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**ORGANIZATIONAL ADAPTATION TO
CHANGES IN PUBLIC OBJECTIVES
FOR MANAGEMENT OF CACHE LA
POUDRE RIVER SYSTEM**

by

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PROJECT COMPLETION REPORT

for

ORGANIZATIONAL ADAPTATION TO CHANGES IN PUBLIC
OBJECTIVES FOR MANAGEMENT OF CACHE LA POUFRE RIVER SYSTEM

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Abstract

The primary objectives of this study have been the specification of the public objectives for the allocation of water resources in the Cache La Poudre River System and the means by which organizations on the river have adapted their policies, procedures, internal structures in response to the changes in the objectives of relevant publics. Realization of these objectives requires identification of the major organizations sharing water in the river system, the goals and policies pursued by these organizations, relevant publics in the system, patterns of interactions and linkages among the major organizations, between them and their publics, and between both of these and their physical, economic, and social environment.

Irrigation goals and organizations dominate the river system in terms of the water policymaking and management of resources. Leadership surveys demonstrate that four ditch companies monopolize the system through diversions of both river water and foreign water, voting control of the river users association, and interactions with a wide number of organizations which can affect the river. Organizational records indicate that objectives remained stable over time but coordination and specialization have internally adjusted to respond to external pressures of urbanization, changes in the national economy, and introduction of foreign water.

PROJECT TERMINATION REPORT

Organizational Adaptation to Changes in Public Objectives for Management of Cache La Poudre River System

Objectives

The primary objectives of this study have been the specification of the public objectives for the allocation and management of water resources in the Cache La Poudre River system and the analysis of the ways in which organizations within the system have adapted their policies, procedures, and internal structures in response to the changes in the objectives of relevant publics. The achievement of these objectives has required the identification of the major organizations that share in the allocation and management of water resources in the river system, the exploration of the primary goals and policies pursued by these organizations, the specification of the relevant publics in the system, and the analysis of the patterns of interactions and linkages between the major organizations, between these organizations and their publics, among these publics, and between the organizations and publics and the total physical, economic, and social environment within which they operate. The problem required specific analysis of:

- (1) The Determination of Public Objectives.
 - a. Methods used to ascertain "public" objectives.
 - b. Variations in the objectives of different groups.
 - c. The reconciliation of divergent objectives.
 - d. The values which underlie the objectives.

- (2) The Bases for Specialization.
 - a. Kinds and categories of specialization.
 - b. Effects of various methods of specialization on:
 - (i) Coordinating requirements.
 - (ii) Organizational outcomes.
- (3) The Coordinating Process.
 - a. Methods used.
 - b. Degree of concentration of responsibility for coordination.
 - c. Problems of coordination.
- (4) The Process of Organizational Change.
 - a. Identification of obstacles to change.
 - b. Determination of the range of acceptable alternatives.
 - c. The tactics of effectuating organizational change.
 - d. Evaluation of the effects of organizational change.

Research Strategy

The study focuses upon a single, fully appropriated river system in which mutual ditch and domestic water companies, individual rights holders, public districts and large federal projects all function. The entire water appropriation and delivery system extending from the Continental Divide to the mouth of the Poudre River where it joins the South Platte River, as well as emplacements diverting water from the Western Slope and the return flow rights extending to Fort Morgan are all conceptualized as a part of the Poudre River system. Historically extreme stress has been placed upon the system and its decision-making structures by the Great Depression, the introduction of foreign water into the system, and by the recent process of rapid urbanization of the

area. The analysis of this system was carried out through four separate but interrelated steps. These were:

- (1) An extensive review of the basic characteristics of the Cache La Poudre River system and the types of organizations comprising the system. The major foci were the body of relevant national and state law; the official and unofficial statements of actors in the system in both public and private agencies, public hearings, conferences; and materials drawn from press commentary, professional journals, and selected monographs in order to determine the persons and organizations active in the system, the structures and decision-making procedures of major organizations, generalized public goals, and historical adaptations in the system.
- (2) Intensive study of the activities of the irrigation and ditch companies who are the primary water users in the area. This analysis included careful review of the office records of companies, review of sources of income and expenditures, the patterns of specialization and coordination found in the agencies, and the employment practices of the organization. A systematic survey of attitudes and perceptions of the officers and employees of these agencies was carried out through the administration of a questionnaire designed to identify the goals of the actors and the organization, actual patterns of specialization and coordination, and the patterns of communication and authority relationships within and between agencies.
- (3) The identification and analysis of the leadership structures, the communication patterns, the authority relationships, and value perspectives of the primary actors in the Poudre River system. This step involved the application of a systematic questionnaire to irrigation and ditch company executives and managers, relevant state officials, selected federal agency officials, local government and water district officials, city government officials, and leading water lawyers. The data collected was designed to specify the persons performing leadership roles in the river system, the continuity and conflict in goal and value perspectives of persons acting different components of the system, and the specification of the patterns of linkages and interactions present among the many components of the water resource allocation and management system. Attention was given to both the patterns and substance of communications between leaders and between leaders and other persons within the system.
- (4) Intensive analysis of the Northern Colorado Water Conservancy District. This organization has had a major impact upon the system as a result of the introduction of large quantities of foreign water into the area. It has been the source of substantial change in the system and has become a focal

point around which the decisions involving the allocation and management of water in the area has come to revolve. The analysis of this agency includes the systematic review of the office records, financial statements, minutes of formal meetings, reports covering its activities, water delivery records, and policy statements and decisional choices. This analysis was designed to yield an understanding of the goals and values of the organization, the kinds of inputs that the organization makes to the total system, the sources and kinds of pressure placed upon the organization that influence its decision-making processes, and the patterns of interactions, authority relationships, and communications patterns of this agency with other components of the allocation and management system.

The findings and observations that are contained in this report are drawn from these research activities.

The Context for Water Decision-Making:
The Cache La Poudre System

The relationship of relevant publics and their objectives to the allocation and management of water resources is determined by the structural characteristics of the system. The first step in the research was to specify the major components of the system. Over time chief use of water resources in the Poudre has been agricultural development by means of irrigation. The organizations which fulfill the functions of irrigation must receive primary attention; consequently, the characteristics of irrigation companies singly and collectively become a major concern of the study. Given their centrality to the system, a second area of concern is the linkages of these ditch companies of other organizational components of the system. Thirdly, the impact of external factors such as national and regional water agencies must be considered.

Before entering into these major areas of concern, the river systems major organizational features should be described. In terms of

administrative development, the river system is complex and diversified. Approximately 20 major irrigation companies operate within the system servicing over 200,000 acres. The water has been fully appropriated throughout the twentieth century. In addition, there are numerous reservoir companies and lateral companies filling out the private sector of irrigation organizations. Local domestic agencies include middle sized cities, several towns and villages, and numerous rural water districts and associations. All but the rural water associations are public agencies. The domestic agencies have become major consumers of water in the last three decades. Given the extent of prior appropriation of Poudre River water by irrigation companies, development of supplemental sources of water was necessary to respond adequately to population pressures. This need has been met primarily by the Colorado-Big Thompson Project developed and managed by the Northern Colorado Water Conservancy District. In spite of its relevance to domestic water supply, the primary purpose of the conservancy district is to provide supplemental water for irrigation purposes. Currently an average of 260,000 acre-feet of water is diverted annually from the western slope of the Continental Divide to serve 700,000 acres of irrigated lands. These two organizational components, the Northern Colorado Water Conservancy District and the complex of ditch companies, are the major policymaking institutions in the Poudre River System.

A number of state officials play more limited roles in management of water resources in the Poudre River system. The most important of these is the river commissioner appointed by and under the nominal direction of the State Engineer. He has formal, legal responsibility for the diversions of water drawn from the Poudre River. Other state

agencies which operate on the periphery are the game and fish commission, the state forest, and the state recreation agencies.

The scope of the activities of federal government agencies is more restricted although the effects of their programs do strongly influence the operation of the system. Among the most important is the United States Bureau of Reclamation which constructed the Colorado-Big Thompson Project. Others playing a more peripheral role are the Forest Service, the National Park Service, and the Bureau of Land Management.

From this sketchy overview, it is apparent the central analytic focus of an investigation of organizational change on the Poudre system must be on the irrigation companies, their patterns of collective decision-making, and their linkages to other components of the system.

Irrigation companies and the River System*

Water is the major resource that is allocated by the decision-making processes of the Poudre River system. Other resources, both material and non-material, are distributed within the system, but who receives these resources is determined by methods and results of the water allocation system. Such phenomena as money, prestige, status, power, security, and property are dependent upon the control of Poudre River water.

As mentioned earlier, there are two major sources of water in the system--the Cache La Poudre River System and Northern Colorado Water Conservancy District. For the purpose of analyzing the management of Poudre River water, the major question becomes one of determining who

*This analysis relies heavily on Thorfinn. Tjersland, Organizational Adaptations of the Pebble River System, M.A. Thesis, Colorado State University, 1967.

controls the water obtained from the major sources. In Table 1, the pattern of diversions of river water and Big Thompson Project water is presented. The water agencies were classified according to the role they play in allocating the water. The dominance of irrigation in water usage is clearly evident. About 92% of the river water and 87% of the project water are controlled by ditch companies. Among them, four companies control two thirds of the diversions of river water. Three of these same companies control 86% of the supplemental water in the system.

Given the dominance of irrigation companies, an analysis of water decision-making must deal with the question of the resolution of conflict within the complex of irrigation organizations. Several modes of conflict resolution are presently operating. A major one is the widespread consensus on values and goals of the system. It has been established by means of surveys of river leaders and irrigation employees that there is basic agreement on the objectives of these organizations and the means of achieving them. Little support exists anywhere for change in the ongoing system.

A major factor which sustains this level of support has been the consistent prosperity and productivity occurring within an organizational context established by 1910. A tradition of success has structured identifications and practices which probably will have to face the pressures of a western megapolis by the year 2000.

The structure of the complex of irrigation organizations itself mitigates against conflict. The monopolistic control of the system's resources by four ditch companies makes meaningful internal challenge

almost impossible. Like any prosperous system, its widespread success engenders greater support rather than opposition.

These behavioral patterns are complemented by an explicit coordinative mechanism in the form of the Cache La Poudre River Users Association. This group contains the irrigation organizations in the river system. The functions of the organization are to coordinate the activities of its members, give greater voice to its members in regional water policymaking, and maximize their economic interests. Internal policymaking is based upon the amount of the member's shares of river water. It is apparent that the association is heavily influenced by the four major ditch companies. Within the system, the users association gains further importance by means of its close nexus to the coordination functions performed by the State of Colorado through the Commissioner of the Cache La Poudre River.

According to statute, county commissioners along the river appoint a commissioner who is responsible to the State Engineer. It is the river commissioner's legal responsibility to coordinate and control the allocation of water in his system. There is a great overlap of functions of the commissioner's office and the user's association. Conflicts are avoided through the patterns of interaction of the two bodies. The commissioner was selected by the association which asked the county commissioners to approve the appointment. The River Commissioner has also received a salary and an automobile from the association which was paid by means of stockholder assessments. The association has, in the past, persuaded the NCWCD to contribute a stipend to the commissioner because of the increase in his workload due to project water. In

addition, numerous ditch companies employ the commissioner as a technical consultant or company engineer.

Our analysis indicates that the primary goals of the ditch companies have been:

- (1) Heavy emphasis on maximization of "private" goals and personal benefits.
- (2) High priority given to company and agency autonomy (self-sufficiency ideology).
- (3) High priorities given to defense and preservation of established water rights (most notably in diversion rights).
- (4) High priority given to preservation of simple structures.
- (5) Low-cost orientation and low-tax and assessment goals.
- (6) Highly ascriptive and particularistic in setting goals.
- (7) High sense of responsibility to constituents (frequently referred to as company users or stockholders).
- (8) Close control of information with independence highly prized.
- (9) Highly resistant to exogeneous influences, demands, and pressures.

The patterns of organizational adaptations in the river system are:

- (1) Some degree of "cannibalism" when the large companies took advantage of small company financial distress during the Great Depression.
- (2) Specialized uses of the New Deal social security program to reduce labor costs by hiring headgatemens of retirement age who were restricted in the amount of gross income they could earn each year.
- (3) Greater emphasis upon preventive maintenance in the delivery systems (related to the introduction of foreign supplementary water).
- (4) Change to higher cash crops (related to the introduction of foreign supplementary water).
- (5) Increase in the complexity and diversity of exchange and transfer systems (related to the introduction of foreign supplementary water).

- (6) Merging of small irrigation companies into larger ones, thus producing greater concentrations and pools of rights (related to the Great Depression).
- (7) Re-organization of the Poudre River Water Users' Association, thus changing from shares represented by rights to actual diversions from the river (related to large company control of the river system).
- (8) Company selection of the river commissioner on an informal but effective basis by the Poudre River Water User's Association rather than by the state as specified by statute (related to large company control of the river system).
- (9) Construction of reservoirs to store winter flows for later application and for the storage of Project water as insurance against dry seasons (related to the introduction of foreign supplementary water).
- (10) Locating reservoirs below main canals, thus catching much shrinkage and return flow for later re-charging. This is used as a manipulative device for keeping water rates low while giving no credit for return flow and shrinkage captured by the reservoir system. In theory, this allows companies to charge double for water seepage and return flow (related to the Great Depression and the failure to obtain possessory rights to other interstate streams).
- (11) Development of feeders to divert water from foreign watersheds into the Poudre River (related to the failure to obtain possessory rights to other interstate streams).
- (12) Development of a water transfer system between companies to co-opt and co-ordinate senior with junior rights. This also has allowed greater flexibility in the water market system (related to the introduction of foreign supplementary water).
- (13) General frugality about technological innovations: (a) in equipment they are very hesitant to adopt new skills or tools; (b) in adoption of new equipment they are very hesitant to proceed until the equipment has been proved effective and inexpensive by others; (c) but in Project water they are extremely resourceful in exploiting the resource (related to the Great Depression and the introduction of foreign supplementary water).
- (14) Overly suspicious of competing companies so that good record-keeping and competitor files are not known to exist. Only surface cooperation seems to exist between companies which rent or transfer water from each other on an exchange basis. It is extremely rare for competing companies to borrow tools or other equipment from each other, thus duplication of machinery and other equipment is widespread contributing

heavily to the high costs of delivering water to stockholders (related to the Great Depression).

- (15) Introduction of project water has enabled particular companies to secure water for nothing except their signature and later sell the units for substantial profits. Proceeds from such sales have enabled some companies to improve and expand their ditch systems (related to the introduction of Project water).
- (16) Access to project water has enabled most companies to obtain more advantageous exchanges and transfers as well as employ the extra income to acquire the full amount of water due them under their rights (related to the introduction of project water).
- (17) Through early control of the Poudre River System companies were able to give high priority toward irrigation uses as opposed to domestic water uses. Thus, recent urbanization growth has been dependent upon the supply of project water and the evolution of a number of special public water districts and private water user associations to provide organization and management for the delivery of rural-domestic water in suburban and developing rural areas. This adaptation within the river system has produced a number of problems, many of which are laden with conflict potential (related to recent urbanization in the area and introduction of project water).
- (18) Demands stemming from urbanization have generated a policy initiated by urban leaders to buy up water for the future and to transfer the unused water for a profit. Greeley, Colorado, has taken over one ditch system within their city limits and has bought out several companies and acquired their rights and reservoirs. Generally, the competition among cities for rights and project units has driven the price of water upward at an increasing rate. Cities are buying resources, benefits, and advantages from companies at high costs (related to urbanization and the introduction of Project Water).
- (19) Despite urbanization processes and the accompanying intrusion of urban values on the rural areas, most agencies, including the urban, feel the need for greater communication between agencies or recognize the need for increased specialization and co-ordination. This phenomenon runs throughout the state. Until recently, for example, very few special rural-domestic water agencies were aware of what other agencies like them were doing. This tendency is even more pronounced among the irrigation companies of the Poudre Valley. Workers of one company rarely communicate with workers of other companies, except to exchange water or discuss wages (related to the Great Depression and urbanization).
- (20) However, a greater degree of co-ordination among irrigation companies has resulted recently. For example, three large

companies have intercom systems between their trucks. Some efforts are also made at Poudre River Water Users' meetings to co-ordinate companies' salary structures (related to the introduction of project water).

- (21) Companies tend to pay cash for their purchases regardless of the expense of the item unless such is a reservoir or beyond the resources of a couple of years stock assessments. This heavily restricts their internal processes in the acquisition of facilities to operate and manage their companies (related to the Great Depression).

Coordination of changes in the river system is achieved without great difficulty through these social mechanisms. A related question of great importance deals with implementation of policies in the decision-making system. How decisions are made depends upon the major actor's perceptions of each other's understanding as well as the patterns of communications within the decision-making system.

Water Knights and Water Barons

To determine adaptation and change within a hydrologic system that encompasses the social variables such as the legal, economic, political, sociological components, one is obliged to identify those events which constitute responses of persons and objects. A significantly large number of these events or responses will be expressions of those persons who compose the power structure, that is, persons who make and implement decisions or affect decisional and implementive outputs from the system. This says that decision-makers and administrators are actors in the total system who stimulate total system responses which lead to adaptations of and within the system itself. Their interactions with other components of the system are therefore crucial to an analysis of general system adaptations.

The pattern of power relations in a social system is a channel for the responses to social change. Such a channel is not unaffected by the substance of the transitions themselves. The major methodological task is to establish criteria for designating leaders and non-leaders. The

experience in research techniques gained from the studies of community decision-making was especially relevant to the analysis of the Poudre River leadership. By means of the reputational technique of leadership analysis, leaders in river system decision-making were identified. The social characteristics, behavioral patterns, and social perceptions are indices of how the power structure functions.

To specify the positive influentials on the river system, eighty-four persons were interviewed personally and requested to respond to an extensive questionnaire. Because the precise boundaries of the river system are extremely difficult to determine, and because water problems and issues have been shown to have low visibility in the public at large, we selected the "official syndrome" as a starting point for identifying knowledgeable. We then identified all public and private agencies, including mutual irrigation companies, which were in some way involved in the river system. These included any state, regional, or federal office directly involved. Lists of officers and employees were obtained for each agency. These lists were employed to select nominators of positive and negative influentials within the river system.

All chief executive officers of the state, federal, and regional offices were listed as nominators as were the chief executives of the four major irrigation companies. A randomized sample of 10% of other agency officials and employees who dealt directly or remotely with water matters was drawn and the names listed as nominators. Finally, a randomized sample of 10% of the minor company superintendents and chief executives was added to the list of nominators. The final list comprised 69 persons, of which 61 were interviewed.

During the interviewing process, names of persons who were nominated by any three of the 69 persons on the original list were added to the list of nominators and an attempt was made to interview them. Twenty-three such persons were listed and interviewed, making a total of eighty-four nominators.

The next operation involved the listing and quantification of all nominations by name of nominee. Twenty-five persons received more than four nominations in either the "off-river" or the "on-river" categories. The questionnaires of these nominees were reviewed and their nominations of each other are shown in the sociogram on Figure 1.

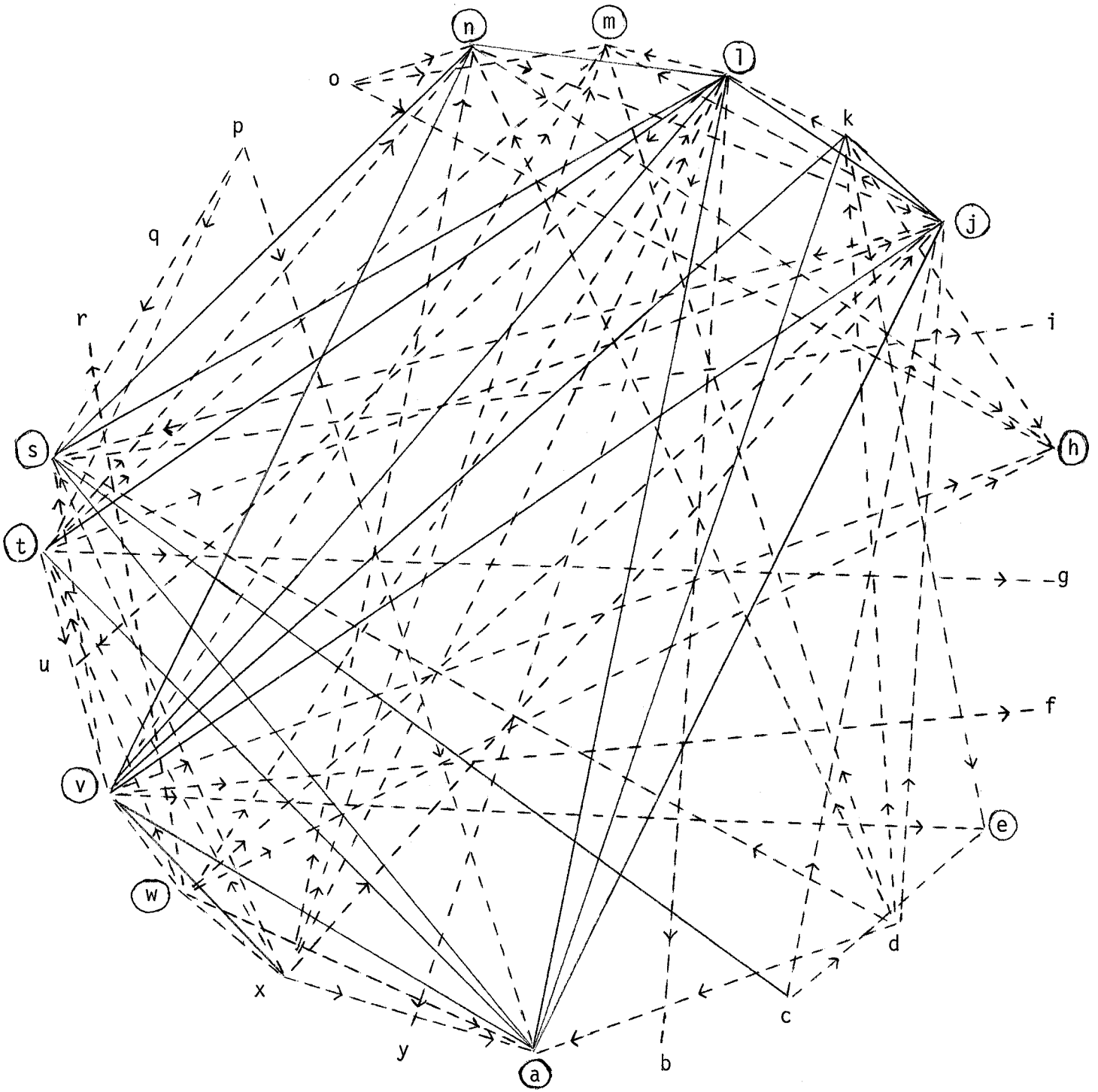
A second operation included the listing of all nominees who were in the "on-river" category. Eight persons on the river received 17 or more total positive and negative nominations from both "on-river" and "off-river" nominators. These eight persons were designated as members of the river power structure. The three persons who received eight or more nominations from "on-river" nominators were also designated as members of the river's power structure, bringing the total number of members so designated to 11.

The sociogram presented in Figure 1 includes all persons who received more than four total nominations as leaders of the eighty-four nominators and shows their nominations of each other. The solid lines indicate that the two persons involved nominated each other and the broken lines indicate single directional nominations.

The values and goals of the system are reflected in the process of leadership recruitment. Representation of elements of the society as well as the river system are reflected by the social characteristics of the leadership which are presented in Table 2. The occupations are

Figure 1

SOCIOGRAM OF NOMINATIONS OF TOP LEADERSHIP
IN THE POUDBRE RIVER SYSTEM



The Letters Circled Indicate Leaders

traditional ones in agricultural water systems. Agriculturalists dominate the leadership group with the highly relevant professions of engineering and law comprising the remainder. In terms of age groups, the distribution is more widespread. Seventy-two percent of the leaders are over 45 years of age and none are under 35. As could be expected of such an age group, they tend to be long term residents of the community. Only one has lived in the area less than 15 years and eight out of eleven have spent their lives in the river system. These leaders are also well educated. Forty-five percent are college graduates, an additional twenty-seven percent have attended college, another eighteen percent are high school graduates, and one is a high school dropout. These general characteristics gain significance when the roles played in the river system by the leaders are examined. Since some of the roles are dual roles, their number exceeds the number of individuals. Three of the leaders are officials of the water users association, two are state officials, and eight are ditch company executives. Among the latter are two attorneys and five ditch company presidents of which three are major ditch company presidents. Irrigation functions are the sole needs met by the leaders of the Poudre River system. Given the changing character of the system, the nature of the linkages of the leaders to the other parts of the system are crucial to understanding the ongoing operation of the system.

A major factor in system linkages is the image of various components of the system. Since the designated leaders have the ability to channel the responses or adaptations of the river system, their perceptions of how well water problems are understood by other groups is an indication of the credibility of these elements in water matters.

Proceeding from those accorded the least understanding to those accorded better understanding of water problems, (Tables 3 to 9) the public appears to have low credibility among all actors in the Poudre system. Leaders are loath to give the public high standing at all while over one-fourth of the non-leaders say the public has a fair or better comprehension of water problems. National officials do not receive as negative a rating as the public but they do not impress the actors as highly knowledgeable. Leaders are especially likely to profess ignorance of these officials understanding. Some non-leaders say they have a good understanding where leaders do not get that far.

Farm irrigators are the first to receive high ratings from leaders and they fail to be perceived as having no understanding of water problems. Non-leaders are less negative about the quality of irrigator's comprehension of these problems. An analytic difficulty is present in that we do not know what the respondents think of when they react to the concept of farm irrigators. How broadly the term is defined and the consensus among the respondents about their definitions inhibit extensive interpretation of the data.

Community leaders in the area received credit for understanding water problems very well by one-fifth of the leaders and one-tenth of the non-leaders. Half of both groups feel community leaders have a fair or better understanding of these problems. Non-leaders are more likely to be highly negative or ignorant about community leaders. This could be due to a higher level of interaction among river leaders and community counterparts (other studies in the Department of Political Science have shown that there is overlap between community leaders and water leaders; they are the same people).

County officials receive differing perceptions by the river actors. Leaders are both more definite and less positive while non-leaders are less negative and less sure of their status. County officials are accorded lower status than community leaders by river leaders while non-leaders go the other way.

State officials have an image of being relatively well informed by both sets of actors. Non-leaders are distributed more evenly across the dimension while leaders divide themselves in the first three cells of the spectrum.

The local water official has the highest status in terms of their understanding of water problems. River leaders differ from non-leaders in their willingness to rate the locals as understanding the water system very well. Non-leaders are less enthusiastic and appear to be less knowledgeable.

A first step in the analysis of the perception of actors in the system is the consideration of the role they perform in making of water policy as shown in Table 10. We find that the NCWCD personnel feel they play a large role in water policy with a much greater frequency than any other group. Local, state, and federal officials perceive themselves carrying out a more modest function and the ditch companies feel they play a large role with a lower frequency than any other group examined.

Given the fact that the primary use of water resources in the area is for irrigation purposes, the irrigation has the greatest personal stake in water policy. In Tables 11 and 12, we examined the extent of the role that different types of officials see irrigators actually playing in the making of water policy and on evaluation of the role they should be playing. We find that the ditch companies and NCWCD officials see

irrigators playing a more modest role in policymaking than do the local, state and federal officials considered. On the other hand, the ditch companies and NCWCD officials perceive the irrigators should be playing a large role with a more greater frequency than do state, local, or federal officials. We should emphasize here the similarity of perception evidenced by ditch company officials and the NCWCD. In striking contrast the data presented in Table 13 shows that practically none of the officials considered perceive the average citizen playing even a modest role in the formation of water policy in this area.

Another way to approach the way the river system functions is to examine the actors' perceptions of each other in terms of understanding of water and the perceived role of other actors in the system. As part of the leadership survey, questions on these dimensions were included.

How the actors perceive how well water problems are understood is presented in Tables 14-18. Officials of ditch companies identify local water officials as having the greatest understanding of water problems and irrigators, federal officials, community leaders, and the public as having the least with state and county officials falling between the others. Conservancy district officials have similar impressions with local officials accorded far greater understanding than anyone else. Federal officials share these estimates on local water officials and county officials. State and local officials also give the high status to the local water official but vary from the first three in terms of the other groups. Only the highly regarded local water official gives the irrigator high standing. None of the groups give the general public credit for understanding water problems.

Patterns of Communication

The way systems function in terms of level of output and internal stress is dependent upon communication patterns within the system. River officials were asked about the frequency that they discussed water problems with various groups in the system. The findings are presented in Tables 19 to 23. Ditch company personnel communicate often with irrigators, the river commissioner, and local water officials in that order. They seldom discuss their problems with state, county, and federal officials. NCWCD officials tended to restrict their discussions to themselves, irrigators, and their own manager. Local water officials are at the center of the communications network with high rates throughout the system. State and federal officials do not engage in frequent discussions with any groups in the system.

When actors are asked to report sources of communication, (Table 24) the high level of communications from local officials is evident. They are prominent on all five actors' lists. All but the ditch company officials list local water officials as their chief communicants. The former tend to be locked into their own subculture of the close contacts on the river while the others receive a more diverse range of contacts.

Indications are that local water officials are a source of pressure and activity in the system in which they do not enjoy power. They are accorded status as understanding water problems and their high rate of communications denotes intense activity. Future adaptations are apparently going to revolve around the changing role of the local official.

The analysis described in the foregoing sections of this report have indicated that the Northern Colorado Water Conservancy District

stands in a central position in the system for allocation of water in the Poudre River basin. The importation of water into the region by the NCWCD is perhaps the most important innovation in the system causing adaptation by other system elements. Conversely, the NCWCD has been forced to adapt its activities and procedures to changes produced by shifts in goals and activities of other organizations within the system and by significant changes in the external environment. Our conclusions about the objectives, procedures, and patterns of adaptation followed in this agency must remain tentative until the completion of a Master's Thesis by Stanley Bastian in August 1969, which involves the intensive analysis of these problems.

The preliminary analysis of the data collected on the activities of the NCWCD does allow us to draw some tentative conclusions. The development of the agency was in itself an adaptation within the system resulting from the growing demands for water in an area in which primary water resources had been fully appropriated. The only feasible means of expanding the available supply of water for irrigation and domestic use was the importation of additional quantities of water from outside the region. This was the motive force for the development of the NCWCD and the justification for the development of the Colorado Big Thompson project which has diverted large quantities of water from the Western Slope of Colorado to the Poudre River system. Irrigators in the Poudre basin control 42% of the units of water delivered by this project and make approximately 44% of actual diversions of this water. Therefore, the linkage between this agency and water allocation in the Poudre River system is quite significant. The intensity of this relationship is even clearer when we consider that approximately 90% of foreign

water brought into the area of the NCWCD project is actually diverted for irrigation purposes.

The primary goals pursued by the NCWCD have remained quite stable through time. The major concern has been the delivery of low cost water to farmers for irrigation purposes. However, the agency has been quite willing to justify their activities on other grounds when the achievement of their goals are threatened by external factors. A prime example of such an adaptation was the shift of emphasis to the production of electric power when the continued progress on the Colorado Big Thompson project was threatened by the exigencies of World War II. Similarly, the district effectively transferred approximately three quarters of the repayment of the project to power production thus restricting repayment obligations of their major clientele group, the agricultural irrigators. Our preliminary analysis indicates a clear sharing of values and perspectives by the officials of the NCWCD and the major irrigation interests. Therefore, while goal stability is present in the system, the agency has effectively shifted its policies and practices as necessary to maximize these values in the face of external stress.

The officials of the NCWCD stand in a central position in the communication and leadership patterns of the Poudre River system. They generally have taken their primary cues for decision-making from irrigation interests. They feel that farm irrigators should expand their already large role in making decisions on water matters in the region. They perceive that irrigators understand water problems in the areas better than any group except their co-workers in the agency. The evidence seems to be reasonably clear that there is an intense pattern of interaction between irrigation interests and the NCWCD which leads to

policy judgments supportative to needs of the irrigation companies. This is particularly significant in the light of the role of the agency in maintaining the broad parameters of the market for water resources in the system and our finding that there is relatively little interaction between the general public and the agency.

Urbanization and increased demands for new sources of domestic water supply for rural areas are placing increased pressures upon the system for change. Increasingly the NCWCD is called upon to handle water problems unrelated to irrigation needs. This is made clear by the intensification of communication between NCWCD officials and local water officials and the developing pattern of transfer of water ownership from agricultural users to municipalities and other domestic users. This shift is and will continue to exert strong pressure on the agency to modify its perspectives, values, policies, and procedures to meet the needs of the changing environmental context within which it operates.

An Overview

The Poudre River system is a highly developed water resource system that evidences substantial organizational and value stability through time. The primary adaptations found in the system are associated with stress being placed upon the system from external sources. The most significant of these have been the economic crisis of the 1930's, the introduction of substantial quantities of foreign water through the development of the Colorado Big Thompson project, changing patterns of state law, and the growth of urbanization in the region. Generally the organizations have maintained consistency of value perspective but have adapted their organizational forms, patterns of behavior, and

communication linkages to the requirements of changing system parameters.

The water from the Poudre River system was fully appropriated early in this century with a relatively small number of ditch companies controlling the rights to this water. Currently four major companies stand in the ascendent position in the system. The control of the water diverted from the Poudre River has remained quite stable through time. Generally, this pattern of dominance was maintained by a similar pattern of distribution of project water imported to the area by the Northern Colorado Water Conservancy District. This pattern of control has strongly influenced the allocation and management activities of the system and the values and goals of the irrigation interests and especially those of the major ditch companies have been dominant. The development of the Poudre River Water Users Association is illustrative of a pattern of institutional innovation and cooperative activity by the ditch companies to maintain effective influence in a changing environment. The clear nexus between this organization and the River Commissioner and the NCWCD indicates adaptive behavior to effectively relate to potentially threatening elements entering the system. The primary formal organizational mechanisms for control and coordination within the system are the River Commissioner and the NCWCD. The relationship with the water users association and the similarity of values, perspectives, and objectives of these system elements indicate substantial coordination in the system originating in the ditch companies, the dominant force in the system. Thereby, we find a system of specialized decision-making in which primary decisions are made by, or are strongly influenced by, those most affected by the system.

The primary patterns of leadership and communication indicate a system of relatively intense local identification and interaction and support the generalized finding of the centrality and dominance of irrigation interests. However, there is an indication of intensification of demands by local water officials for a greater voice in the system. Given the patterns of perception by all actors in the system of the awareness, interest, and understanding of water matters by local water officials, it seems clear that the system will increasingly adapt to the values and objectives represented by these officials. As increased diversification is introduced into the system, the clash of values will intensify and additional organizational adaptations, patterns of coordination, and power relationships will emerge.

Appendix I

Quantitative Data

Table I

PER CENT OF WATER DIVERSIONS MADE AMONG WATER AGENCIES
POUDRE RIVER SYSTEM
1966

Name of Water Agency	Per Cent of Poudre River Diversions Under Agency Jurisdiction	Per Cent of Project Water Diversions Under Agency Jurisdiction
*Big Ditch Irrigation Company ¹	20.4	20.1
*Farm Ditch Irrigation Company ¹	18.2	39.0
Valley Ditch Irrigation Company ¹	14.6	26.6
Mountain Ditch Irrigation Company ¹	14.5	1.8
Other Irrigation Companies and Rural-Domestic Agencies Combined	24.6	12.43
Greeley	5.2	0.07
Fort Collins	2.5	0.0
Totals:	100.0	100.0

Note: (*) Denotes inclusion of subsidiary companies.

Source: Thorfinn N. Tjersland, Organizational Adaptations of the Pebble River System, M.A. thesis, Colorado State University, 1967.

¹Pseudonyms are used for the four major ditch companies.

Table 2

BACKGROUND CHARACTERISTICS OF LEADERS
IN Poudre RIVER SYSTEM
(In Percentages)

N=11

Occupation

Farmers or Agricultural Business	Lawyers	Engineers
64	18	18

Age

35-44 Years of age	45-54 Years of age	55-64 Years of age	Over 65 Years of age
27	27	27	18

Education

Below High School	High School Graduate	College Dropout	College Graduate Or Above
9	18	27	45

Years in Community

7-15 years	over 15 years	all their life
9	18	72

Table 3

POUDRE RIVER ACTORS

vs.

HOW WELL DO YOU THINK WATER PROBLEMS IN THIS AREA
ARE UNDERSTOOD BY THE PUBLIC
(In Percentages)

	Very Well	Fairly Well	Poorly	Not At All	Total
Poudre River Leaders	0	10	80	10	100 (10)
Poudre River Non-Leaders	9	18	68	5	100 (22)

Table 4

POUDRE RIVER ACTORS

vs.

HOW WELL DO YOU THINK WATER PROBLEMS IN THIS AREA
ARE UNDERSTOOD BY NATIONAL OFFICIALS
(In Percentages)

	Very Well	Fairly Well	Poorly	Not At All	Don't Know	Total
Leaders	0	40	40	0	20	100 (10)
Non-Leaders	18	18	45	9	9	99 (22)

Table 5

POUDRE RIVER ACTORS

vs.

HOW WELL DO YOU THINK WATER PROBLEMS IN THIS AREA
ARE UNDERSTOOD BY FARM IRRIGATORS
(In Percentages)

	Very Well	Fairly Well	Poorly	Not At All	Total
Poudre River Leaders	10	40	50	0	100 (10)
Poudre River Non-Leaders	9	64	27	0	100 (22)

Table 6

POUDRE RIVER ACTORS

vs.

HOW WELL DO YOU THINK WATER PROBLEMS ARE UNDERSTOOD
BY COMMUNITY LEADERS IN THE AREA
(In Percentages)

	Very Well	Fairly Well	Poorly	Not At All	Don't Know	Total
Leaders	20	30	50	0	0	100 (10)
Non-Leaders	9	41	23	9	18	100 (22)

Table 7

POUDRE RIVER ACTORS

vs.

HOW WELL DO YOU THINK WATER PROBLEMS ARE
UNDERSTOOD BY COUNTY OFFICIALS
(In Percentages)

	Very Well	Fairly Well	Poorly	Not At All	Don't Know	Total
Leaders	20	20	60	0	0	100 (10)
Non-Leaders	36	27	14	0	23	100 (22)

Table 8

POUDRE RIVER ACTORS

vs.

HOW WELL DO YOU THINK WATER PROBLEMS ARE
UNDERSTOOD BY STATE OFFICIALS
(In Percentages)

	Very Well	Fairly Well	Poorly	Not At All	Don't Know	Total
Leaders	40	20	40	0	0	100 (10)
Non-Leaders	27	32	27	5	9	100 (22)

Table 9

POUDRE RIVER ACTORS

HOW WELL DO YOU THINK WATER PROBLEMS ARE
UNDERSTOOD BY LOCAL WATER OFFICIALS
(In Percentages)

	Very Well	Fairly Well	Poorly	Not At All	Don't Know	Total
Leaders	80	20	0	0	0	100 (10)
Non-Leaders	41	50	0	0	9	100 (22)

Table 10

TYPE OF OFFICIAL

vs.

PERCEPTION OF THEIR AGENCY'S ROLE IN WATER POLICY
(In Percentages)

Type of Official	Large Role	Modest Role	Very Restricted Role	No Role At All	Total Total
Ditch Company	18	50	25	7	100 (28)
NCWCD	78	11	11	0	100 (9)
Local	25	50	25	0	100 (4)
State	30	50	20	0	100 (10)
Federal	27	31	31	11	100 (19)

Table 11

TYPE OF OFFICIAL

vs.

PERCEPTION OF THE ROLE FARM IRRIGATION
COMPANY OFFICIALS ACTUALLY PLAY IN MAKING WATER POLICY
(In Percentages)

Type of Official	Large Role	Modest Role	Very Restricted Role	No Role At All	Total
Ditch Company	28	45	28	0	101 (29)
NCWCD	33	44	22	0	99 (9)
Local	75	25	0	0	100 (4)
State	58	25	17	0	100 (12)
Federal	42	41	12	0	100 (17)

Table 12

TYPE OF OFFICIAL

vs.

PERCEPTION OF THE ROLE IRRIGATORS AND IRRIGATION COMPANY
OFFICIALS SHOULD PLAY IN WATER POLICY
(In Percentages)

Type of Official	Large Role	Modest Role	Very Restricted Role	No Role At All	Total
Ditch Company	82	18	0	0	99 (28)
NCWCD	100	0	0	0	100 (9)
Local	50	50	0	0	100 (4)
State	58	33	8	0	99 (12)
Federal	56	28	17	0	101 (18)

Table 13

TYPE OF OFFICIAL

vs.

PERCEPTION OF THE CITIZEN'S ROLE IN
MAKING WATER POLICY
(In Percentages)

Type of Official	Large Role	Modest Role	Very Restricted Role	No Role At All	Total
Ditch Company	4	10	52	35	101 (29)
NCWCD	0	0	63	38	101 (8)
Local	0	0	75	25	100 (4)
State	0	0	67	33	100 (12)
Federal	0	5	80	15	100 (20)

Table 14

DITCH COMPANY OFFICIALS PERCEPTION OF
HOW WELL AGENCIES UNDERSTAND WATER PROBLEMS OF THE AREA
(In Percentages)

Agency	Very Well	Fairly Well	Poorly	Not Understand At All	Total
Irrigators	7	59	34	0	100 (29)
National Officials	12	38	42	8	100 (26)
Community Leaders	15	44	37	4	100 (27)
State Officials	25	39	32	4	100 (28)
County Officials	32	36	32	0	100 (25)
Local Water Officers	50	50	0	0	100 (28)
General Public	7	14	72	7	100 (29)

Table 15

NCWCD OFFICIALS PERCEPTION OF
HOW WELL AGENCIES UNDERSTAND WATER PROBLEMS OF THE AREA
(In Percentages)

Agency	Very Well	Fairly Well	Poorly	Not Understand At All	Total
Irrigators	11	67	22	0	100 (9)
National Officials	13	63	25	0	101 (8)
Community Leaders	22	44	33	0	99 (9)
State Officials	11	78	11	0	100 (9)
County Officials	33	56	11	0	100 (9)
Local Water Officials	67	33	0	0	100 (9)
General Public	0	11	78	11	100 (9)

Table 16

LOCAL WATER OFFICIALS PERCEPTION OF
HOW WELL AGENCIES UNDERSTAND WATER PROBLEMS IN THE AREA
(In Percentages)

Agency	Very Well	Fairly Well	Poorly	Not Understand At All	Total
Irrigators	50	25	25	0	100 (4)
National Officials	0	50	50	0	100 (4)
Community Leaders	0	75	25	0	100 (4)
State Officials	25	50	25	0	100 (4)
County Officials	0	50	50	0	100 (4)
Local Water Officials	50	50	0	0	100 (4)
General Public	0	0	100	0	100 (4)

Table 17

STATE OFFICIALS PERCEPTION OF
HOW WELL AGENCIES UNDERSTAND WATER PROBLEMS IN THE AREA.
(In Percentages)

Agency	Very Well	Fairly Well	Poorly	Not Understand At All	Total
Irrigators	17	50	33	0	100 (12)
National Officials	36	27	27	9	99 (11)
Community Leaders	9	45	45	0	99 (11)
State Officials	42	50	8	0	100 (12)
County Officials	25	50	25	0	100 (12)
Local Water Officials	67	25	8	0	100 (12)
General Public	0	17	66	17	100 (12)

Table 18

FEDERAL OFFICIALS

vs.

HOW WELL AGENCIES UNDERSTAND WATER PROBLEMS IN THE AREA
(In Percentages)

Agency	Very Well	Fairly Well	Poorly	Not Understand At All	Total
Irrigator	12	65	24	0	101 (17)
National Officials	19	44	31	6	100 (16)
Community Leaders	13	80	7	0	100 (15)
State Officials	39	50	11	0	100 (18)
County Officials	47	35	18	0	100 (17)
Local Water Officials	59	41	0	0	100 (17)
General Public	5	30	55	10	100 (20)

Table 19

FREQUENCY OF DISCUSSION OF WATER POLICY BY DITCH COMPANIES
(In Percentages)

Type of Official Discussed with	A Great Deal	Occasionally	Very Little	None	Total
Local Water Officials	48	41	10	0	99 (29)
City Officials	17	38	24	21	100 (29)
County Officials	7	28	41	24	100 (29)
Community Leaders	10	45	31	14	100 (29)
State Officials	10	7	31	51	99 (29)
Irrigators	79	17	3	0	99 (29)
NCWCD Secretary	17	34	21	28	100 (29)
River Commissioner	59	21	14	7	101 (29)
NCWCD Board	10	28	28	34	100 (29)
Federal Officials	7	14	24	55	100 (29)

Table 20

FREQUENCY OF DISCUSSION OF WATER POLICY
by
STATE OFFICIALS
(In Percentages)

Type of Official Discussed With	A Great Deal	Occasionally	Very Little	None	Total
Local Water Officials	25	42	8	25	100 (12)
City Officials	8	42	25	25	100 (12)
County Officials	0	42	42	17	101 (12)
Community Leaders	33	33	17	17	100 (12)
State Officials	25	50	17	8	100 (12)
Irrigators	25	42	8	25	100 (12)
NCWCD Secretary	8	25	8	58	99 (12)
River Commissioner	18	27	0	55	100 (11)
NCWCD Board	0	42	17	42	101 (12)
Federal	8	50	17	25	101 (12)

Table 21

FREQUENCY OF DISCUSSION OF WATER POLICY
by
FEDERAL OFFICIALS
(In Percentages)

Type of Official Discussed With	A Great Deal	Occasionally	Very Little	None	Total
Local Water Officials	25	40	20	15	100 (20)
City Officials	20	40	20	20	100 (20)
County Officials	10	55	15	20	100 (20)
Community Leaders	0	45	40	15	100 (20)
State Officials	20	40	15	25	100 (20)
Irrigators	5	20	35	40	100 (20)
NCWCD Secretary	20	20	5	55	100 (20)
River Commissioner	5	15	35	45	100 (20)
NCWCD Board	5	15	35	45	100 (20)
Federal Officials	35	35	25	5	100 (20)

Table 22

DISCUSSION OF WATER POLICY
by
NCWCD OFFICIALS
(In Percentages)

Type of Official Discussed With	A Great Deal	Occasionally	Very Little	None	Total
Local Water Officials	22	67	0	11	100 (9)
City Officials	11	78	0	11	100 (9)
County Officials	0	33	56	11	100 (9)
Community Leaders	0	56	44	0	100 (9)
State Officials	11	22	44	22	99 (9)
Irrigators	56	44	0	0	100 (9)
NCWCD Secretary	75	25	0	0	100 (9)
River Commissioner	33	33	0	33	99 (9)
NCWCD Board	56	33	11	0	100 (9)
Federal Officials	11	22	44	22	99 (9)

Table 23

FREQUENCY OF DISCUSSION OF WATER POLICY
by
LOCAL WATER OFFICIALS
(In Percentages)

Type of Official Discussed With	A Great Deal	Occasionally	Very Little	None	Total
Local Water Officials	100	0	0	0	100 (4)
City Officials	75	25	0	0	100 (4)
County Officials	0	50	50	0	100 (4)
Community Leaders	50	50	0	0	100 (4)
State Officials	0	50	50	0	100 (4)
Irrigators	50	50	0	0	100 (4)
NCWCD Secretary	75	25	0	0	100 (4)
River Commissioner	75	0	0	25	100 (4)
NCWCD Board	50	25	25	0	100 (4)
Federal Officials	0	25	25	50	100 (4)

Table 24

OFFICIALS AND COMMUNITY LEADERS WHO HAVE MADE A SPECIAL EFFORT
TO TALK ABOUT WATER PROBLEMS AND AFFAIRS
(In Percentages)

Type of Official	State Officials	Federal Officials	Local Officials	NCWCD Officials	River Com- missioner	Ditch Company Officials	Water Attorney	Other	Total
Ditch Company Officials	10	2	17	6	19	25	13	8	100 (48)
NCWCD	0	0	65	8	8	12	8	0	101 (26)
Local Officials	16	0	36	12	8	12	4	12	100 (25)
State Officials	21	0	29	14	0	7	29	0	100 (14)
Federal Officials	9	3	40	7	7	30	3	0	99 (30)