the first proposal exist from local viewpoints, both in the distribution of the resource between political units and in the use of the resource for best advantage to strengthen the social institutions of local areas. Some of these inequities appear to some of the opponents as the lack of providing adequately for industrial development in small urban areas. Also from the point of view of present social problems it may be suggested that more emphasis on recreation and aesthetics as well as for economic improvement in agriculture would be considered appropriate. In a highly urbanizing world there is an important place even in largely rural areas for planning for the needs of a growing urban society.

Opposition has been reflected in the attitudes of important proportions of the people in the river basin. It has occurred in various ways such as: through individuals who were uninformed or misled or who had an understanding but disagreed with the objectives or the way in which the project would be accomplished; by irrigation groups who felt they would either lose water or would not gain as much as they desired; by state and local government agencies who felt that division of water to their areas was not just or in accordance with their areas' contribution to the resource; by politicians who found this a responsive issue; by voluntary associations who did so for various reasons such as economic investment, community interest, locality loyalty, conservatism toward change, or interest in a cause.

Opposition, however, has not only a negative aspect but contributes to improvement of the proposal through identifying areas of needed adjustment and compromise that make possible its adoption. Functions of the opposition include pointing out inequities and obtaining adjustments, identifying means of compromise, involving the larger public in decisions, and requiring greater depth in analysis, planning and evaluation.

Since the 1962 proposal was made, all of these opposition functions have been portrayed in relation to the Bear River Project. The survey study has discovered some of the elements of the problem. It does not describe the complete process of the decision being made in this river basin. The process in making a decision and the elements involved in adopting that decision will be discussed in a second report.

Summary

The strong majority of respondents in all areas had heard of the Bear River proposal. Idaho counties showed significantly higher awareness than Utah counties. One factor that likely accounted for some of this difference was the active involvement of a local opposition group.

Using area breakdowns based upon state and county geographical divisions, it was found that awareness of the Bear River Project was highest in Franklin County, followed by Bear Lake and Caribou, then Cache and Box Elder, and finally the urban area of Ogden. Highest awareness in Franklin County was probably because the main dam was proposed to be built there and the issue has been highly debated by both farm and non-farm interests.

Sources of information in the awareness stage were mainly mass media followed by personal contacts with neighbors and friends. This result also supports similar results in the diffusion model discussed in an earlier chapter.

About one-fifth of the farmers exhibited accurate knowledge about the Bear River proposal. Since farmers were more highly involved than any other category of the public it is reasoned that all groups had a low level of accurate knowledge about the proposal. This has two important implications. First, lack of knowledge leaves the public more vulnerable to inaccurate information; and second, the public cannot make sound judgments without knowledge.

Open country farmers, followed by town farmers, were the main groups to attend meetings about the Bear River Project. About half of both groups attended meetings compared to much smaller proportions in other groups. Meetings, although not very effective in disseminating accurate knowledge of the project to large numbers of people, were nevertheless important means for farmers in the later or information-seeking and evaluation stages of the diffusion-adoption process. The fact that non-farmers did not participate in meetings indicates that the large majority of non-farmers seldom went beyond the mass media type of information. Because of this dependence upon the mass media it is important to have accurate and definitive information disseminated by these sources. Also very small proportions of non-farmers actively became involved. It is believed that non-farm involvement could be stimulated if the direct and indirect benefits were stressed more by promoters of the Bear River Project.

A related study showed that farmers who belonged to canal company cooperatives or associations were the main ones to attend meetings, suggesting the importance of these types of social systems in this information process. Sponsorship of

meetings was reported to be mainly by the following groups: federal government agencies, civic or community groups, farmers and water organizations. About two-thirds of the answers were directed to one of these three types of sponsors. The use of meetings beyond formal hearings are potentially effective tools particularly for farmers. However, better planned educational meetings would increase their effectiveness.

It was further found that over half of the farmers in each residence category considered themselves as having actively tried to become better informed about the Bear River Project. This activity mainly consisted of reading and meeting attendance, but also talking to people. It was shown that about six-tenths of all those who attended meetings did so for the purpose of becoming better informed rather than attending for other reasons.

When asked about constraints to the project or what they felt was holding up the Bear River Project, more respondents gave answers that fell into the category "political bickering" than any other category. Other reasons given were: opinions of special interest groups, local government and officials, local individuals or groups, interstate friction, federal government agencies and officials, lack of finances, private industry, and undesirable features of the proposal itself, in that order. "Political bickering" is a highly general category and does not specify the level of political behavior or the clarity with which the respondent views the decision process. It is indicative of the lack of specific knowledge of a large part of the population who do not participate directly in decisions. The understanding of these people is often vague and incomplete.

All Idaho counties had higher percentages than those in Utah who believed that some areas would get more water than others. In addition, these proportions were directly associated with position on the river, those upstream having higher percentages. It was reasoned that part of the reluctance for the proposed change may be related to the view that the benefits were going to other areas downstream. With each development in any one area water resources become less flexible for future development in all other areas. When development occurs downstream it means less possibility for the future upstream. Therefore, even though the water goes unused, many people are reluctant to change their chances for future improvements.

While about four out of ten of the open country farmers felt that some areas would receive more water than others, smaller proportions in all other groups felt this way.

Several factors were reported as influencing the choice made to favor or oppose the project. These were not of one qualitative type but were mainly beliefs or attitudes that had been previously set, or because of self interest. Some, however, reported conscious study or contact with others as important factors in helping them to make up their minds.

In response to the question, "Do you think that the Bear River Project will hurt you?" the majority in all groups felt that the project would not hurt them personally. However, the main perception of threat was felt by the open country farmers.

When viewed by locality, about four out of ten from each of the upstream counties in Idaho reported that the project would hurt them personally. Further downstream, Franklin County and the Utah counties felt less threatened.

When asked, "Overall, do you think that the proposed Bear River Project would help or hinder the water picture in this area?" it was found that a greater proportion of open country farmers expected harmful effects than did other groups. This group has consistently felt the most threatened by the proposal as determined by various measures in this study. Conversely, the more urban groups have felt least threatened.

Significantly higher proportions in Bear Lake and Caribou counties than in other areas felt the project would hinder the water situation. Attitudes of residents in Franklin County where the major dam was proposed to be built were more similar to those of Utah residents. Franklin County was a downstream area and would also receive major benefits, both direct and indirect.

In order to understand why people felt the project would help or hinder they were asked to give the reasons for their belief. Relatively few people could consciously state reasons. This indicates that most reasons are based upon established attitudes rather than consciously thought out decisions. The few who did answer who favored the project generally felt that it would provide more water through conservation and storage. Those who answered who opposed the project felt that it would provide less water for them or take the water out of their state or area.

The remaining analysis was concerned with identifying the attitudes and characteristics of the respondents with favorable and unfavorable attitudes toward the project who lived in the Bear River Basin. The findings can be illustrated by the use of modal personality types.

A modal (i.e., typical) person who felt that the project would help the water situation had the following characteristics and attitudes in contrast to a typical person with an unfavorable attitude: He felt that the project would provide more water through conservation and storage. He lived in a town either in Cache, Box Elder or Franklin County, was 44 or younger, had completed education beyond high school, did not feel that it was wrong to move water from one river basin to another and felt that a surplus amount of water existed in the Bear River.

A typical person who felt that the project would hinder the water situation had the following characteristics and attitudes: He was an open country farmer and felt that the project would decrease the water supply because of diversions, etc. He lived in either Bear Lake or Caribou County, was 45 or older, had a grade school education; he felt it was wrong to move water from one river basin to another more than those with favorable attitudes toward the project, and felt that no surplus water exists in the Bear River.

Respondents with both favorable and unfavorable attitudes toward the project were similar in that they were found in all three levels of living categories.

Interbasin transfers of water were opposed by half the respondents in Bear Lake and Caribou counties although 40% did not oppose it. This level of opposition

was the highest in the study area. The opposition to the project proposal in Idaho has used the issue of interbasin transfer of water from the Bear River to the Ogden area as a major reason for opposing the project. By doing so they related negative, emotionally charged attitudes toward interbasin transfer to attitudes toward the project. This is one example of a convenient symbol which was used to generate opposition. However, the interbasin transfer issue has not been clear-cut among the opposition inasmuch as they have also proposed transfers of water from the Bear River into the Snake River.

A large majority of the respondents in all residence categories favored some kind of development of the Bear River water resources. However, the response to the Bureau of Reclamation proposal was considerably less favorable. Only 4 out of 10 open country residents favored the proposal while slightly over half of the town and urban people felt it would help the water situation. It is significant to note that 4 out of 10 open country farmers felt that the project would hinder. This is interesting inasmuch as this group would be the one to gain the most from the major project goal of providing more irrigation water. About one-fourth of the other groups, except metropolitan-urban who had none, felt that the project would hinder. It is evident that although respondents generally favored development they did not have the same goals for development.

Compromise will evidently have an important role in finding solutions to getting agreement on the project. These compromises will probably involve local upstream area and state interests as well as involving agricultural and non-agricultural interests.

Although opposition may be dysfunctional it also has a functional role in identifying inequities and other problem areas requiring adjustment and compromise, clarifying means of compromise, involving the public in the decision and requiring greater depth of analysis, planning and evaluation.

The general agreement that the Bear River should be developed shows a recognition that many advantages could accrue to the region from this action. The area of the study is subject to considerable out migration of population. There are few jobs to hold people there. Industrial development, whether in the upstream or downstream areas, would help retain more people in or near the Bear River Basin. In addition to the general area, however, planning for more industry and improving agriculture in the local areas would stabilize the population and strengthen the institutions of these areas. Planning the water resource with industry and agriculture in mind, as well as providing for the adjustments in the present reclamation institutions so that new uses can be made of this water in the future, is important for development in the Bear River Basin.

FOOTNOTES

¹U.S. Department of the Interior, Bureau of Reclamation, *Feasibility Report*, p. 13.

²Bohlen, "The Adoption and Diffusion of Ideas in Agriculture."

³Dennis C. Geertsen and Wade H. Andrews, "Social-Psychological Elements of Motivation in Water Resources Development" (paper presented at the Rocky Mountain Social Science Association meetings, at Colorado Springs, Colorado, May 1-21, 1970).

⁴Berelson and Steiner, *Human Behavior: An Inventory of Scientific Findings*, p. 573. For a further discussion of age and the reduction of tolerance see Samuel Stouffer, *Communism, Conformity, and Civil Liberties* (New York: Doubleday & Co., 1955), p. 94.

⁵Three categories of low, medium and high levels of living were assigned according to total score, which score was based upon the following factors: education, occupation, automobile ownership, newspaper subscription, telephone in home, person per bedroom ratio, and renting or buying a home.

⁶The Idaho Statesman, Boise, Idaho, Letter to the Editor under the title, "Bear Lake, Caribou County Commissioners Seek Action to Halt Export of Idaho Water to Utah" (exact date not certain, press release January or February of 1966).

⁷Evan M. Kackley, "Proposed Bear River Project-Utah-Idaho Oneida Division," November 20, 1962, p. 60 (Mimeograph report, privately distributed).

CHAPTER 9

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Introduction

The objectives of this study were broad to allow exploration of the many facets of the sociological problem associated with development of water resources in an arid lands area. Establishing a western society in this area has required social and ecological adjustments that were different from that of the humid areas of the eastern part of the United States. In addition, the period of settlement of the area was during a time when the society at large was rural, subsistence farm oriented, and mechanical steam power had not yet spread to the western part of the country. Settlement in the region was also largely accomplished by a strongly cooperative, religious social system whose interests were to establish self-sufficiency and to achieve a cultural standard similar to that which they had left in the urbanizing east. The Latter-day Saints built cities and villages from the beginning, often laying them out and populating them in a few months time.

In the semiarid lands of the Great Basin, of which the Bear River is a tributary, an agriculturally based society had to alter the natural ecology by not only clearing the land of its native vegetation in order to plant crops, but also to develop water resources and devise methods for spreading the water on the land to provide for the continuous moisture requirements of the crops.

Irrigation developed both as a technology and as a social institution. Engineering technology for irrigation includes, among other things, planning, design and construction of physical structures such as dams, canals, headgates, and ditches. Also, soils and agronomic technology developed for the adjustment of production to irrigation. In addition to new technology, however, social patterns of living developed and communities grew around the location of water resources. The size of farms was related to the availability of water and the labor required to manage it. Water turns became a timetable for family activity. Cooperative type corporations became social systems common to all farm people; water rights became customary and also became fundamental legal systems. These systems were as closely guarded as land ownership itself. Consciousness about water and its territoriality in the sense of rights became a second resource socialized into the behavior patterns of the society as land was in the eastern part of the country. Men, recognizing the need for water as a factor of life, treated it as a right and behaved in relation to it as a basic resource the same as land. Violation of these institutionalized normative or expected patterns led to serious conflict.

Several principles of human behavior come into play when changes are introduced that are related to social institutions. With the establishment of an institutional pattern comes also sets of beliefs, values and attitudes about the institution. These are taught to succeeding generations and diffused throughout the population that is linked to the institution. Because they had become institutionalized in the region, the beliefs about water rights, the ways water should be used, controlled and developed, were also found to be established in the Bear River Basin. The introduction of changes in an established system, whether they were different techniques for irrigation application, different laws and rights, or new means of storage and distribution, might be expected to require considerable social adjustment.

Social adjustment requires the action of learning of new ways which in turn requires motivation to stimulate action to accomplish acceptance of change.

Learning, except that through direct experience, involves communication and may occur in many ways and through many systems. In addition, learning may involve both accurate and inaccurate information.

Perception of the individual about what is going on about him affects the direction and intensity of his motivation to act. Previously learned attitudes, or preset tendencies to act, are acquired through learning from the individual's experience. In changing behavior about water then, not only is it necessary to provide technical facts and information, but conditioned responses in the form of attitudes must be changed. This must be done by learning new forms of behavior and developing new attitudes to go along with them. New behavior will be based on other established, compatible values and attitudes.

There are many social systems or functional groups that communicate information and from which people learn things related to water resources. Those systems may be informal groups of friends or they may be formal systems such as a committee or a government agency. All of these systems have goals, patterned ways of achieving these goals, and they all affect human behavior in some way related to water. When a proposal to develop a water resource is made, it brings into play all of these facets of human behavior.

It has been the purpose of this study to explore the complex problem of human behavior related to a major water resource development. Since little is known about this problem this study has intentionally been broad rather than deep, touching such things as organizational, communication, and change problems.

The problem studied included several aspects related to introducing a proposal for change in water use and management on a stream involving three states. The greatest population and industrial development was near the mouth of the stream and there was a high degree of consciousness of the value of water as a resource from long historical experience. Many small, private irrigation companies exist on this river. Several industrial and municipal interests are represented, as well as many individual water users. In addition, there are civic groups, local governments, and state and federal government agencies. Voluntary groups as well as rural and urban residents are among the active, interested people and social systems involved in introducing the proposal.

Attitudes and basic issues

Each chapter in this report has been summarized and these summaries provide a resume of the results of the survey study. The following are largely conclusions from these results.

Attitude theory provides a frame of reference for understanding the phenomena which give direction to human behavior. As indicated in the results of the study, attitudes that both enhance or impede change exist in the Bear River Basin. Although most people favor irrigation use of water and general development of the resource, there are significant differences in attitudes on the basis of locality and residence. The lack of a favorable attitude by the rural residents has strongly impeded acceptance of the proposal. Symbols that become related to attitudes which are characteristic of a number of people can be effective mechanisms for partisan positions and can be used to establish favorable or unfavorable action. Symbols are words or phrases, etc., that trigger the attitude or preset tendency to act.

One of the attitudes investigated in the study was concerned with whether interbasin transfer of water was right or wrong. More respondents in the middle basin, in contrast to those of the lower basin, felt it was wrong to move water out of its basin of origin. The words "interbasin transfer" or their equivalent, became to many one of the main symbols used by opposition groups to the Bear River Project. The project proposal called for transfer of a small portion of the water from the lower Bear River to the lower Weber Basin. This proposed transfer was used by the opposition. The strongest opposition was largely centered in the middle Bear River Basin (consisting of Caribou, Bear Lake and that portion of upper Franklin County that is in the Gentile Valley). The extent of the Idaho opposition shows the effectiveness and the far-reaching influence in these areas of both the informal influential and the organized opposition. The attitude of the opposition was more pronounced among open country residents than among town residents in the middle basin. Generally in the lower basin and in the metropolitan-urban area it was felt that interbasin transfer was not wrong. This meant that functionally a tendency for concentration of opposition attitudes in one area, rather than an even distribution over the whole area, provides a block of strength which in a case such as this gives the opposition a strategic advantage. The advantage exists in this case because the system for making the final decision is by congressional action and the Congress has traditionally refused to act until substantially all areas involved have agreed on a plan. Thus, opposition in a small area can magnify the impact of the opposition.

Another strategic means of power in a public decision occurs when a strong organized minority has control of important influential leadership roles. A minority in a limited part of an area can affect the decisions of a much wider area if the majority in this wider area is not active and does not achieve general control of the leadership. Both the condition of concentration of the opposition and the control of important leadership roles by the opposing minority occurred in the Bear River problem.

Attitudes toward the use of water by various categories of residence provide insight into the location of likely support for future project proposals. When given the choice of priority for stream water use, irrigation use was given the favored priority by a majority of all of the various residential groups. The next use given first

priority by some was urban and household uses. This was strongest among metropolitan-urban residents. Contrary to expectations, almost no one identified industry as the top priority use.

Beyond the top priority rating, however, respondents felt strongly that industrial development is good. The major benefits of the proposal for development of the Bear River by the Bureau of Reclamation were first, irrigation and second, municipal and industrial uses. It thus appears that the respondents are in harmony with the expected benefits of the proposal if not the specific plans. This close agreement was not exploited by the proponents of the 1962 Bear River proposal. The survey would have been helpful in these early stages to discover this condition.

The majority of all residential groups felt that it was wrong to take water away from agriculture to use it for industry. This is an important result from another standpoint inasmuch as there is an interest in Bear River water by industrial interests on the Great Salt Lake. These interests on the Great Salt Lake have stimulated state-sponsored organizational developments in Idaho and studies for the purpose of both developing and protecting Idaho's interest in the Bear River, primarily for agricultural use. However, some Idaho people want some of the water available for industry. The competition involving both industrial and agricultural interests has been one of the major driving forces at work in Idaho for opposition to the Bear River Project by some and interest in work toward development by others.

Water has a peculiar effect upon the choices of resource use because of the established attitudes and perspectives about it that are widespread among the general population. For example, when water is not considered in the matter, attitudes tend to follow more closely a principle of self-interest. More farmers favor grazing uses of public land to forest uses and private farming uses to public uses; whereas non-farmers tend to favor forest and public uses in each case. However, a comparison of preferences for public or private control of water for either erosion problems or reservoir storage purposes reveals that about three-fourths of all groups favor intervention by the public sector, although this preference was not quite as strong among open country farmers. There was a slightly larger percentage of respondents in the middle basin that favored private control than in the lower basin. It may be inferred from this that most people in the basin would prefer a government development plan to a private development plan for water. This may be important to those attempting to promote private development on the river as an alternative to Bureau of Reclamation development. That they may lack public support in their endeavor from the standpoint of both the local level and the entire basin seems apparent in this finding.

There has been a consistently smaller proportionate support for government activity among the farmers of the study than non-farm people.

Perception of change

In some contrast to the previous questions on preferences of use, when asked if they favored industrial expansion even though increased pressure on the water supply would result, about two-thirds of the respondents in each category indicated that they favored industrial expansion. Also, nearly 90% of the respondents believed that industry would be good for the region. Both of these findings suggest that there would probably be strong community support for industrial expansion should it

occur in the Bear River Basin or adjacent areas. However, since industrial uses were placed lower in priority than irrigation and urban-household uses, industrial expansion would probably have weakening support beyond the point that it begins to compete strongly with one of these higher priority uses. People in the area apparently don't feel any real or immediate danger at this time. If more industry is established in the basin, priority attitudes relating to agriculture might also be revised.

The further conservation of water by storage would provide more flexibility and availability of water for various purposes, including industrial, recreational, and aesthetic development, as well as for irrigation purposes. However, this is not necessarily to say that all water resources allocated to non-irrigation use should be focused in existing urbanized areas. New perspectives for development might also be included in future planning in new areas for other than traditional irrigation and municipal uses. Public concern for present and future urban growth and urban problems indicates that any development of water resources should now include a wide spectrum of consultation, advice, and planning, in addition to traditional water engineering, in order that this basic resource can be flexibly developed and used for both present and new uses. For example, it is now possible to disperse industry, to strengthen rural subregional centers, and to develop new centers. It is also possible to assist in the improvement of existing cities with more open space, recreational, and aesthetic development rather than compounding the problems of present large urban areas.

This type of urban management can occur along with agricultural development because water needed for municipal and industrial development is only a fraction, perhaps 5% to 10%, of that required for irrigation. Water in an arid area is as fundamental as land for future development, therefore it becomes an integral part of any move to solve other social problems of the region.

In this study urban and non-farm people were found to be conscious of some changes in water use and management, but differences in awareness occurred in local areas, as for example in the metropolitan Ogden area people mentioned storage type changes most often, while in the rural areas sprinkling was mentioned most. However, the experience with these local changes did not necessarily enhance attitudes toward all change.

Inasmuch as the single change most often reported was found to be the adoption of sprinkling irrigation, it would seem that reclamation development could further enhance this method and bring about much wider adoption of sprinkling technology. Sprinkling involves changes in such customs as changing the length of delivery time for water turns and quantity of water delivered since sprinklers require less water for longer and more continuous periods of delivery. However, the idea of sprinkling has been widely accepted and therefore the survey shows changes are slowly being made in other institutionalized patterns to accommodate the change.

Diffusion of ideas

Diffusion and adoption of ideas and practices in the study area function generally in a similar manner as in other rural areas, with minor exceptions. Mass media is a fundamental means for the spread of ideas. This means provides a neutral source of information which can help in areas of high competition and conflict where people in various special interest camps are not listening to each other.

It was found that initially new farm practices or methods are mainly diffused through farm journals. Not only are ideas diffused best by this source, but three-fourths of the farmers indicated that they adopted ideas related to water found in farm journals. With the low level of knowledge observed about the institution of water rights and the Bear River Project, it would seem that diffusion of knowledge regarding the Bear River Project could have been enhanced either through farm journals themselves or by a widely diffused, simplified yet complete report written in the popular style of a farm journal. However, the types of information made available and the means of disseminating them proved to be ineffective in diffusing any real understanding of the project to the large majority of farmers. Even the usual public meetings had limited value for this purpose. One reason may be that they were frequently restricted by invitation.

Other sources that respondents reported as being important as diffusion agents of farm ideas were informal sources such as friends and neighbors, followed by agricultural extension agents. Use of these two sources for reclamation development diffusion has certain implications. Knowledge diffused through friends and neighbors, although the more common of the two, is likely to be less accurate and less rational than knowledge diffused through a trained professional such as a county extension agent or a soil conservation staff worker. Misunderstandings regarding reclamation plans coming from inaccurate sources are likely to be costly and even create needless opposition. Active, objectively neutral, legitimate, and accepted leadership that can function through an educative or service system can provide basic information to all and reduce inaccuracies in the informal friends and neighbors system of communication. These are tactics that will shorten the development process, where development is demonstrated to be functional for the common good.

Institutions

The development of institutions is a known process. This process has variations in relation to its adaptation to any particular situation. Any change that is to become a pattern of behavior for a society or any part of a society will have the same essential ingredients.

An example of an attempt to institutionalize a change in pattern of behavior which has not yet been achieved is that of the conceptualization of measurement of water in terms of a volume rather than rate unit of measure, as is the case with the acre foot unit in agriculture. This entails considerable adjustment and change in customary and legal behavior. Although the question was perhaps too unstructured, there is slight evidence that farmers may have lacked definitive knowledge about this concept.

Farmers surprisingly had little accurate knowledge of the institution of water rights. This level of knowledge may be a function of the source of this knowledge inasmuch as it was found that the strong majority of the respondents traced their knowledge to informal rather than formal sources.

About 95% of the farmers surveyed indicated that they had water rights, although there is some evidence to suggest that respondents may not have been clearly differentiating between collective and private rights. Few, if any, radical changes have occurred in the water rights system. However, evolutionary-type

changes such as formalization and codification of water rights, emphasis on private ownership and others have occurred which have a direct affect upon water rights. In addition, recent technological changes have been introduced, particularly sprinkling and water storage, which indirectly affect the traditional water rights institution. Although these changes have been occurring, nearly three-fourths of the respondents did not recognize either present or historical changes.

The institution of water rights is one that farmers have relatively little specific knowledge about, but strong institutional acceptance for, and have given little thought about changing. In this situation where very little exact knowledge is held by the large majority, most people find themselves almost entirely dependent upon the advice, counsel or public statements of others. This state of knowledge will have further impact upon decision making among these people.

The level of knowledge will likely be inversely related to the level of emotionalism, fear of change, and the unknown. There will need to be a good grounding in understanding in order to change long-standing, patterned institutions. Assuming that farmers hold water rights to be sacred, the evidence would indicate that this is not based upon a clear and complete knowledge of water rights. The implications of this may well be that raising the level of knowledge could be a major force in the implementation of social change in water institutions.

Perception of water supply

Felt-needs for irrigation water as expressed by farmers are important in any reclamation development plan. It was found that one-fourth of the farmers interviewed in Utah indicated that they felt that their present water supply was inadequate for their needs, while about half of the farmers in Idaho felt this way. This would suggest that Idaho residents would generally have more to gain immediately from development of the Bear River than Utah residents. Inasmuch as Idaho residents were more unfavorable toward the Bear River Project than Utah residents, it appears that the opposition was more against the specific plan than against the general need for an idea of development. However, because of the fewer felt-needs expressed by those in Weber County, an alternative plan may reveal less interest by Utahns unless the benefits are readily ascertainable. The identification of the type of opposition, whether toward development or toward a specific plan, provides new avenues of possible approaches to the problem. Assessing this early in the process may contribute to effective action. Survey study methods are most effective in defining and detecting this type of problem.

With regard to perception of the need for water supply, it might be expected, all other things being equal, that if the benefit-cost ratio for any future development is equally favorable one would also expect more favorable opinions toward water development where water needs are greatest. However, as the present study reveals, all things are seldom equal when considering social factors. Felt water needs were reported as being greater in Idaho counties, but that is also where the greater opposition to development occurred.

Several things, such as state of knowledge, opposition by influential people, alternative physical and social benefits or costs, and differences in objectives or interests in development may intervene in different proportions, and actually have in

all counties. The survey reveals that although individual water needs of farmers are greater in Idaho the alternatives for getting more water also are reported to be greater than were reported in Utah. Two of these alternatives are: 1) obtaining more water through buying, renting or trading, and 2) drilling wells. It would seem, however, that the continued uncertainty involved with the first as well as the last would probably make these alternatives less desirable to farmers than large scale reclamation development.

Social systems involved in water

Social systems are vehicles for action. They are interacting systems of human beings. The way individuals relate to each other in positions in the system is its structure. What the system does and the way it does it is the function.

An examination of several basic social systems in the study revealed two general aspects, first, the extent and type of involvement and second, the perception of the people as to whether or not these institutions were functionally concerned with water.

Conclusions reached are that the investment of funds and effort on water resources by local government is understood by about half the adult population. Interest shown for water in politics is reported as high in Idaho and if it is seen as a partisan concern, political involvement may inhibit finding solutions. But, even if it is not a partisan issue, as long as it pays off in votes to keep it as a hot issue before the public, the problem of cooling it off for consideration of the ideas proposed still exists.

Educational systems have done little to prepare people to understand this vital natural resource in regard to either its place in the economy or its ecological significance. This could be the main channel for improvement of knowledge in the future.

Government was identified as being the most important as well as the most acceptable means for water development. However, the increasingly widening periods between federal approval and federal financing of reclamation projects may also indicate a need for a review of the role of state or other sources of cooperation in development. This may require shifts in federal policy on how to participate and implement development of the work. Some possibilities for different approaches include reimbursing local financing, completion of part of the program at one time and others at later times, and cooperative funding. If, for example, the policy of returning federal tax funds to the states is implemented, states may desire to make reclamation developments a high priority use of the funds in cooperation with other federal participation.

An ambivalence in the people's feelings toward government appeared in this study. Most respondents felt that federal government agencies do a good job in relation to water development, but there were also strong undercurrents of anti-government feeling in a more general sense. The study indicated that this antagonism was sometimes related to influential in leadership roles who had a disproportionate impact on the situation. Again the force or effect of this leadership was likely related to the lack of real information available to most people in relation to the project proposal.

In identifying the systems and their functions important to water resources, it may be concluded that the general population is not well informed on many aspects, and has erroneous conceptions in others. This is not an unusual situation on public matters in the average American community. However, it is useful to understand where one stands on accurate information when public decisions must be made.

Two approaches are often taken in public decisions. The most common is that of working through established systems of leaders and influentials who have a legitimized right to make decisions. That is, most people are not involved in decision making, but they permit others to do this either as formally appointed or elected representatives or by informally accepting the opinions of others whom they perceive as having good judgment. The latter informal system is as important, if not more so, than the formal system in American society, but this is often not recognized and not taken into account in dealing with official problems.

The second approach is to put on public campaigns and activate the mass of the people to make a decision. Many times there is no choice as to which means can be used. The procedure may be set by law or limited by funds or manpower. However, it is also often the case that both approaches must be used. This usually occurs in decisions on large public projects such as reclamation programs. A certain amount of factual knowledge is needed by a substantial part of the public in order for them to be able to participate in decisions. The weight of a well informed public has great influence upon leaders as well as vice versa.

The problem of public relations is very broad, but results from the survey indicate that the efficient function of public social systems in an area concerned with a decision about a major development is hampered if the people do not have sufficient information regarding both specific facts and general understanding of the effect and function of the project. Therefore, adequate community relations would improve the efficiency of development decisions. Understanding the community, its leadership and group structure would greatly minimize the causes of conflict and help the people in the local area to more effectively assume their role in stating their interests and needs which might influence the project.

The survey as a methodological tool

In gaging public involvement in water resource development the social survey can be an effective tool. One of the important problems in water development and management is to identify and include the interests and needs of a broad spectrum of the people to be affected by the project. Accuracy in determining the way the public feels is very difficult by the public hearing method. The survey method in water resources problems was shown to be useful in the acquisition of several types of information including:

- a. Specific identification of important variables or factors in the situation such as: attitudes in particular geographic areas, leaders, and interest groups.
- b. Identification of the state of knowledge of the public and the kind of knowledge to which the public reacts.

- c. Identification of the characteristics, needs, interests, and problems of the public.
- d. Determination of methods of water use, water distribution and other matters related to effective use of water.

The Bear River Proposal

Most people had heard of the Bear River proposal in some degree, but this awareness was significantly higher in Idaho. This was probably due to the activities of an organized opposition whose main methods for diffusion of their opinions included circulars, news releases, participation in hearings and meetings, and personal contacts. Most people reported that they first heard of the project proposal through the mass media. Neither the opposition nor the mass media would be expected to provide complete information concerning the proposal. It was found that only one-fifth of the farm sample, who were the best informed, reported accurate knowledge about the proposal and this was not complete. As has been noted, this situation leads to two conclusions: first, lack of knowledge leaves the public who are involved directly or indirectly in the decision in a more vulnerable position to inaccurate or misleading information, second, the public cannot make sound judgments without accurate information. It is also concluded that although there will always be resistance to change even by some who are well informed, the non-rational type of resistance to changes related to water would undoubtedly be reduced if they had more knowledge of the proposal and if they understood how adjustments can be made.

Opposition can be both functional and dysfunctional. When it makes both proponents and opponents search out facts and causes them to make adjustments according to overlooked aspects of the problem it is functional. But, when opposition becomes largely emotionally based due to insufficient knowledge it impedes constructive action.

Functions of the opposition

Opposition in a public system requiring popular consensus performs several functions, some of which impede the proposed action and some of which may implement and improve it.

Three categories of opposition were identified: (1) "adjustment opposition," (2) "economic interest," (3) "idealistic interest."

The adjustment opposition may be described as those who have a general welfare interest in the area and wish to find the best way for all concerned and feel the proposal needs improvement not necessarily defeat. Those falling in this category on the Bear River Project were some state and local government agencies and some specialists who had knowledge about the problem and believed improvements could be made.

The economic interest opposition are defined as those who have a particular economic interest they are defending and wish to maximize regardless of other concerns or the general welfare. These people in the Bear River area included those

with property or business interests which would be negatively affected by the project.

The idealistic interest category would be described as those who oppose change on the grounds of aesthetic or traditional interest, or because of strong ideological values which would be affected by the change. This type of opposition is often by individuals, but sometimes they join in groups to accomplish their ends.

These might be called ideal types and probably are difficult to identify as real types because in real situations they are often made up of combinations of such interests. However, such types may provide a means for improving observation of the functions of the opposition. The data in the survey analysis only suggest types of opposition.

Factors affecting behavior

Factors that influenced the respondents' decision to favor or oppose the project are revealing in that they provide insight into some of the felt causes of behavior. The types of causes reported ranged from previously conditioned or established attitudes to a perception of an imminent threat to their personal interests. Some of the felt causes were: anti-government attitude which had been learned over a long period of time; the perception of a threat to water supply or property, the influence of contact with the opinions of other people, and actual study of the matter.

Although meetings were attended by a number who sought information, particularly among the farm respondents, it was concluded from the small degree of accurate knowledge portrayed about the project that meetings were not very effective. The use of meetings other than hearings seemed to be used as a tool for influencing opinion, but better planned educational meetings may be useful in developing greater understanding. It might be added, as noted earlier, that meetings held on the basis of invitation would function as a constraint on wide diffusion of knowledge. Non-farm people relied most on mass media for information, indicating that they seldom became involved beyond the awareness stage. Because of this, it is important to have accurate and adequate information in the mass media.

Since this project has been sensitive to the pressures of public opinion, the interest of the large non-farm public would be strengthened if both the direct and indirect benefits of this project were emphasized.

Constraints to the project were largely seen as social in nature involving mainly such elements as political, governmental, informal, influential or attitudinal aspects. This perspective shows the importance of the behavioral aspects of the problem in economic and engineering development.

Another factor which the study revealed was that of the characteristic differences between higher and lower location on the stream. The threatening aspects seem to be stronger upstream generating anti-downstream attitudes. These apparently are accentuated by identifiable state lines which give a focus to the attitude. However, state lines were in reality not the most fundamental boundaries of difference since differences were more clearly shown between middle and lower basin areas. This attitude, although difficult to pin down concretely, colors the responses of numerous

people and is expressed vehemently by some. At a minimum, these feelings deter a clear view of the problem. Also, attitude provides a symbol which can be used by spokesmen who wish to stir opposing sentiments.

Real reasons for concern in planning often exist. In many cases such as this one, larger population and industrial centers are located on the lower reaches of a stream. Where this occurs the pressures are strong to serve the needs of the large centers at the expense of other areas. In doing so, however, upstream localities feel that this limits their future opportunities. There may be recognized advantages downstream, but the problems of large population growth in the near future and the need for distribution of this population gives the argument for providing for future development upstream more validity. The problem of managing the distribution of people most effectively and with maximum flexibility remains an important problem for human ecologists and planners to solve. It may or may not be best to leave such a decision which will affect a whole region to a local community. These are difficult questions which face resource and community planners and the public more and more.

Majorities of all types of respondents favored complete planning and development of the Bear River. When shown by residence the metropolitan-urban people were most favorable and farmers least. It is evident that, although favoring development, people in each area did not have the same goals for development. These differences in goals need careful study in order to find both important areas of need and areas of compromise. In addition, and perhaps even more important is the need to clarify further the alternatives available and what they mean to each. Finally, it is necessary to clarify to all parties concerned, including the public, what rights are involved for each area that will affect the ultimate decisions and what each area contributes in order for fair and equitable decisions to be made. These decisions are often irreversible for generations and affect future possibilities for a long period.

Little seems to be known and understood by the public about the compromises needed to get a decision made. Facts are also needed on the function of the linkage between organized systems representing the areas concerned to work out the necessary compromises. At least three types of organizations are needed. These include: (1) study groups consisting of specialists who can show the legal and technical facts, (2) authorized officials to carry out negotiations, and (3) groups of local people organized into committees or councils to keep the local areas informed, to provide feedback regarding the needs of the people related to the proposal, and to help legitimize compromises that are worked out to the people in the local areas. These local groups must include a wide cross section of interested people in order that they will not be dominated by any one interest group.

Boundary expansion

One phenomena which appears in this study which may be of value to explore relates to the fringe or border area to a proposed development. Technically, Bear Lake County, the highest upriver county studied, was not necessarily concerned directly with the water resource development proposal. The proposal explicitly stated that the water resources and rights of that area, including the storage in Bear Lake, would not be affected in any way except as adjustments would be required with the power company's rights to lake storage water.

Bear Lake County, although above the proposed area to be affected, was included in the study to measure its interest and interrelationship to the project. As may be observed throughout the report, there was high concern and dissatisfaction with the proposal in that county. Generally less understanding and knowledge of the proposal was also evident there and a high degree of need for water was expressed in this county. Likewise, the upper part of Caribou County was not to be included, although the major part of the storage lake of the main proposed dam would lie in lower Caribou County and by exchange virtually all of the supplemental needs of the Gentile Valley area of the county would be permanently relieved. Much feeling and anxiety developed in the upper Caribou County area to the point that a group of private investors filed a claim on a part of the water to be used in the proposed project which would bring the impact of development further upstream.

The tendency for spreading the effects further upstream may be a phenomenon requiring specific attention. Subsequent supplementary proposals of the Bear River Project published since the survey have included this upstream aspect and would affect Bear Lake County. This action has occurred in conjunction with the existence in the area of important political influence and power on the decision process. Future planning may be more efficient if logical border interests and needs are noted early in the process.

Problems for Further Research

One very predictable aspect of research is that it points to gaps in knowledge. In other words, research inevitably generates further research. The present study on social and psychological aspects of reclamation development is no different inasmuch as problems relating to perception, intangible social values, social change, social conflict, decision making, and social systems and their functions have been conceived for future study.

Answers to many of the exploratory open-end questions in this study have raised numerous other queries regarding the affect of perception on behavior associated with water resources and its management. More research is needed on this important problem.

Intangible social values, goals, attitudes, and sentiments enter into all stages of the decision in the development process. What are the most important of these "intangibles" and what effect do they have upon reclamation decisions? How can they be measured and evaluated as to their importance?

In examining the data on social change, questions of acceptance or rejection of change arose. Suggested to the writers were three broad types of change which are believed to affect people differently. One type includes change which simply adds to the social or physical environment without causing any disruption to an existing element. A second type involves change which occurs as a replacement to an existing element, that is, the new change destroys or disrupts an existing part of the social or physical environment as it replaces it. The third type of change places it in competition with an existing aspect of the social or physical environment. The question for study is, what is the meaning for public acceptance or rejection of water resources programs of each type of change and how can planning be done that will avoid the most disruptions of environmental and social elements?

In a decision making group, what impact does cleavage between two opposing subgroups within that body have upon decisions that are made? More specifically, how does a controversial decision which barely passes with a small majority affect later decisions? Will it create more conflict or will it increase the probability of cooperation, and under what conditions?

Further study should be focused upon types of opposition to reclamation development. How and why is change opposed, and what are the positive and negative consequences or functions served by such opposition?

Research should also be done to discover the ideal and actual role of government agencies in the river development decision process, as well as to examine the political process in this regard.

The role of evaluation of resource development is an important problem in light of changing society. Priorities of use and development may be changing to meet new social problems. Further analysis of these values would be useful.

This study of the Bear River Basin has provided a view of the complexity of human behavior in achieving the goal of water resource development. However, it has also identified many of the parameters of the problem which gives it a more concrete perspective. Solutions to some functional problems can be seen from this work although many others will require more study and adaptation.

With the attempts to develop more systematic categories as well as more depth in several areas of the work there is some promise that many of the difficult problems can be understood.

BIBLIOGRAPHY

- Allen, Francis R. *Technology and Social Change*. New York: Appleton-Century-Crofts, Inc., 1957.
- Allport, Gordon W. "Prejudice: A Problem in Psychological and Social Causation." *Journal of Social Issues*, 1950.
- Andrews, Wade H. "Sociological and Social Psychological Factors Related to Metropolitan Water Resource Development." Special Paper No. 2 presented to the Institute for Social Science Research on Natural Resources, Utah State University, Logan, Utah, November 1968.
- Andrews, Wade H. "Toward the Sociological Analysis of Natural Resources." Special Paper No. 1 presented to the Institute for Social Science Research on Natural Resources, Utah State University, Logan, Utah, September 1966.
- Andrews, Wade H. "Trade, Leisure and Institutional Center Behavior in a Tributary Area of the Great Basin." *Proceedings of the Utah Academy of Sciences, Arts, and Letters*, Vol. 45, Part 2, 1968.
- Andrews, Wade H., and J. Ross Eshleman. *The New Community*. Research Bulletin 929, Ohio Agriculture Experiment Station, 1963.
- Arrington, Leonard J. *Great Basin Kingdom*. Cambridge: Harvard University Press, 1958.
- Barnett, Homer G. *Innovation: The Basis of Cultural Change*. New York: McGraw Hill, 1953.
- Bennett, John W., ed. "Social Research in North America Moisture-Deficient Regions." The Committee on Desert and Arid Zones Research, Southwestern and Rocky Mountain Division, A.A.A.S. Contribution No. 9. New Mexico State University, 1966.
- Berelson, Bernard, and Gary A. Steiner. *Human Behavior: An Inventory of Scientific Findings*. New York: Harcourt, Brace and World, 1964.
- Bohlen, Joe M. "The Adoption and Diffusion of Ideas in Agriculture." *Our Changing Rural Society*. Edited by James H. Copp. Ames, Iowa: Iowa State University Press, 1964.
- Bultena, Gordon L. "Recreation, Research and Forest Policy." Paper presented at Rural Sociology Society Meeting, San Francisco, California, August 28, 1967.
- Burch, William R. "The Play World of Camping: Research into the Social Meaning of Outdoor Recreation." *The American Journal of Sociology*, 72(5):604-612.
- Bylund, H. Bruce. "The Human Factor and Changes in Water Usage Patterns." *Water Resources Research*, 2(3):365-369, 1966.
- Copp, James H., ed. *Our Changing Rural Society*. Ames, Iowa: Iowa State University Press, 1964.
- Chapin, F. S. *Contemporary American Institutions*. New York: Harper & Brothers Publishers, 1935.
- Christiansen, John R., and William S. Folkman. "Factors Associated with Attitudes of Responsibility Toward Fire Prevention in National Forests." Paper presented at Rural Sociology Society Meeting, San Francisco, California, August 27, 1967.

- Cochran, William G. *Sampling Techniques*. 2nd ed. New York: John Wiley and Sons, 1963.
- Collazo, Jenaro Collazo. "Human Factors Involved in the Development of a Watershed Project in Yabucoa, Puerto Rico." Paper presented at Workshop for Sociological Aspects of Water Resources Research, Utah State University, Logan, Utah, 1968.
- Criddle, Wayne D., and Dallin Jensen, compilers. *Water Laws of Utah and Interstate Compacts and Treaties*. 2nd ed. Salt Lake City, Utah: Office of State Engineer, 1964.
- Dasgupta, Satadal. *Attitudes of Local Residents Toward Watershed Development*. Preliminary Report 18, Social Science Research Center, Mississippi State University, May 1967.
- Davis, Kingsley. *Human Society*. New York: The Macmillan Company, 1949.
- Dictionary of the Social Sciences, A*. New York: Free Press, 1964.
- Dynes, Russell R. "Community Reaction to Water Resources Problems in Relation to Planning." Paper presented at Workshop for Sociological Aspects of Water Resources Research, Utah State University, Logan, Utah, 1968.
- Fairchild, Henry Pratt, ed. *Dictionary of Sociology*. Patterson, New Jersey: Littlefield, Adams & Co., Inc., 1962.
- Firey, Walter. *Man, Mind and Land: A Theory of Resource Use*. Glencoe, Illinois: The Free Press, 1960.
- Geertsen, Dennis C. "The Effects of the Psycho-Social Need for Security on Irrigation Farmers' Behavior and Cognition Related to Water Resources." Unpublished M.S. thesis, Utah State University, 1969.
- Geertsen, Dennis C., and Wade H. Andrews. "Social Psychological Elements of Motivation in Water Resources Development." Paper presented at the Rocky Mountain Social Science Association meetings at Colorado Springs, Colorado, May 1-2, 1970.
- Gillings, James L. "Attitudes Toward Water Resource Development, Use and Control and the Rural Urban Differential in the Bear River Basin." Unpublished Ph.D. dissertation, Utah State University, 1969.
- Glock, Charles Y., and Rodney Stark. *Religion and Society in Tension*. Chicago: Rand McNally & Co., 1965.
- Hagen, Everett E. *On the Theory of Social Change*. Homewood, Illinois: The Dorsey Press, Inc., 1962.
- Hamilton, Walton H. *Encyclopedia of the Social Sciences*. Vol. 8, New York: Macmillan, 1933.
- Hendee, John C., Thomas H. Stienburn and William R. Catton, Jr. "Wildernism—The Development, Dimensions and Use of an Attitude Scale." Paper presented at Rural Sociology Society Meeting, San Francisco, California, August 26, 1967.
- Hertzler, Joyce O. *Social Institutions*. New York: McGraw Hill Book Co., Alfred A. Knopf, Inc., 1965.
- Himes, Joseph S. *The Study of Sociology*. Glenview, Illinois: Scott, Foresman and Company, 1968.
- Hines, Larry E. "The Relationship of Traditional Values to Outdoor Recreational Behavior." Unpublished M.S. thesis, Ohio State University, Columbus, Ohio, 1963.
- Hutchins, Wells A. "A Comparison of Riparian and Appropriative Rights." Paper presented at the Southwestern Social Science Association meetings, Dallas, Texas, April 1955.

- Ibsen, Charles A., and John A. Ballweg. *Public Perception of Water Resource Problems*. Blacksburg, Virginia: Water Resources Research Center, September 1969.
- Idaho Department of Reclamation. "Hydrologic Reconnaissance of the Bear River Basin in Southeastern Idaho." Water Information Bulletin No. 13, October 1969.
- Idaho Statesman, The*. Letters to the Editor under the title, "Bear Lake, Caribou County Commissioners Seek Action to Halt Export of Idaho Water to Utah." Boise, Idaho, Jan. or Feb. 1966.
- Idaho Water Resource Board. Official minutes, Soda Springs, November 28, 1966.
- Ingman, Stanley R. "Private Outdoor Recreation Development: Factors Associated with Adoption." Unpublished M.S. thesis. Ohio State University, Columbus, Ohio. 1963.
- Institute for Social Science Research on Natural Resources. *Proceedings of the Workshop for Sociological Aspects of Water Resources Research*. Utah State University, Logan, Utah, 1968.
- Jensen, Max C., and Mark R. Kulp. "Farm Water Measurement." Extension Bulletin No. 170 of the Extension Division of the College of Agriculture, University of Idaho, 1948.
- Jones, Arthur R., M. Lee Taylor and Alvin L. Bertrand. *Some Human Factors in Wood Burning*. Bulletin 601, Louisiana Agricultural Experiment Station, Louisiana State University and Agricultural Mechanical College, Baton Rouge, 1965.
- Kackley, Evan M. "Proposed Bear River Project-Utah-Idaho Oneida Division." (Mimeograph report, privately distributed.) November 20, 1962.
- Kubat, Daniel. "Water Resources Research in Florida." Paper presented at Workshop for Sociological Aspects of Water Resources Research, Utah State University, Logan, Utah, 1968.
- LaPiere, Richard T. *Social Change*. New York: McGraw Hill Book Company, Inc. 1965.
- Larson, Olaf F., and Everett M. Rogers. "Rural Society in Transition: The American Setting." *Our Changing Rural Society*. Edited by James H. Copp. Ames, Iowa: Iowa State University Press, 1964.
- Loomis, Charles P. *Social Systems*. New Jersey: D. Van Nostrand, 1960.
- Lowry, Sheldon G., and Nancy K. Hammond, compilers. *Supplement to Rural Sociology 30*. Cumulative Index, Vols. 21-30, 1956-65.
- O'Dea, Thomas. *The Mormons*. Chicago: The University of Chicago, 1957.
- Ogburn, William Fielding. *Social Change*. New York: Delta Publishing Company, 1966.
- Ostrum, Vincent. "The Social Scientist and the Control and Development of Natural Resources." *Land Economics*, Vol. 29, May 1953.
- Parsons, Talcott. *The Social System*. Glencoe, Illinois: The Free Press, 1951.
- Panunzio, Constantine. *Major Social Institutions*. New York: The Macmillan Company, 1939.
- Preston Citizen. "Changes in Bear River Project." Editorial about February 2, 1967.
- Ricks, Joel E., ed. *The History of a Valley*. Cache Valley Centennial Commission, 1956.

- Rogers, Everett M. *Bibliography of Research on the Diffusion of Innovations*. Report No. 1, Department of Communication Research on the Diffusion of Innovations, Michigan State University, July 1964.
- Rokeach, Milton. *Beliefs, Attitudes and Values*. San Francisco: Jossey-Bass, Inc., 1968.
- Selznick, Phillip. *TVA and the Grass Roots: A Study in the Sociology of Formal Organization*. Berkeley, California: University of California Press, 1949.
- Singh, R. N., and Kenneth P. Wilkinson. *Sociological Studies of Selected Water Resource Problems*. Preliminary report, Social Science Research Center, Mississippi State University, scheduled for publication July 1968.
- Slocum, Walter, and LaMar T. Empey. *The Role of the Farmer in Upland Game Production and Hunting in Whitman County*. Bulletin 552, Agriculture Experiment Station, Institute of Agriculture Sciences, State College of Washington, 1954.
- Sorokin, Pitirim. *Society, Culture, and Personality*. New York: Harper Brothers, 1947.
- South, Donald R., Thomas Hansbrough and Alvin L. Bertrand. *Factors Related to the Adoption of Woodland Management Practices*. Bulletin 603, U.S. Department of Agriculture, 1965.
- Spaulding, Irving A. *Household Water Use and Social Status*. Contribution 1237, University of Rhode Island Agriculture Experiment Station, 1967.
- Stock, Eldon M. *Measurement of Irrigation Water*. Bulletin No. 5, Utah State Engineering Experiment Station and Utah Cooperative Extension Service, Utah State University, Logan, Utah, June 1955.
- Stouffer, Samuel. *Communism, Conformity, and Civil Liberties*. New York: Doubleday & Co., 1955.
- Taves, Marvin, William Hathaway and Gordon Bultena. *Canoe Country Vacationers*. Misc. Report No. 39, University of Michigan Agriculture Experiment Station, 1960.
- U.S. Department of Commerce. Bureau of Census. *United States Census of Population: 1960*.
- U.S. Department of the Interior. Bureau of Reclamation. "Alternate Plans for Bear River Project Idaho and Utah." Interim Information Summary, Region 4, Salt Lake City, Utah, November 1966.
- U.S. Department of the Interior. Bureau of Reclamation. *Feasibility Report, Part I, Oneida Division, Idaho and Utah, Region 4*. Salt Lake City, Utah, July 1962.
- Vidich, Arthur J., and Joseph Bensman. *Small Town in Mass Society*. Princeton, New Jersey: Princeton University Press, 1958.
- Wilkinson, Kenneth P. *Local Action and Acceptance of Watershed Development*. Preliminary Report 12, Social Science Research Center, Mississippi State University, July 1966.
- Wilkinson, Kenneth P., and Lucy W. Cole. *Sociological Factors in Watershed Development*. Preliminary Report 20, Social Science Research Center, Mississippi State University, July 1967.
- Williams, Robin M., Jr. "American Society in Transition: Trends and Emerging Developments in Social and Cultural Systems." *Our Changing Rural Society*. Edited by James H. Copp. Ames, Iowa: Iowa State University Press, 1964

APPENDIXES



Irrigation canals and industrial development on the Lower Bear River.

APPENDIX 1

PROJECT STATISTICAL SUMMARY

Costs

Project costs (April 1962 prices)

| | |
|---|------------------------|
| Oneida Narrows Dam and Reservoir | \$26,440,000 |
| Honeyville Dam and Reservoir | 5,900,000 |
| Glendale Dam and Reservoir (enlargement) | 3,840,000 ¹ |
| Willard Pumping Plant No. 2 addition | 90,000 |
| Oneida Canal | 32,240,000 |
| Portage Canal | 1,340,000 |
| Honeyville Canal | 1,470,000 |
| East Cache Canal | 1,340,000 |
| Willard Canal (enlargement) | 250,000 |
| Laterals | 7,670,000 |
| Drains | 3,500,000 |
| Substation—Willard Pumping Plant No. 2 enlargement | 40,000 |
| Operating and housing facilities | 531,000 ² |
| Recreational facilities | 1,160,000 |
| Total project cost (Reclamation) | 85,811,000 |
| Transitional development | 55,000 |
| Coulam Waterfowl Management unit | 350,000 ³ |
| Total project cost (Federal) | 86,216,000 |

¹Includes cost of Deer Cliff Diversion Dam, Cub-Worm Canal enlargement, and associated facilities.

²Reduced to allow for depreciation of service facilities and salvage.

³Land acquisition costs only; development costs are to be borne by the State of Idaho.

Operation and maintenance costs

| | |
|------------------------------|-----------|
| Reclamation costs | \$228,090 |
| Recreational costs | 55,591 |
| Total | 283,681 |

Water Supply (avg. ac.-ft. annually)

Irrigation

| | |
|----------------------------------|---------|
| Diversion requirements | 364,300 |
| Water within requirements | |
| Without project | 146,800 |
| Project increase | 202,900 |
| Total with project | 349,700 |

Municipal and industrial use

Estimated requirement and project supply

| | |
|------------------------------------|--------|
| Ogden, Utah and vicinity | 22,000 |
| Lewiston, Utah | 400 |
| Smithfield, Utah | 600 |
| Total | 23,000 |

Fish and wildlife

Increased water supply to:

| | |
|--|--------|
| Coulam Waterfowl Management unit | 11,000 |
| Newton Reservoir (existing) | 2,000 |
| Utah State Public Shooting Grounds | 7,000 |
| Bear River Migratory Bird Refuge | 68,000 |
| Total increase | 88,000 |

Total project supply 313,900

Depletion of Bear River above Bear River

| | |
|---------------------------------|---------|
| Migratory Bird Refuge | 175,200 |
|---------------------------------|---------|

Irrigable Area (Acres)

| | Class 1 | Class 2 | Class 3 | Class 4 | Total |
|--|---------|---------|---------|---------------------|-------------|
| Full service land | | | | | |
| Idaho | 2,487 | 5,834 | 4,635 | | 12,956 |
| Utah | 10,747 | 16,266 | 8,305 | 1,492 | 36,810 |
| Subtotal | 13,234 | 22,100 | 12,940 | 1,492 ¹ | 49,766 |
| Supplemental service land | | | | | |
| Idaho | 7,743 | 9,825 | 2,382 | 27,993 | 47,943 |
| Utah | 1,449 | 3,935 | 5,915 | | 11,299 |
| Subtotal | 9,192 | 13,760 | 8,297 | 27,993 ² | 59,242 |
| Project total | 22,426 | 35,860 | 21,237 | 29,485 | 109,008 |
| Elevation of project lands (feet m.s.l.) | | | | | 4,300-5,600 |
| Frost-free period (avg. days annually) | | | | | 112-148 |

¹Fruit land.

²Irrigated by sprinklers with class 1 or 2 land productivity.

Agricultural Economy

Principal agricultural production Alfalfa, small grains,
corn, sugar beets, canning peas,
pasture, and dairy cattle

Development periods (years)

| | |
|--------------------------------|----|
| Grace area | 5 |
| West Cache area | |
| Twin Lakes subarea | 3 |
| Weston Creek subarea | 5 |
| Oneida subarea | 10 |
| Malad River area | 10 |
| East Cache area | 3 |

Summary of average annual project increase in irrigation payment capacities and benefits ¹

| | Project Total |
|---|------------------|
| Gross farm income | \$7,666,246 |
| Farm expense | 4,339,547 |
| Net farm income | 3,326,699 |
| Family living and equity allowance | 2,603,853 |
| Payment capacity | 722,846 |
| Recommended water charge | |
| Total | 610,700 |
| Average per acre-foot | 3.00 |
| Project irrigation operation and maintenance cost | 190,200 |
| Amortization capacity | |
| Total | 420,500 |
| Average per acre-foot | 2.07 |

¹Based on a price index level of 250 for prices received and 265 for prices paid (1910-14=100).

Benefit-Cost Analysis (Unit—\$1,000)

(100-year period of analysis at 2½ percent interest)

| | Irri- gation | Munici- pal and indus- trial use | Fish and wild- life | Flood con- trol | Recre- ation | Total |
|------------------------------------|-----------------|---|------------------------------|-----------------------|-----------------|---------|
| Average annual benefits | | | | | | |
| Direct | 3,958.0 | 456.3 | 319.0 | 72.0 | 578.0 | 5,383.3 |
| Indirect | 1,936.0 | | | | | 1,936.0 |
| Public | 802.0 | | | | | 802.0 |
| Total | 6,696.0 | 456.3 | 319.0 | 72.0 | 578.0 | 8,121.3 |
| Average annual equivalent costs | | | | | | 2,805.4 |
| Benefit-cost ratio | | | | | | 2.89:1 |

Cost Allocations and Repayment (Unit—\$1,000)

| | Irri- gation | Muni- cipal and indus- trial use | Fish and wild- life | Flood con- trol | Recre- ation | Total |
|---|-----------------|---|------------------------------|-----------------------|-----------------|----------|
| Allocations | | | | | | |
| Project costs | 62,252.5 | 5,678.2 | 9,754.1 ¹ | 1,769.1 | 6,762.1 | 86,216.0 |
| Annual operation and maintenance costs | 190.2 | 20.5 | 11.2 | 1.5 | 60.3 | 283.7 |
| Repayment | | | | | | |
| Project costs | | | | | | |
| Irrigators | 25,230.0 | | | | | 25,230.0 |
| Municipal water users | 13,297.7 | 5,678.2 ² | | | | 18,975.9 |
| Advalorem taxes | 23,724.8 | | | | | 23,724.8 |
| Nonreimburs- able | | | 9,754.1 | 1,769.1 | 6,762.1 | 18,285.3 |
| Total | 62,252.5 | 5,678.2 | 9,754.1 | 1,769.1 | 6,762.1 | 86,216.0 |
| Annual operation and maintenance costs | | | | | | |
| Irrigators | 190.2 | 20.5 | | | | 210.7 |
| Operating agencies | | | | | 55.6 | 55.6 |
| Nonreimburs- able ³ | | | 11.2 | 1.5 | 4.7 | 17.4 |
| Total | 190.2 | 20.5 | 11.2 | 1.5 | 60.3 | 283.7 |

¹Includes \$185,000 allocated to mitigate project-caused losses to fish and wildlife values.

²In addition municipal water users would pay \$557,300 in interest during construction based on a rate of 2.742 percent.

³Would be paid by conservancy district which in turn would receive credit for an equal amount toward payment of its construction obligation.

Project Features

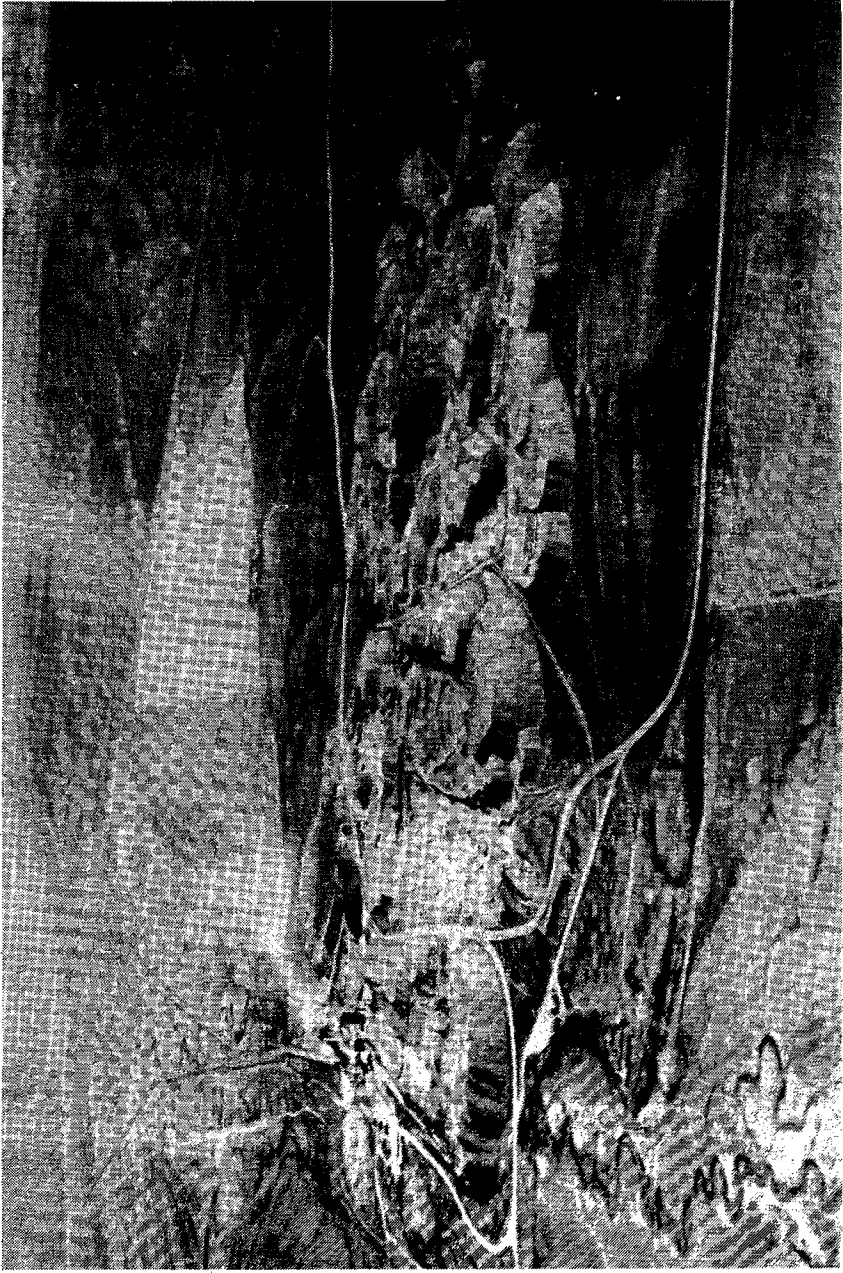
| | Oneida Narrows | Honeyville | Glendale |
|-------------------------------|-----------------------|-----------------------------------|-----------------------|
| Dams | | | |
| Location | Bear River | Bear River | Worm Creek |
| Type | Earth and rockfill | Earth | Earth and rockfill |
| Height (ft.) | 311 | 76 | 130 |
| Crest length (ft.) | 1,250 | 1,660 | 1,480 |
| Reservoirs (acre-feet) | | | |
| Active capacity | 225,000 | 104,800 | 22,000 |
| Inactive capacity | 150,000 | 15,200 | 1,000 |
| Total capacity | 375,000 | 120,000 | 23,000 |
| Surcharge storage | 80,000 | | 2,050 |
| | | Initial Capacity (sec. ft.) | Length (miles) |
| Canals and conduits | | | |
| Oneida Canal | | 1,380 | 104.8 |
| Portage Canal | | 230 | 14.9 |
| Honeyville Canal | | 250 | 19.4 |
| Cub-Worm Canal enlargement | | 382 | 7.0 |
| East Cache Canal | | 432 | 27.0 |

Hydrology

| | | |
|---|--|-----------|
| Bear River at Oneida Narrows Dam site | | |
| Drainage area (sq. miles) | | 3,760 |
| Average annual flow (ac.-ft.) 1911-61 | | 516,000 |
| Maximum flow (ac.-ft.) 1951 | | 1,102,000 |
| Minimum flow (ac.-ft.) 1935 | | 298,000 |
| Bear River at Honeyville Dam site | | |
| Drainage area (sq. mi.) | | 6,000 |
| Average annual flow (ac.-ft.) 1889-61 | | 823,000 |
| Maximum flow (ac.-ft.) 1951 | | 1,682,000 |
| Minimum flow (ac.-ft.) 1934 | | 320,000 |
| Worm Creek and Cub River above Glendale Dam Site | | |
| Drainage area (sq. miles) | | 35 |
| Average annual flow (ac.-ft.) | | 73,000 |
| Maximum flow (ac.-ft.) | | 102,000 |
| Minimum flow (ac.-ft.) | | 42,000 |

Remarks

Water conservancy districts would be formed in Idaho and in Utah and jointly serve as the administrative and contracting agencies for the project.



Phosphate mining of south east Idaho and northern Utah.

APPENDIX 2

ALTERNATE PROPOSALS

Two months after the social survey was completed, Region 4 of the Bureau of Reclamation published a booklet entitled "Alternate Plans for Bear River Project Idaho and Utah." Called an "interim information summary," these two plans, which were first presented at a meeting of the Idaho Water Resource Board on November 28, 1966,¹ included changes from the 1962 plan which were made to accommodate recommendations of reviewers of that report.² These recommendations were intended to provide solutions for the issues of inundation of agricultural lands in the Oneida Reservoir area, lack of reservation of water for future industrial development in Caribou and Bear Lake counties, the suggestion that financing be obtained in part by broad based advalorem tax, and the division of water between states.³

To satisfy these recommendations, alternate Plan II would greatly diminish the amount of land that would be inundated because of a proposed smaller Oneida Narrows Dam with a total storage capacity of 140,000 acre-feet⁴ compared to the original proposed size of 375,000 acre-feet.⁵ Alternate Plan I, however, would have an even greater storage capacity than the original at 435,000 acre-feet.⁶

Both alternate plans would provide 20,000 acre-feet of water annually to meet future municipal and industrial requirements in the Soda Springs-Montpelier area of Idaho above the Oneida Narrows Reservoir,⁷ whereas the 1962 proposal did not make any provision for this purpose.⁸

Both alternate plans removed the requirement of partial project repayment by advalorem taxes⁹ which was considered by many in Idaho to have been a major constraint to development. This complaint was also heard by some in Utah. Finally, both alternate plans allowed for an equal division of water between states. Alternate Plan I allowed 119,000 acre-feet annual diversion for net new development to each state, while alternate Plan II allowed 116,500 acre-feet to each state.¹⁰ The original plan of 1962 proposed an annual stream depletion attributable to project use in Idaho of about 50,800 acre-feet compared to a considerably higher 124,400 acre-feet in Utah.¹¹

FOOTNOTES TO APPENDIX 2

¹ Idaho Water Resource Board. Official minutes, Soda Springs, November 28, 1966, p. 3.

² U.S. Department of the Interior. Bureau of Reclamation, "Alternate Plans for Bear River Project Idaho and Utah" (Interim Information Summary), Region 4, Salt Lake City, Utah, November 1966, p. 1.

³ Preston Citizen, "Changes in Bear River Project," editorial about February 2, 1967.

⁴ U.S. Department of the Interior. Bureau of Reclamation. *Alternate Plans*, p. 17.

⁵ U.S. Department of the Interior. Bureau of Reclamation. *Feasibility Report*, p. 1.

⁶ U.S. Department of the Interior. Bureau of Reclamation. *Alternate Plans*, p. 6.

⁷ *Ibid.*, p. 10, 18, 25.

⁸ U.S. Department of the Interior. Bureau of Reclamation, *Feasibility Report*, p. 55.

⁹ U.S. Department of the Interior. Bureau of Reclamation, *Alternative Plans*, p. 26.

¹⁰ *Ibid.*, p. 25.

¹¹ U.S. Department of the Interior. Bureau of Reclamation, *Feasibility Report*, p. 55.

APPENDIX 3

Publications and papers written as a part of or related to Project CWRR-11

I. Publications

- Wade H. Andrews, "Trade, Leisure and Institutional Center Behavior in a Tributary Area of the Great Basin." In Proceedings of the Utah Academy of Science, Arts and Letters, Vol. 45, part 2, 1968.
- Wade H. Andrews, "A Status Report of the Bear River Basin Water Resources Study." In the proceedings of the Workshop for the Sociological Aspects of Water Resources Research held at Utah State University April 18 and 19, 1968.
- Wade H. Andrews, "Social Science Issues and Alternatives Involved in Planning Water Resources with People in the West." Presented to the Third Western Interstate Water Conference, Fort Collins, Colo., August 25, 1969. Proceedings in Press.
- Wade H. Andrews, "Toward the Sociological Analysis of Natural Resources and Society." Special Paper No. 1, September 1968.
- Wade H. Andrews, "Sociological and Social Psychological Factors Related to Metropolitan Water Resources Development." Published in *Water and Metropolitan Man*, Proceedings of the Second Conference on Urban Water Resources Research, Engineering Foundation, 1969.
- Wade H. Andrews, "Sociology and Water Resources Management," presented to the University of Kentucky Colloquim. Series on the Social Sciences and Planning and Management of Water Resources, December 1, 1969, In Press.

II. Papers

- Wade H. Andrews, "The Functions of Attitudes and their Ecological Antecedents as they Affect Water Resource Development." Presented to the Natural Resources Section of the Rural Sociological Society meeting, Boston, Mass., August 1968.
- Wade H. Andrews, "Social Factors Affecting Water Management." Prepared for the Urban Water Resources Management Conference of the American Society of Civil Engineers at Deerfield, Mass., July 1970.
- Wade H. Andrews, and James L. Gillings, "The Social Characteristics and Values Affecting Social Change in Agricultural Water Resources." Presented at the Natural Resources Section of the Rural Sociological Society meeting, San Francisco, Calif., August 1967.
- Dennis C. Geertsen and Wade H. Andrews, "Social-psychological Elements of Motivation in Water Resources Development." Delivered to the Rocky Mountain Social Science Association meeting, Colorado Springs, Colo., 1970.

III. Theses

- James L. Gillings, "Attitudes Toward Water Resource Development, Use and Control and the Rural Urban Differential in the Bear River Basin." Unpublished Ph.D. dissertation, Utah State University, 1969.
- Dennis C. Geertsen, "The Effects of the Psycho-Social Need for Security on Irrigation Farmers' Behavior and Cognition Related to Water Resources," an unpublished M.S. thesis, Utah State University, 1969, p. 70.