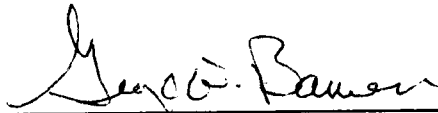


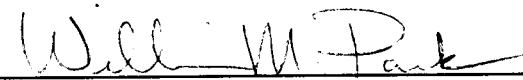
To the Graduate Council:

I am submitting herewith a thesis written by Mark Edward Hairr entitled "Institutional Issues and Problems in East Tennessee's Water Utility Districts and the Application of Regional Approaches." I have examined the final copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science in Planning.

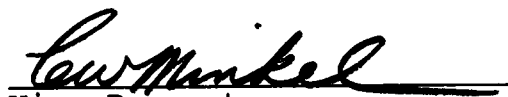

George E. Bowen, Major Professor

We have read this thesis
and recommend its acceptance:





Accepted for the Council:


Vice Provost
and Dean of The Graduate School

STATEMENT OF PERMISSION TO USE

In presenting this thesis in partial fulfillment of the requirements for a Master's degree at The University of Tennessee, Knoxville, I agree that the Library shall make it available to borrowers under rules of the Library. Brief quotations from this thesis are allowable without special permission, provided that accurate acknowledgement of the source is made.

Permission for extensive quotation from or reproduction of this thesis may be granted by my major professor, or in his absence, by the Head of Interlibrary Services, when, in the opinion of either, the proposed use of the material is for scholarly purposes. Any copying or use of the material in this thesis for financial gain shall not be allowed without my written permission.

Signature Mark E. Hair
Date 8/8/90

INSTITUTIONAL ISSUES AND PROBLEMS
IN EAST TENNESSEE'S WATER UTILITY DISTRICTS
AND THE APPLICATION OF REGIONAL APPROACHES

A Thesis
Presented for the
Master of Science in Planning
Degree
The University of Tennessee, Knoxville

Mark Edward Hairr

December 1990

ACKNOWLEDGMENTS

I would like to take this opportunity to identify several individuals for their gracious contributions of time and effort during the completion of this thesis. I would like to thank Professor George Bowen for his advice and review of the numerous drafts, as well as committee members Joseph Prochaska and Dr. William Park.

Appreciation is also given to the individuals of the water systems who took time to participate in the interview process. In addition, I would like to thank Timothy Gangaware of the Water Resources Research Center and Deborah Jack of the Graduate School of Planning for their assistance with this research. Finally, thanks to my parents, David and Ava Hairr, and Denise Beal. Without their support and encouragement this thesis would not have been possible.

ABSTRACT

This thesis analyzes the institutional issues and problems involved with the regionalization of water utility districts in East Tennessee. The main reason regional approaches are considered viable alternatives is the current ineffectiveness of small, weak utility districts in the provision of water.

The data collection techniques used consisted of a literature review, survey, and case studies. The regionalization survey and case studies served to reinforce the findings from the literature review. The fear by customers of higher water rates and the resistance from the governing authorities of the utility districts present the greatest barriers to regionalization.

Through the completion of the research, certain conclusions were reached. To begin with, a reorganization of utility districts is successfully achieved through cooperation and long-range planning. Forced takeovers create inter-agency conflicts between water systems and impede the efficient provision of water to customers. As a result, a general set of principles concerning regionalization should be applied to each individual case in order to identify the most effective organization arrangement.

Next, regionalization schemes can provide a utility district with the additional water supplies needed to serve

a growing customer base. In addition, the quality of service can be improved while water rates experience a decline. Finally, planning and management practices can be improved to meet future community needs.

TABLE OF CONTENTS

CHAPTER	PAGE
I. INTRODUCTION	1
Problem Statement	1
Purpose	5
Research Methodology	6
Definition of Terms	8
Scope	11
Organization of Study	13
II. LITERATURE REVIEW	15
Regionalization Issues	15
Regionalization Issues in Tennessee	28
Legal and Legislative Issues	32
Institutional Issues	35
Summary	47
III. REGIONALIZATION SURVEY	52
Methodology	52
Survey Overview	54
Regionalization Problems, Barriers, and Constraints	58
Regionalization Survey Issues	69
Appropriateness of Regionalization in East Tennessee	78
Regionalized Utility Districts in East Tennessee	85
Summary	89
IV. REGIONALIZATION CASE STUDIES	99
Case Study Methodology	99
Knoxville Utilities Board	104
Clinton Utilities Board	117
City of Kingsport	126
City of Rogersville	137
Tennessee-American Water Company	144
V. CONCLUSION	158
BIBLIOGRAPHY	165
APPENDIXES	175
A. Survey Cover Letter	176
B. Regionalization Survey	178
C. Outline Cover Letter	181
D. Regionalization Interview Outline	183
VITA	187

LIST OF TABLES

TABLE	PAGE
1. Frequencies of Categorized Responses to Question One	59
2. Frequencies of Categorized Responses to Question Two	70
3. Regionalization Case Studies	101
4. List of Interviews	103
5. Knoxville Utilities Board Water Rates	115
6. Clinton Utilities Board Water Rates	120
7. Regionalized Utility Districts in the Kingsport Area	128
8. City of Kingsport Water Rates	133
9. City of Rogersville Water Rates	142
10. Hamilton County Area Utility Districts	147
11. Tennessee-American Water Rates	153

CHAPTER I

INTRODUCTION

Problem Statement

The securing of adequate and clean water supplies for a nation's citizens is necessary to ensure continued existence into the future. Water is not only a key ingredient for individual survival, but it is also a major factor in residential, commercial, industrial, and agricultural development. As a result, the provision of this vital resource should be managed effectively and efficiently by capable water supply systems. The inability of many small systems to manage and deliver high quality water in an effective manner has provided the impetus for the restructuring of organizational arrangements. The proliferation of small, ineffective water supply systems has impeded the provision of water supplies to specific regions and communities. A comprehensive approach to managing water supplies is one of the solutions generally considered as a remedy for alleviating this dilemma.

Oftentimes the major barriers in providing adequate water supplies lie with the entities responsible for its provision. Water supplies in the form of both surface and ground water are available within reach of many water distribution systems. However, difficulties often arise with the withdrawal and

distribution of water due to a diverse set of problems including: droughts, inadequate financial resources, lack of community support, and political conflict. In addition, the issue of which type of water supply system is best for specific communities is made even more complex by diverse policy influences from the local, state, and federal levels.

Historically, the provision of water has been a function of local agencies relying on autonomous methods of water distribution. However, many of these water supply systems have been unable to carry out the needed maintenance and updating of their facilities in order to provide adequate and clean water. Moreover, the escalating number of small water supply systems has made water quality control all the more difficult. Almost 90 percent of the water supply industry in the United States is made up of systems which serve less than 3,300 customers (Humphrey and Walker, 1987, p. 34). As a result, the increasing number of problems associated with these small water supply systems constitutes a major portion of the overall inadequacies with the provision of water.

Concerns over the issue of the effectiveness of small water supply systems has spawned interest in the regionalization and/or consolidation of these systems in order to improve their efficiency and effectiveness. Public Law (PL) 93-523, the Safe Drinking Water Act, and the Federal Water Pollution Control Amendments (PL 92-500) Sections 201 and 208 both contain references to the regionalization of

water supply systems as a means of providing adequate and pollution-free supplies of water (Thackston, 1983, p. 123). Also, the American Water Works Association (AWWA) has been involved in regionalization study projects during the past decade which have examined the alternative organizational models available for improving the operation of small water supply systems. It is evident that the increasing pressures from development and the existence of outdated and inadequate water supply systems and facilities provides a need for further investigation of the various organizational arrangements available for improving these systems.

The national interest surrounding the issue of the regionalization of water supply systems reflects the concerns expressed by small local communities with respect to problems they have experienced with water provision. Tennessee is one example of a state in which discussions of regionalizing small water supply systems is gaining momentum. The state is home to approximately 600 community water systems, or an average of over six systems for each of Tennessee's ninety-five counties (Thackston, 1983, p. 83). The increase in the number of small water supply systems in Tennessee has shown many of these systems to be unable to provide customers with adequate supplies of water even though the quantity of water supplies in the state is ample to meet overall demand (Thackston, 1983, p. 85).

The control of water supplies within the state of Tennessee is maintained by a diverse set of institutions which are often fragmented and inefficient in their efforts to provide water. The ineffectiveness of current water supply systems has served as a catalyst for a reorganization of the existing water utility districts in the state. The inability to provide this vital resource has implications on a wide scale. The inadequate supply of water to customers, the inhibition of residential, commercial, industrial, and agricultural development, and the pollution of both surface and ground water supplies are major problem areas influenced by the ineffective utility districts in Tennessee.

Among the alternative solutions to this dilemma is the concept of establishing regionalized water utility districts in order to manage the region's water resources in a more effective manner. In these, the resulting regionalized systems would be originated and implemented for the purposes of decreasing the costs associated with water provision and to assure sufficient water supplies to users. Regionalization is often a difficult process to fully complete, and as a result, this remedy to the state's water ills needs to be investigated and understood more fully in order to bring about a more useful system of water provision.

Purpose

This thesis examines institutional issues and problems involved with the regionalization of East Tennessee's water utility districts. During the investigation of this issue specific questions will be answered. These questions include:

1. How are the water utility districts currently organized?
2. To what extent does the current organizational structure of these utility districts lead to inefficient water provision?
3. What coordinative relationships exist between the various utility districts in the study area?
4. What factors differentiate efficient utility districts from inefficient ones?
5. What institutional constraints (economic, political, legal, and social) exist which impede regionalization?
6. What alternative solutions exist which may alleviate these institutional problems?
7. What benefits have been experienced by successful regionalized utility districts in the study area?

The specific research objectives include:

1. To examine the alternate ways utility districts are organized.
2. To analyze the institutional issues surrounding the regionalization of utility districts.
3. To assess the potential of regionalization for utility districts in East Tennessee.

The thesis will provide useful information on the prospects, problems, and issues concerning the regionalization of water systems in East Tennessee.

Research Methodology

In order to gain an understanding of the issues concerning the regionalization of water utility districts, several techniques of data collection were used. To begin with, a literature review was undertaken for the purpose of gathering information concerning the various organizational alternatives which exist in the literature. This literature review consisted of an examination of books, articles, and research reports. Also, public documents were inspected in order to gain an understanding of the legislative and legal framework which exists in relation to the issue of regionalization.

Following the literature review, telephone contact was made with planning agencies in East Tennessee. They were asked to provide the names of water agencies and/or districts dealing with water resources issues which will be useful in this study. The identification of these agencies provided a list of those which were considered for selection for further investigation and analysis.

The water agencies that were selected were surveyed by a questionnaire in order to gather data on problems and issues concerning water utility districts. The results of this questionnaire were compiled in order to generate information on issues and problems with utility districts. Also, during the data collection process experts on water resources from East Tennessee agencies and districts were asked to identify which regionalized systems in East Tennessee are most effective based on the systems' past activities. Five of these regionalized systems were selected for case studies.

In-depth information concerning the problems, issues, and constraints to regionalization was the focus of the case studies. Structured and unstructured interviews were conducted with key individuals involved with the regionalized agency. Also, a review of these districts' documents dealing with the problems and issues was undertaken. The case studies were chosen based on their application to the regionalization of water utility districts in East Tennessee and on the responses to the questionnaire.

Definition of Terms

In order to clearly express the meanings of the terms and concepts contained in the thesis and to avoid confusion over the interpretation of these terms, it is necessary to specifically define several of these terms. First, the concept of regionalization and/or consolidation will not be limited to the merging of water supply systems into one centrally managed entity. The concepts as used here will go beyond this definition and may encompass several different arrangements including, but not limited to, the following (American Water Works Association [AWWA], 1981, p. 225):

1. Joint efforts by independently-owned and operated water supply systems to serve a specific area.
2. The utilization of one policy which directs the coordination of several services and/or functions of the water supply system.
3. The instigating of regionalized water supply system management in times of emergencies (i.e., drought, facility failure, etc.) while allowing the systems to maintain their autonomy in non-emergency day-to-day operations.

The different methods and structures for regionalizing utility districts reflect the fact that this concept can exist in a variety of forms.

The reference to water supply systems in the thesis encompasses a wide range of systems in existence and is meant to provide a general definition for all of the more specific systems. As used here, the concept of water supply systems will refer to public and private systems, community and noncommunity systems (i.e., summer camps, rural schools, etc.), and any other providers of water to a multiple consumer base.

A more specific type of water supply organization is the focus of this thesis and it is that of the water utility district. The Tennessee State Legislature allows for the creation of utility districts to provide public services such as water and waste water treatment in areas not served by utility systems. The incorporation of a utility district may only be approved if at least twenty-five owners of real property who reside within the proposed boundary of the district petition for it (Tennessee Code Annotated, Section 7-82-202). Also, a Board of Commissioners consisting of three members is appointed from the district to formulate and implement policies for their respective districts (Keller, 1988, p. 44).

The State Enabling Legislation for Tennessee granted utility districts legal authority and quasi-municipal status

in 1937. Although utility districts have not been given the power to collect taxes or implement ordinances, they may adopt rules and regulations and set their own rates and fees (Keller, 1988, p. 45). After the incorporation of a utility district, this entity is under only minimal regulation by authorities. As a result, incorporated utility districts become basically independent organizations whose operations are regulated only by Tennessee state law.

The discussion of the organization of the agencies responsible for water provision should be expressed in way which provides for a common understanding of the concept. Organization as used in the thesis refers to the framework and coordination of activities in order to provide the means for accomplishing some objective (Mintzberg, 1979, p. 18). The focus of the research here was on the organization of small water utility districts and an analysis of the various forms of organization.

Another concept related to organizations is that of institutional arrangements. This concept refers to both the formal and informal ways in which the utility districts may be organized. Institutional arrangements are less entrenched in specific structural compartments, but rather they reflect the existence of an agreement or preparatory plan for the attainment of objectives (Webster's New Collegiate Dictionary, 1987, p. 33).

The research concerning how well the water utility districts conduct water provision gives rise for the need to define terms associated with this concept. As presented here, the term "adequate" will refer to the ability to provide only that amount of service or product which will sustain a process from failure. In other words, adequacy is seen as just enough to get by without any surplus. This definition may be clarified further by contrasting it with the meanings of what constitutes effective and efficient water supply systems.

The term effectiveness, as applied to water supply systems, goes beyond adequacy in that effectiveness refers to the achievement of desired ends. This definition reflects a more specific and conscious effort to meet a particular objective than the concept of adequacy. Also, the concept of efficiency is defined here as the achievement of a desired result with a minimum of effort, expense, or waste (Webster's New Collegiate Dictionary, 1987, p. 196). The terms adequacy, effectiveness, and efficiency are often used interchangeably, but the preceding definitions will apply to these concepts in the thesis in order to differentiate between them and to avoid confusion between the terms.

Scope

This thesis analyzes specific cases of regionalized small water utility districts in East Tennessee. Although the focus of the thesis was on utility districts, water systems with a

variety of organizational arrangements were incorporated into the research. The growing interest in regional water systems in recent years as a possible solution to water provision problems requires a full understanding of the issues surrounding this topic. The lack of reports and studies pertaining to this subject highlights the fact that exploratory research projects should be undertaken in order to begin to identify and clarify the problems and issues of regionalization.

There are a wide array of complex variables which influence the regionalization of utility districts. There are, among others, technical, political, social, and economic problems surrounding this subject matter. The focus of the thesis was to examine and analyze the institutional arrangements which are available to utility districts which want to regionalize. Within this framework, the problems mentioned earlier will be addressed as they influence the regionalization issue. However, an exhaustive analysis of all variables influencing regionalization is beyond the scope of the research here. The aim of the thesis is to present decision makers with the institutional and organizational issues and problems involved with regionalized water systems.

It is not assumed here that the regionalization of water utility districts is the answer for all of the problems encountered by small water systems. Rather, this research presents the advantages and disadvantages of this particular

organizational form. The decision of whether to implement this type of organization rests with local decision makers and community citizens.

Economies of scale were assumed to be inherent in the regionalized systems investigated during the completion of the thesis. Although this is an important factor in water system management and organization, the complexity of this subject warrants that it be left for another research project to deal with. As a result, an in-depth analysis of this topic is beyond the scope of the thesis.

The treatment of both water and waste water by utility districts is a common occurrence. There is often coordination and competition for resources between water and waste water departments within one utility district. Although these two areas are closely related, the research here will center around the issues concerning water rather than both water and waste water. However, during the process of data collection any information concerning waste water which was pertinent to water provision was highlighted.

Organization of the Study

The remainder of the thesis is organized and presented as follows:

Chapter II contains a literature review of relevant books, articles, documents, and reports concerning the regionalization of small water utility districts. The

literature which contains references to the institutional issues and problems of regionalization was the focus of the chapter. Supplementing this literature is a review of the legislative and legal documents which regulate the process of regionalization.

Chapter III presents an examination of the problems, issues, and constraints gathered from questionnaires. The recommendations and discussions of questionnaire respondents are contained in this section.

Chapter IV contains an analysis of the case studies in order to provide contrasts and comparisons of the different regional water systems which exist in East Tennessee.

Chapter V contains the conclusions arrived at based on the literature review, questionnaire, and the analysis of the case studies.

CHAPTER II

LITERATURE REVIEW

Regionalization Issues

The subject of regionalized water utility districts is gaining attention from organizations and individuals involved in water resource management. As water provision practices and facilities become outdated and inefficient, alternative organizational arrangements are being investigated as a means for alleviating problems. The purpose of this chapter is to examine the literature concerning the issue of regionalization. The scope of this literature review included materials from state, national, and international perspectives related to the process of regionalization. The diverse combination of works reviewed provided a broad foundation and background for understanding the problems, issues, and barriers surrounding this subject.

The increasing interest in regionalization is reflected in the fact that the American Water Works Association began organizing a regionalization committee late in 1979. The formulation of this committee came about so that the AWWA could specifically define issues surrounding the regionalization of water supply systems. After these issues were clearly defined, the committee then proceeded with the

development of an AWWA policy statement concerning the regionalization concept (AWWA, 1979, p. 697).

In the past, the AWWA had no definitive position on the issue of regionalization, but rather they addressed each issue separately on a one-by-one basis (AWWA, 1979, p. 707). The investigation into this subject matter was covered in-depth by two separate issues of the AWWA Journal within a three-year period (1979-1981).

The December 1979 issue of the AWWA Journal entitled "Regionalization of Water Utilities" contains several articles describing the goals and objectives of the regionalization committee. The article which covers the needs and issues of regionalization attempts to define this issue with a statement that reflects its complexity and diversity. Their definition states (AWWA, 1979, p. 698):

Regionalization of water systems is (1) a creation of an appropriate management or contractual administrative organization, or (2) a coordinated physical system plan of two or more community water systems in a geographical area for the purpose of utilizing common resources and facilities to their optimum advantage in planning, designing, constructing, operating, and maintaining water supply systems that meet current minimum standards.

This definition applies to both urban and rural water systems which have been organized under a single management structure in order to improve water provision (AWWA, 1979, p. 698).

This article stresses the need for the development of long-range plans for the entire region which is considering

whether or not to regionalize (AWWA, 1979, p. 699). In addition, the problems and benefits of regionalization were presented in this article. The benefits were expressed as improvements in the following areas: operation and management, planning and design, financing, and government (AWWA, 1979, p. 699).

The problems associated with regionalization were identified as existing in two different areas. First, there were those problems associated with public attitude and government. Second, problems were found to exist with the inequities involved with financing regionalized water systems (AWWA, 1979, p. 700). The needs and issues contained in this article assisted the committee in developing a checklist of variables to be examined and evaluated when determining whether to support the regionalization of water systems (AWWA, 1979, p. 701).

This journal issue also contained an analysis of questionnaire results obtained from AWWA utility members concerning issues related to regionalization programs. The purpose of the questionnaire was to identify trends and attitudes concerning regionalization. Also, the survey was used to help the committee understand several of the issues pertaining to regionalization including: comprehending the actual need for regionalization, understanding the barriers hindering its implementation, and perceiving the water

utilities' view of the government's role in the regionalization process (AWWA, 1979, p. 706).

The discussion concerning this survey stressed the fact that noninstitutional issues (i.e., attitudes, opinions, vested interests, etc.) are often neglected even though they wield great influence on this process (AWWA, 1979, p. 707). The AWWA Regionalization Committee stated that each separate case considered for regionalization must be decided locally, but along with this the committee feels that certain basic concepts must be followed by all water systems which utilize a regional arrangement (AWWA, 1979, p. 707). These general guidelines and principles are set forth so that the resultant water system will utilize consistently effective utility management practices in their daily operations (AWWA, 1979, p. 707).

Another article in this issue contained a discussion of the politics of regionalization. The merging of small independent water utility districts was seen as a political process in which public officials must gain support and acceptance in order to reach a consensus for a regional solution for water systems' problems (Bumstead, 1979, p. 708).

A case study from Delaware was also presented in this article in which an interconnection agreement was implemented for the purpose of regionalizing both the physical facilities and the management practices of specific water supply systems. (Hurd, 1979, p. 713). Although legal, political, and social

problems accompanied this agreement, the feeling was that it achieved economic improvements over the old system and the regionalized system was gaining both political and public support (Hurd, 1979, p. 719).

The second AWWA Journal issue concerning this subject matter appeared in May of 1981 and was entitled "Regionalization: How and Why." One article contained in the journal discussed the methods of state assistance to local water systems attempting to regionalize. It is stated in this discussion that local officials are often seen as the catalysts for regionalization, but in reality they have little initiative to originate this process themselves (Okun, 1979, p. 243).

According to the author, the majority of regionalized systems which exist in the United States have developed in the larger metropolitan areas where local officials followed the advice of water professionals (Okun, 1979, p. 244). He states further that the inability of local efforts to improve water provision and the distrust of the federal government have given rise to the call for the states to enact legislation and distribute funds to assist the regionalization process (Okun, 1979, p. 243).

Another article in this issue covered the topics of drought and water supply emergencies. This article details the drought in California in 1976-1977 which provided the impetus for the Monterey Peninsula Water Management District

(MPWMD). This plan utilized effective planning and design practices in order to provide adequate water supplies to drought-stricken areas (Smith, 1979, p. 226). The MPWMD created a regional district for the specific purpose of relieving the effects of the drought. This special district did not usurp power from already existing organizations because it was limited to only relieving the effects of the drought. As a result, the organizations already in existence aided in the origination of this district because it did not threaten their community sovereignty (Smith, 1979, p. 231).

This journal issue also covered agreements such as the Washington Water Supply Emergency Agreement (WSEA). This plan was established to provide regional cooperation among utilities in order to avoid conflicts encountered by multiple agencies within the same jurisdiction (Hooker, 1979, p. 232). The agreement was formulated with the intention of effectively dealing with water shortages caused by drought, mechanical malfunctions, and contamination (Hooker, 1979, p. 232). The WSEA aided in alleviating the need for different emergency plans by local governments while also reducing the coordination problems between neighboring water systems (Hooker, 1979, p. 233).

One of the better known examples of a regionalized water supply system in the world took place in England and Wales. Daniel Okun, a professor in Environmental Engineering at The University of North Carolina, examines the process of

regionalization in his book, Regionalization of Water Management: A Revolution in England and Wales. Although this situation is unique and different from regionalization experiences in the United States, it does provide an example of a water system overcoming complex barriers in order to improve its management and operation practices. Consequently, certain aspects of this regionalization process can be applied by local officials in the United States to their particular communities when this organizational scheme is being investigated (Thackston, 1983, p. 130).

The process of regionalization in England and Wales saw the number of water supply systems decrease from over 1,200 to under 200 in the twenty-year period following the end of World War II (Thackston, 1983, p. 130). At the same time, less than 1 percent of the citizens of this territory were without public water supply service during this transformation (Okun, 1977, p. 2). The book states that the regionalization of the water systems was a radical change for water provision and that this process was able to occur without any interruption of service to water users (Okun, 1977, p. 16). Also, there were both internal and external problems which affected this process and an analysis of these items is presented in the text.

This book contains several references comparing and contrasting this process to similar instances in the United States. The author states that the proliferation of water

systems in the United States is reflected in the fact that in a twelve-year period up to 1975, the number of systems serving less than 1,000 customers doubled, while the total population served by these systems only increased 6 percent (Okun, 1977, p. 2). This increasing number of water supply systems coupled with the enormous number of local, county, municipal, township, and special governments and districts has led to inadequate water provision in many areas of the United States (Okun, 1977, p. 303). Okun (1977, p. 305) states that the rural schools in the United States were reorganized and consolidated with larger school systems in order to improve education in the twentieth century, so certainly there is a possibility for regionalizing the country's water systems in the future.

A book was recently published by the American Water Resources Association entitled Regional and State Water Resources Planning and Management which contained the proceedings of a symposium on the regionalization of water supply systems. The papers presented in this publication discuss state and regional planning and management, economic and financing analyses, and planning tools useful in regional planning and management.

One paper presented in this book is of particular relevance to the issue of water supply system regionalization. Goodwin and Doeksen (1984, p. 105) put forth an analysis of rural water district consolidation and the issues affecting

this process by way of a case study. The major benefits of this consolidation process were seen as improvements in the operation of the water system and the financial advantages of reorganization (Goodwin and Doeksen, 1984, p. 111).

The relationship between water provision and community growth goals was determined to be of major importance in whether or not regional water systems would be developed (Goodwin and Doeksen, 1984, p. 111). The planning and policy influences on the regionalization issue were also expressed as major factors in determining what type of future development would occur in a community seeking regionalized systems (Goodwin and Doeksen, 1984, p. 111).

Another study concerning the issue of regionalization was conducted under the sponsorship of the Water Resources Research Institute at The University of North Carolina entitled Regional Water Resource Planning for Urban Needs: Part 1. This report examined alternative organizational schemes for water resource planning in the state of North Carolina. A special emphasis was placed on those cities and areas which were becoming urbanized centers for the state's population. The focus on urbanizing areas was embraced because of the increasing demand on water resources and water systems that a growing population produces (Moreau, 1973, p. 5). Several recommendations were presented in this report for the purpose of providing decision makers with alternative solutions for improving water resource planning. These

suggestions were directed at the state level of government because of their major role in this process (Moreau, 1973, p. X).

This report initially analyzed water resource planning in North Carolina and presents the problems and issues surrounding this subject matter. This background gave the research report a basis for a water resource planning model which was formulated to integrate water supply and waste disposal techniques for assisting urbanizing areas (Moreau, 1973, p. 60).

The study addressed the regionalization issue by stating that the state and federal governments must instigate a regional planning scheme for the following purposes: to resolve problems of externalities, or multiple political and private interests, to achieve economies of scale, and to communicate local and regional alternatives to decision makers (Moreau, 1973, p. 59). Thus, the state and federal governments are seen as major actors in this process which can be used to assist the less powerful local agencies in a particular area.

Several recommendations for improving water resource planning for urbanizing areas were presented. Among these include a call for establishing a State Water Resource Council for the purposes of (Moreau, 1973, p. X):

1. Dealing with policies concerning both the quantity and quality of water supplies.
2. Developing guidelines for regional and local water resource planning.
3. Examining the diverse alternatives which exist for controlling water delivery rates.

A second recommendation was that a technical program should be devised which assists with regional studies, field surveys, projections of needs, simulation models, and technology transfer (Moreau, 1973, p. X). Also, this report suggests that the state should provide up-to-date information for regional planning to decision makers involved with this issue (Moreau, 1973, p. 60). The major role the state would play in these processes makes it imperative that they handle regionalization issues in a timely and effective manner.

A book which addressed the regionalization issue as part of overall water supply planning was completed by David W. Prasifka in 1988. The text identified issues which were associated with urban water supply planning, including water quality, water demand, the financial aspects of water supply planning, and the risks associated with water supply planning (Prasifka, 1988, p. 6). The examination of these issues provided the information needed in order to select the most appropriate organizational arrangement available for water supply planning. Prasifka (1988, p. 17) states that after

short and long-term water needs are identified, the regionalization of water systems may be considered as an alternative organizational arrangement.

The discussion of the regionalization of water supply systems often focuses on small systems which have inadequate resources to carry out their responsibilities. The major problems encountered by these systems were seen as those related to a lack of economies of scale due to the fact that capital, maintenance, and operational costs cannot be distributed over enough customers to keep individual costs low (Prasifka, 1988, p. 18). Also, problems with small water systems were attributed to the mismanagement associated with the financing of capital improvements.

The majority of water supply facilities have long lives, with substantial investments in them coming when older facilities built at lower costs are replaced by newer facilities constructed at higher costs and higher interest rates (Prasifka, 1988, p. 18). As a result, smaller systems often face major problems of resource shortages which larger diversified water systems usually avoid.

Two different forms of regionalization were identified in this book. They included (Prasifka, 1988, p. 19):

1. The formation of two or more existing systems which share production facilities.

2. The extension of service in one or more existing systems to areas without service.

The major benefit of the first type of regionalization was seen as the increased economy of scale achieved through monetary savings to the customer or the water provider (Prasifka, 1988, p. 19). The benefits of extending service were seen as improvements with the increased value of water consumption, which may be apparent in the increasing property values in the areas with new water system customers (Prasifka, 1988, p. 19).

The attainment of certain requirements is mandatory for effective regionalization arrangements to result. The text identifies three of these basic requirements (Prasifka, 1988, p. 20). First, strong institutional arrangements must exist in order to transcend local and regional jurisdictional barriers. Secondly, the costs for sharing existing facilities must be distributed fairly and equitably to all relevant systems. Lastly, the economic responsibility must be properly assigned to customers. The common theme running through all of these requirements is that all costs should be tied to actual services rendered so that the needs of each customer and water supply system are effectively and efficiently satisfied.

Regionalization Issues in Tennessee

A research report sponsored by the Tennessee Water Resources Research Center entitled Water Policy in Tennessee: Issues and Alternatives provides a comprehensive analysis of the major water resource issues in the state. This report examines several separate issues concerning water resources and provides alternatives addressing each issue. Topics covered include water allocation law, water shortages, financing issues, management, and river transportation. The major factors influencing water resources are presented and the report includes a section which specifically addresses the regionalization issue in the state of Tennessee (Thackston, 1983, p. 123).

This study indicates that there has been a rapid growth in Tennessee's rural utility districts in the last half of the twentieth century and these districts are having difficulties maintaining and operating their water systems (Thackston, 1983, p. 85). The proliferation of utility districts within each county of the state is evidenced by the existence of municipal water systems, rural utility districts, and private water supply systems all within one county. This study says that attempts to consolidate these weaker systems with stronger ones in order to improve water provision has been a slow process (Thackston, 1983, p. 85).

The research report examines the major benefits and problems with regionalization programs. The categorization

of these items is similar to those obtained from the AWWA Journal and presented earlier in the thesis (Thackston, 1983, p. 128). The identification of regional water and sewage systems in existence elsewhere in the United States is also contained in this study. Also, there is a discussion of the four regionalized water systems which were operating in the state of Tennessee at the time of this research project. Information concerning the creation of these systems is supplemented by a short technical profile of each system in order to provide a summary of the characteristics of each Tennessee system (Thackston, 1983, p. 132).

Information concerning the regionalization issue is contained within several water and waste water plans prepared by the East Tennessee Development District (ETDD) for Tennessee counties and regions. One such plan for Claiborne and Union counties recommends the absorption of Cumberland Gap Water System into the Arthur-Shawnee Utility District in order to ensure a reliable water supply and a reasonable rate schedule (ETDD, 1981, p. 8). A major issue surrounding this proposed consolidation was whether or not Arthur-Shawnee would take on Cumberland Gap's bond indebtedness (ETDD, 1981, p. 10). It was recommended that the Arthur-Shawnee Utility District Board of Commissioners be modified to include representation from a Cumberland Gap resident and that the consolidation occur only after the completion of all legal requirements was met (ETDD, 1981, p. 10).

Another water plan devised for Scott County, Tennessee addresses the merging of water systems as an alternative organizational arrangement for water provision. The consolidation of the Town of Oneida and the Huntsville Utility District was seen as one method of financing large water projects more easily (ETDD, 1979, p. 78). Advantages of this consolidation were seen as the reduction of dual costs of buying equipment and supplies, billing and accounting, and the reduction of general administrative expenses (ETDD, 1979, p. 78). Also, ETDD (1979, p. 78) suggested that larger water systems may be more likely to receive federal funds than smaller systems which were competing with one another for funds.

A third report concerning water needs in Tennessee was prepared for Loudon and Monroe Counties. Several alternative arrangements for the Lenoir City area utility systems were presented in this report. One method of improving water provision in this area was to continue to operate Lenoir City Utilities Board as a separate system while merging Martel and Dixie-Lee Utility Districts (ETDD, 1980, p. 43). The resultant consolidated system would have the Dixie-Lee Utility District handle all of the administrative and operational responsibilities of the new system (ETDD, 1980, p. 43).

A total consolidation of Lenoir City Utilities Board, Dixie-Lee Utility District, and Martel Utility District was also presented as a possibility. Lenoir City Utilities Board

would then handle the administrative and operational responsibilities of this single system (ETDD, 1980, p. 45). It was recommended by ETDD that the Board of Commissioners of the new system should reflect representation from all three of the areas in order to promote community interests equitably (ETDD, 1980, p. 45).

The final ETDD report examined was one prepared for Roane and Morgan Counties which dealt with water and waste water alternatives. Among the possible alternatives presented for these counties' water problems was the building of one large regional plant for water provision for the entire area (ETDD, 1978, p. 67). It was estimated that replacing existing water facilities with one regional plant would cost over \$9,000,000 (ETDD, 1978, p. 67). Although this high capital cost is the most expensive of the alternatives presented in this report, the operation and maintenance costs were predicted to be lower than the other alternatives in the long run (ETDD, 1978, p. 68).

The implementation of this alternative would require cooperation between both water suppliers and Roane and Morgan County Governments (ETDD, 1978, p. 67). The report suggests that there may be problems with financial debts, prioritizing system improvements, and the consolidation of the utility boards, but that a multi-county utility authority could assist in alleviating these problems to a certain extent (ETDD, 1978, p. 67). The greatest advantage of this consolidation was seen

as the cost savings to water customers and the report suggests that this was reason enough to warrant serious consideration of consolidation (ETDD, 1978, p. 67).

Legal and Legislative Issues

The legal considerations and requirements pertaining to the regionalization of water utility districts in Tennessee is provided for in both national and state legislation. The issue of regionalization has been addressed in two Federal Acts. First, the Safe Drinking Water Act (Public Law (PL) 93-523) of 1974 refers to regionalization as one alternative available for the managing of water supplies. This Act provides for a rural water survey to be conducted in order to see if the present water systems are providing an adequate and healthy supply of water (Safe Drinking Water Act, Section 3, 1974). This federal legislation also makes reference to the regionalization concept as a solution which is available to states which need to upgrade their water supply systems' practices and facilities (Thackston, 1983, p. 123).

A second federal legislative tool which can be applied to this issue is the Federal Water Pollution Control Act (PL 92-500). Sections 201 and 208 of this Act refer to regionalization as an alternative form for the management of wastes. This concept can be transferred and applied to water supply management due to its broad coverage of organizational systems (Thackston, 1983, p. 123). The Act states that a

regional agency may be designated as a waste treatment management organization in order to carry out the required policies put forth by Federal Law (Federal Water Pollution Control Act, Section 201, 1972). These Federal Acts show that regionalization is considered as one viable alternative for the management of water resources in the United States.

Another document related to the legal considerations of water resource management was published by the Tennessee Water Resource Research Center. This report reviews the state legislation concerning water resources in times of water shortages. Background is provided on Tennessee's water laws and the various management forms available for water provision during times of shortages. Recommendations are presented to assist decision makers in improving the allocation of water when it is in short supply in the state.

This report states that water management problems and issues can exist on a local, state, and regional level. As a result, the authors suggest that water supply systems should be flexible and efficiently managed in order to provide the entire public with water supplies (Jones, 1983, p. 117). They note that comprehensive water supply system planning is most effective because it includes as many of the issues surrounding water development and use as it can (Jones, 1983, p. 117). The need for cooperation between all involved actors is one characteristic which is imperative so that resulting systems will be successful in their provision of water.

The consolidation of utility districts in the state of Tennessee is provided for in the state legislation. An examination of Section 7-82-202 of Tennessee Code Annotated shows that the modification, merger, or consolidation of utility districts is legally allowable subject to specific requirements. Among the specific requirements which must be met include the following: public convenience and necessity must be present, the creation of the district must be economically sound and desirable, and the resultant utility district must serve the public interest (Tennessee Code Annotated, Section 7-82-202). Once created, the utility district is empowered with the authority to operate and maintain systems for furnishing its residents with water (Tennessee Code Annotated, Section 7-82-301).

The bulk of the law providing for the creation of a consolidated utility district is concerned with the specific procedural process required for its inception. The chapter of the legislation contains requirements such as providing public notice, legally registering the new district, transferring facilities and financial items to another body, and describing the appeals process (Tennessee Code Annotated, Section 7-82-202). The creation of multi-county utility districts is also provided for in the legislation and commissioners must be appointed to the resulting district from each county in the district (Tennessee Code Annotated, Sections 7-82-601, and 7-82-602). The specific requirements

needed for creation of this multi-county district are the same as those previously described.

Institutional Issues

An investigation of the literature concerning institutional barriers to the regionalization of water systems turned up a limited number of documents. Much more research has been conducted on the institutional barriers associated with overall water resource management. An examination of reports dealing with institutional barriers in water resource management assisted with the understanding of the influence they have on the organizational arrangements of water systems. The compilation of information concerning these barriers provided a framework in which the problems of water systems were analyzed. Several reports and studies were reviewed in order to present a diverse cross-section of materials on this subject.

The first report reviewed here is entitled Institutional Problems of Water Quality Planning in Urbanizing Areas in the Pacific Northwest and was completed by Kurt Wehbring. This study analyzed the institutional barriers to water quality planning during the planning process of the 208 Program (Water Quality Management Program) (Wehbring, 1980, p. 1). The barriers were divided into two categories, with those associated with sewerage systems examined separately than those institutional barriers related to urban and agricultural

runoff. Several barriers were identified as unique problems associated with each type of water pollution.

Some of the institutional barriers related to waste water management produced during this research project are also pertinent in the study of regionalization. One barrier identified in this study was that of public opposition to increased costs of water quality planning (Wehbring, 1980, p. 10). The opposition to increased costs for water quality was evident in many planning areas such as the construction of new plants, plant conversions, and pollution control programs (Wehbring, 1980, p. 10). At times these complaints could dissipate as the necessity for improvements become more apparent to people, but this problem still existed in all plans examined in this study (Wehbring, 1980, p. 11).

Another obstacle identified in this study was the proliferation of single purpose agencies which provide public services to an area's residents. An example from Washington County, Oregon is presented in the study to show how an overabundance of agencies can lead to problems such as uncoordinated land use developments, disagreements between cities and agencies over organizational arrangements, and at times, a low quality of service to customers (Wehbring, 1980, p. 16). These problems related to the treatment of waste are similar to those encountered during the regionalization process. Both waste water and water processes face many of the same obstacles when consolidation schemes are implemented.

Some of the problems associated with the regionalization of waste treatment plants are also similar to those encountered by water systems which have or plan to regionalize. First, this study states that cities and agencies wish to protect their local autonomy and may not want to be part of a regional approach to solving their organizational problems (Wehbring, 1980, p. 16). Several factors are seen as causing this type of attitude. These include (Wehbring, 1980, p. 16):

1. The consolidation of systems may mean increased costs and less control in setting service costs for agencies.
2. The consolidation may affect personnel, rates, and the intensity of land use developments.

The ability of a regional approach to deal with these concerns effectively is paramount in order for successful water systems to result.

Two other institutional barriers associated with water quality management were uncovered during this research project. These barriers were expressed as problems with land use growth and the conflicts revolving around the politics of city incorporation (Wehbring, 1980, p. 12). Issues surrounding urban growth and land use development are affected greatly by the availability of water and sewer service. This

report states that because the provision of sewer services influences a community's growth, it is a political issue (Wehbring, 1980, p. 12).

The increased costs of providing sewer service is seen as a problem for residents currently on septic tanks because their operating costs are basically nonexistent (Wehbring, 1980, p. 12). The decision of whether to grow through aggressive land use development is often a controversial issue in and of itself and the provision of water and sewer services is an important element which plays a major role in this problematic process (Wehbring, 1980, p. 13).

The problems associated with the legal incorporation of certain areas into independent towns or cities could be seen as political constraints to providing public services. The report suggested that unincorporated areas outside of cities often provide inadequate services for several reasons (Wehbring, 1980, p. 14). First, the county governments may not be designed to handle the provision of urban services and the governing of urban and urbanizing areas. Also, an urbanizing area may not receive adequate urban services quickly enough because of the rural nature of the community's decision making bodies and the unclear priorities which these officials maintain. These types of problems may also exist in some of the areas in East Tennessee which are currently served by small, rural water supply systems.

For the purposes of the thesis, there is one important institutional constraint associated with water runoff in this study. The fragmentation of authority in water quality planning was seen as a geographical, functional, and governmental problem. First, boundaries for water resource planning may stretch into different cities, counties, or even states which makes it difficult to develop coordinated organizational arrangements (Wehbring, 1980, p. 27). The geographical and spatial distance between areas which may fall into one jurisdictional boundary may require the consolidation of agencies in order to pool resources to provide a foundation for conflict resolution (Wehbring, 1980, p. 27).

Functional and governmental fragmentation were also seen as problems in water resource planning. The proliferation of numerous local special districts with different purposes may impede the development of an effective water quality plan (Wehbring, 1980, p. 27). Each agency may promote its own interests without paying attention to how its actions affect other agencies in the area. There are also problems with federal, state, and local governmental fragmentation because of the discrepancies which exist between each in the amount of resources each has (Wehbring, 1980, p. 4). Although some coordination of activities may exist, oftentimes each level of government has different goals and objectives which causes ineffective plans to result, or the plans may not even get formulated.

Another research report which addressed the institutional barriers to water resource management was prepared by the Graduate School of Planning Research Center at The University of Tennessee. This study analyzed the institutional barriers and problems encountered in water quality management planning in southeastern United States as identified through questionnaires and case studies. The sections which specifically addressed the institutional barriers to water resource management and planning are of particular relevance to the thesis. The problems, issues, barriers, and constraints examined and presented in this study are similar to those surrounding the regionalization of water systems.

The discussion of institutions and what is meant by this concept produced a definition of institutions which states that they are a set of complex interdependencies which affect people's efforts to control and influence actions (Bowen, 1981, p. 83). The structures and relationships surrounding the concept of institutions are much more complicated matters than what is normally considered as institutional issues in day-to-day life. By utilizing this definition of institutions, the report categorized the institutional barriers to water quality management into five classes (Bowen, 1981, p. 84): legal, political, cultural, economic, and religious. The separation of these barriers into specific groups assisted in measuring the extent of their influence on water resource management issues.

A Delphi process was conducted by this research team in order to reveal the individual components which go into making up each group of institutional barriers. First, legal barriers were made up of several issues which also exist in the regionalization process. One element in this barrier category is that planning activities are often neglected while physical facilities development constitutes the majority of management's time and financial resources (Bowen, 1981, p. 139). Also, a lack of information and data concerning development controls was seen as a major legal barrier impeding the formulation of effective problem solutions (Bowen, 1981, p. 140). The mismanagement of programs along with the lack of information relevant to the issues at hand both hinder movement toward improved water resource management.

The next two most important institutional barriers to water quality management were identified as political and governmental barriers. Several items examined in this category are of importance to the purposes of this thesis. Among the more important political and governmental barriers contained in this report were as follows (Bowen, 1981, p. 147):

1. Small jurisdictions wish to preserve authority and not merge with a larger regional agency.

2. Fragmentation with no one general-purpose local government with authority. Planning, coordinating, and implementation plans are difficult.
3. Lack of interagency cooperation.
4. Decentralized responsibility for utility provision.
5. Too many providers of water and sewer service to monitor and control.

The severity of each of these barriers is dependent upon separate individual cases, but all are seen as at least minor problems in water resource management (Bowen, 1981, p. 146).

Two other major classes of institutional barriers analyzed in this study were economic and cultural barriers. The major concerns associated with economic barriers were found to be with the costs of formulating and implementing water quality plans and programs and also with the adequacy of funds available for carrying out these activities (Bowen, 1981, p. 156). Cultural barriers were seen as the public's inability to view water quality as an important problem and also as citizen distrust of and resistance to governmental agencies (Bowen, 1981, p. 152). These economic and cultural barriers, in addition to the legal and political barriers, reflect the complex and interrelated nature of institutional barriers to water resource management.

Another study completed by the Graduate School of Planning in 1983 analyzed the problems and issues of water quality management in the state of Tennessee. The report examined the issues, problems, and needs for water quality management in Tennessee and how land use regulations and growth and development goals can be used to bolster water quality programs (Bowen, 1983, p. 3). Included among the topics of this study is an analysis of a survey conducted which identified institutional barriers to water quality management. Case studies were also completed and these produced information concerning the barriers and constraints to water quality management.

Among the more important legal barriers listed in this study were the need to improve intergovernmental communication between agencies and levels of government and a call for the legislature to provide more funds for water quality management (Bowen, 1983, p. 107). The lack of governmental communication and cooperation was also identified as the top political barrier to water quality management (Bowen, 1983, p. 108). The diverse set of local agencies and governmental units concerned with water resource management impedes the ability of these organizations in providing coordinated management schemes.

Two other categories of institutional barriers were also identified from this survey and they included economic and cultural barriers. The two most important economic barriers

were ones faced by many of the water resource management plans and programs in existence. A lack of funds in all water quality management areas and reductions in federal and state funding grants to assist local agencies are seen as the major economic barriers (Bowen, 1983, p. 109). The major cultural barrier identified in the study included a lack of awareness of water quality problems due to poor education and information systems (Bowen, 1983, p. 108). Other cultural barriers identified in this study included the promotion of self interests and a fear and distrust of governmental authority (Bowen, 1983, p. 109).

During the course of the analysis of case studies, several barriers and constraints were found in water quality management. The major problems were seen as a lack of resources and an absence of political support for water quality programs and plans (Bowen, 1983, p. 119). Also seen as significant constraints were the fragmented management systems and a lack of cooperation between the various water quality agencies (Bowen, 1983, p. 119). The interrelationships among the barriers fuse together to restrict the implementation and development of effective water resource management policies.

A study which examines the institutional issues associated with water supply development in southeast Virginia was completed by William E. Cox and Leonard A. Shabman in

1983. The purpose of this research project was to provide information on (Cox and Shabman, 1983, p. 8):

1. The institutional considerations affecting water supply plans.
2. The alternative water supply management arrangements available and their costs.

Analyses of several institutional issues is contained in this study and these include (Cox and Shabman, 1983, p. 1): existing laws and administrative programs in water resource management, water rights issues, and legal and legislative constraints on water supply development. This study specifically addressed several of the institutional issues in water resource management which are also in existence in East Tennessee water systems.

As in Tennessee, public water supply in the state of Virginia can be provided by various different entities. These organizational entities may include water suppliers such as city and county governments, sanitary districts, public facility districts, service districts, water authorities, and private water companies (Cox and Shabman, 1983, p. 10). The diverse set of agencies responsible for water provision reflects the fact that uniform policies and plans cannot address individual water systems' needs. As a result, the complex institutional arrangements for water provision makes

selection and implementation of water supply plans a difficult process to complete (Cox and Shabman, 1983, p. 10).

Included among the topics covered in this study was an examination of issues associated with water supply planning programs. It is stated that local governing bodies usually are the agencies with the primary responsibility for the provision of public water supplies (Cox and Shabman, 1983, p. 20). Other higher level governmental units such as state, regional, and federal agencies play roles in water resource management, but the nature of water provision makes it mainly a local community issue. However, limited management resources tend to be specifically focused on the development of physical facilities (Cox and Shabman, 1983, p. 20).

The difficulties which local governing units have with water resource management is magnified in small, rural areas. The low number of community residents and a limited tax base in many small communities both combine to restrict the ability of particular water systems from realizing their desire to create effective plans (Cox and Shabman, 1983, p. 20). This inability to deal with water supply problems contributes to problems such as ineffective water system development plans and inappropriate rate schedules (Cox and Shabman, 1983, p. 20). As a result, certain adjustments must be made in the current organizational structures for water provision in order to deal with existing and developing systems.

Summary

The literature search concerning the issue of regionalization turned up limited information which specifically addressed this process. However, the literature reviewed provides a comprehensive view of regionalization as it exists today. The identification of several important aspects of regionalization resulted from this review and these factors are important considerations in evaluating this type of alternative organizational arrangement.

The first concept identified through the review was that the regionalization of water systems has been established as a viable and legitimate alternative available for water provision. An increase in the number of comprehensive analyses of this process has been occurring during the past two decades. As the 1990's begin, a basic conceptual approach using a regionalized organizational structure is constantly being refined. Although this model cannot be applied uniformly to each case under consideration for regionalization, it does provide a set of principles and standards to guide the consideration of this alternative.

At the present time, the majority of regionalized water systems have been developed and implemented in large metropolitan areas. The literature suggested that this is due to the strong resource base which larger water systems possess. The smaller, rural water systems that attempt to consolidate with other systems which are similar in size to

them often encounter conflicts because of competitiveness and local community pride.

Regionalization has been expressed as a local concern, where a local community does not want to lose community sovereignty. As a result, vested interests in small communities are sometimes a constraint to regionalization initiatives. The literature suggests that long-range planning should be undertaken so that the relevant issues and problems of regionalization can be objectively presented where this arrangement is under consideration.

The literature review identified several key issues surrounding the process of regionalization. First, the impact of actions or changes on the customer is seen as an issue. Providing quality service at an equitable rate is seen as the top priority for any utility district. The transition to a regional system should take place in such a way that the affects on the customer are kept to a minimum and their water service is continued without interruption.

Another major issue surrounding regionalization is its relationship to a community's growth and development. Water and sewer services are important aspects which support and sometimes guide the direction and quantity of land use development. The provision of these services should be effectively and efficiently managed so that the negative impacts from an increasing population and future development may be minimized.

The literature review revealed that special attention should be given to water systems which are inadequate in the services they provide. Oftentimes the systems which are experiencing major problems with water provision seek out consolidation arrangements in order to enhance their ability to improve their service. As a result, an arrangement which is equitable to both the weaker water system and the strong system is important in order to avoid conflict.

A final issue incurred is the replacement of outdated organizational arrangements and physical facilities with new ones. The problem of obtaining the capital needed to replace old facilities with new ones forces many capital-poor utility districts to merge with ones with access to capital. The immediate demand for new facilities often precedes long-range planning and analysis. This often results in poor decisions concerning future demand, construction needs, and plant locations.

During the course of the literature review, several problems and benefits of regionalization were identified. The majority of the problems revolved around financial matters. The lack of an adequate financial resource base for many utility districts is often due to the low number of residents and a small tax base. The systems which are weak financially often face major barriers if they wish to consolidate with systems which are sound financially. The outstanding bonds and indebtedness of some utility districts prevents their

consolidation with other systems because the weak system creates too much of an economic burden.

It is seen as a difficult process to convince an autonomous utility district to dissolve and its members give up their power. The loss of sovereignty and control by the governing board of a utility district is seen as a major constraint to regionalization. Public opposition to the process of regionalization was seen to exist for several reasons including:

1. The possibility of increased water rates.
2. A distrust of governmental officials.
3. A lack of relevant and objective information often creates adversarial conditions in the process.

In addition, problems were also seen with the consolidation of the boards of commissioners of participating regional systems and decisions over how this board will prioritize the needs of the system and its customers.

The benefits of regionalization identified in the literature consisted of monetary savings to customers through lower water rates and improvements in services. Also, the consolidation process may result in a system which has the financial resources to undertake upgrading of services and facilities which was not possible for a smaller independent

water system. Other benefits mentioned in the literature included improvements in planning and design, operations, and management through a more experienced and well-trained staff of employees.

Regionalization was also seen as a method of eliminating the proliferation of weak water systems. A large number of systems providing the same service within close proximity often results in duplication of activities, uncoordinated land use development, conflicts from competing communities, and poor management. Consolidation was presented as a way to restructure the large number of current organizations into fewer entities with strong resource bases.

The literature review has provided a diverse set of issues related to regionalization. As funds become more and more scarce and the pressures of development increase, the analysis and implementation of regionalized water systems will continue to warrant serious consideration.

CHAPTER III

REGIONALIZATION SURVEY

Methodology

One of the data collection techniques used in the thesis was a questionnaire mailed to utility districts, individuals, and agencies which have dealt with the regionalization process. The questionnaire was formulated to gain a better understanding of the subject and to identify regionalized utility districts for the case study portion of the thesis. In addition, the questionnaire was designed to provide a list of the most knowledgeable and experienced individuals on this subject. The responses obtained from the participants were compiled and analyzed in order to identify the major issues related to the regionalization of utility districts.

The questionnaire contained six open ended questions aimed at allowing the respondent latitude in formulating their answers. The major areas covered by the questions included the following items concerning utility district regionalization: problems, barriers, constraints, the major concerns and issues, the appropriateness of the process in East Tennessee, the identification of successful and unsuccessful regionalized districts in East Tennessee, and the identification of key individuals knowledgeable about this subject in East Tennessee.

Initially, the questionnaire was mailed to the three development districts in East Tennessee. These districts included the East Tennessee Development District, the First Tennessee Development District, and the Southeast Tennessee Development District. In each case, the questionnaire was completed by those staff members who were most experienced in water resource issues in their respective district. These agencies were useful resources for information because they provide assistance to utility districts on matters related to the districts' development, operation, and facilities (ETDD, 1989, p. 7).

In addition to the questionnaires mailed to the development districts, a document was obtained from the Tennessee Department of Health and Environment which listed all of the utility districts in East Tennessee involved in the provision of water. This list contained the names, addresses, and telephone numbers of the utility districts along with their respective water storage capacities, average daily production, population served, and the number of services provided. The list also contained private water systems such as mobile home and shopping center systems. These water systems were excluded from the mailing due to their limited service area and a lack of participation in the regionalization process.

Finally, other relevant agencies concerned with water resource issues in East Tennessee were identified from the

questionnaire responses and interviews as useful information sources. These agencies were also mailed questionnaires concerning this subject. A total of 140 questionnaires were mailed to individuals and agencies in the East Tennessee area. This area encompassed and was limited to all of the counties served by the three previously mentioned development districts.

Approximately four weeks after the initial survey mail-out, a letter was sent to the same individuals and agencies asking that the surveys be returned by the participants if they had not already done so. The follow-up letter was used in order to increase the response rate for the survey. A total of thirty usable surveys were returned and analyzed which accounted for a response rate of 21 percent. The results were compiled and are presented in this chapter.

Survey Overview

The questionnaire results were analyzed in order to generate information concerning the important issues, water systems, and individuals involved in the regionalization process. Questions number one, two, and three were designed to produce information on the major issues related to this subject while questions four, five, and six, were developed to identify key water systems and individuals involved in this process. The remainder of this chapter focuses on the first five questions of the survey. The sixth question was

formulated for purposes of identifying key individuals to contact regarding this topic and was not intended for analysis.

The first two questions of the survey were designed to produce a list of the major problems, barriers, constraints, issues, and concerns related to this subject. The responses to these two questions were grouped according to the nature of the answer supplied. Answers provided by the participants were not limited to one response per question, but rather several answers were given to each question by a majority of the respondents.

The comments and explanations supporting the participants' responses were also analyzed. In order to more easily compile and present this data, it was grouped into categories according to the major point of the response. The categorization of the participants' answers after the survey was received by the research investigator was done in order to not preclude or limit the particular responses of the participants. These responses were grouped according to the following categories: political and governmental, economic and financial, physical and technical, cultural, management and personnel, geographical, and legal.

In order to provide a consistent understanding of what is specifically meant by each of these categories it is important to define the terms. These definitions were not developed to provide inflexible categories for the responses,

but rather they were used only as a grouping mechanism to make data compilation and analysis more easily. It is beyond the scope of this thesis to study these response categories as direct influences on the regionalization process. Rather, these categories served as groupings of items which the participants gave in response to a question. As a result, the focus of this thesis is on each single response and the aggregation of those responses as they are related to regionalization.

The first four categories presented and defined here include the following: political and governmental, economic and financial, legal, and cultural. The definitions of these categories consist of the following components utilized in a study of Water Quality Management Plans in the southeast portion of the United States (Bowen, 1981, p. 84). These definitions are as follows:

- A. Political and Governmental - includes the policies, and regulations, the powers and duties of federal, state, local and special governmental units.
- B. Economic and Financial - includes fiscal policy, taxes, public and private property, contract, vested rights, competition, and leasing arrangements.

- C. Legal - rules and regulations seen as binding by individuals and nations. These may include statutes, ordinances, administrative regulations, judicial interpretations, and decisions and customs which have gained the sanction of legal authority.
- D. Cultural - includes a diverse set of institutions and may encompass customs, habits, traditions, tastes, preference, goals and attitudes.

Certain elements in each of these categories may extend and fall into different categories. At the same time, these categories were useful in providing a classification and grouping scheme for the responses generated by the survey.

The remaining three categories utilized for questions one and two included the areas of management and personnel, physical and technical issues, and geographical influences. In relation to the regionalization of water utility districts, these three categories may be defined by the following expressions:

- E. Physical and Technical - includes the facilities and equipment used in water provision and the engineering, mechanics,

repair, development, monitoring, testing, and maintenance of these components.

- F. Geographical - includes spatial dimensions, proximity, topography, and physical land characteristics.
- G. Management and Personnel - includes directing, controlling, planning, and servicing of operations and facilities, and issues related to employees.

The preceding definitions provided a framework for the classification system used here. This system was useful in grouping the data and allowing it to be presented in an understandable manner.

Regionalization Problems, Barriers, and Constraints

The first question of the survey, "Based on your experience, what do you feel are the greatest problems, constraints, and barriers to the regionalization and/or consolidation of small water utility districts in East Tennessee?" produced a list of seventy-nine separate items viewed as problems, constraints, and barriers by the respondents. These responses were grouped according to the previously mentioned seven categories. The frequency of occurrence of each response was tabulated for each category and these are presented in Table 1.

TABLE 1
FREQUENCIES OF CATEGORIZED RESPONSES TO QUESTION ONE

Rank	Problem Category	Frequency
1	Political and Governmental	26
2	Economic and Financial	24
3	Cultural	10
4	Physical and Technical	8
5	Management and Personnel	5
6	Geographical	4
7	Legal	2
		—
TOTAL		79

The frequencies of occurrence for each problem does not indicate the magnitude of the problem for the purposes of the thesis. Rather, the frequencies show that this particular problem is one which is commonly viewed as existing in the regionalization process. The magnitude and influence of each problem in this process is beyond the scope of the thesis. Items which are preceded by a numeral indicate that they are ranked according to the frequency of responses. The items which are preceded by a letter are in no particular order.

The first category of problems examined here are those of a political and governmental nature. Responses include the following:

1. Loss of political control.
2. Disagreements between board commissioners.
3. The make-up of the governing board.
4. Failure of board members to make politically unpopular decisions.
5. Rivalries between board members.
6. Apathy of political officials.
7. Fear of annexation.
8. General political climate and barriers.

The most frequently listed problem of a political and governmental nature was seen as the potential loss of control by existing utility districts to a regional authority.

Explanations concerning this problem expressed by respondents showed that the board members of potential regionalization candidates often resent attempts by others to gain control of their district if it means that they may lose their jobs. The vested interests of the board members and other water related agencies in maintaining a small autonomous water system often create conflicts over the issue of regionalization irrelevant as to whether it is a viable alternative to an area's water problems or not. Other responses to question one portrayed many of the small utility districts as having created "small kingdoms" with what is perceived as sovereign powers.

The fact that utility district board commissioners are not elected was perceived as a reason for them not being accountable to their customers. In addition to not having to answer to any overseeing authority, these districts are sometimes composed of members who do not wish to give up having influence and power while playing "the political game." The power base created by some members of certain utility districts is perceived as a major problem impeding the rational consideration of regionalization alternatives.

The next two most frequently occurring problems were seen as those of disagreements among board members and the make-up of the governing board. The disagreements were seen as those which revolve around the general issues concerning the process of combining water systems, or as conflicts over how a newly regionalized system will be operated and managed. An example

presented in a survey response mentioned that a disagreement which often takes place is the order of priorities which the newly regionalized system will undertake. This problem was represented by a situation in which the dilemma was whether to attend to industrial and commercial water demands first, or to provide efficient and clean water supplies to the individual residential water user as the top priority.

Less frequently listed problems under this heading included the failure of board members to make decisions which were not politically popular with their constituents. This was seen as a problem especially in cases where water provision is inadequate and failing to meet customer needs. The inability to make decisions to upgrade the water systems contrary to the general public opinion has resulted in many systems which are consistently experiencing problems and shortages with their water provision.

The next set of problems, constraints and barriers examined consisted of those of an economic and financial nature. These problems were expressed as the following:

1. Lack of funds for service and expansion.
2. Increase in water rates.
3. Indebtedness and outstanding bonds.
4. Difficulty in obtaining outside funding.
5. Questions over responsibilities for funding.
6. Economic efficiency.

The most commonly occurring response in this category dealt with the small utility districts' lack of revenue to maintain adequate levels of water provision. This shortage of capital makes the smaller utility districts unattractive for consolidation purposes as this action could lead to financial difficulties for the larger utility district. The inability of some smaller systems to aid in the financing of a regionalized system often creates an economic hardship the larger systems wish to avoid.

The next problem listed in this category consists of issues surrounding water rate structures, schedules, and pricing mechanisms. There has often been an unwillingness of larger water systems with low rates to take on the costs of upgrading weak systems with inferior operations and facilities. The costs of the regionalization process for systems in these instances often outweigh the benefits received through improved water provision. Many utility district board members and their customers feel that the improvement in water provision through regionalization comes at too high of a cost. As a result, the smaller water systems often desire to maintain their own systems rather than becoming part of a regional water system.

Among the other economic and financial problems restricting the regionalization process included the indebtedness and outstanding bonds which many small utility districts possess. Many of these systems were originally

financed by low-interest Farmers' Home Administration (FHA) loans and these loans are binding until the last payment is made. As a result, there are problems with the acquisition of utility districts with FHA loans because they must be paid off to dissolve the utility district. The remaining problems identified in this category include difficulties with obtaining outside funding, disagreements concerning who will pay for system improvements, repair, and maintenance, and the question of whether the newly regionalized water system will be an economically efficient entity.

The third category of problems expressed in question one consisted of those of a cultural nature. The most frequently occurring response concerned the hostilities and rivalries which exist between cities and between communities. The competition and traditional conflicts between neighboring communities often lead to the resentment of proposals which deal with the joint participation of each area in one organization. Other problems which were listed once as single items to this question included the following:

- A. Pride in one's own small community.
- B. Protective attitude toward one's community.
- C. Personal feelings against a neighboring community.
- D. Fear of a loss of identity as a small independent community.

The next category of problems to be examined included those related to the physical and technical aspects of the regionalization process. These problems exist as the following:

1. Improving and repairing physical facilities.
2. Securing a raw water source.
3. Water source compatibility.
4. Size and condition of water lines.
5. Water quality.

The frequency of problems listed in this category were more evenly distributed than the previous three categories. Issues concerning the physical facilities of potential regionalization candidates ranged from where to make improvements and extensions first to how the varying conditions of the facilities affected debts, assets, and the costs of water.

One problem listed in this category concerned decisions on locating an adequate and acceptable raw water source for the regional water system. The possibility of combining water source supplies to meet water demands was expressed as a potential solution to this problem if there is not a source which can adequately supply the entire region served by the regional system.

The next physical and technical problem enumerated under this category dealt with the chemical make-up of the water sources. The composition of the water for different systems may vary in its chemical content. As a result, this chemical incompatibility may cause the break-up of the sediments in different water lines and produce unsafe water supplies. The incompatibility of water supplies during the physical connection of two different systems is a technical constraint which exists in some areas of East Tennessee. A problem related to this expressed in the survey concerned issues related to the quality, testing, and monitoring of the water supplies within the system.

Another physical problem identified concerned the size and condition of water lines. The decision as to whether increase line sizes often causes disagreements even among those in the engineering field. The poor conditions of some water lines and the decision as to whether to incur the high costs of replacing them often commands more time and effort than utility district authorities and personnel are able to give. This phenomenon makes the consideration of regionalization schemes an often-neglected subject as the system struggles just to maintain its physical facilities and equipment.

The separate geographical problems associated with the regionalization process expressed in the survey were all

related to one another. The problems in this area were seen as the following:

- A. Distances and proximity of facilities.
- B. District boundaries.
- C. Administrative center locations.

A concern expressed by the responses here was with whether the administrative offices would be in close proximity to the water distribution area. This was seen as a concern because the customers often express the desire to have an administrative office dealing with water provision in the immediate area which provides prompt and personal service.

The responses which dealt with management and personnel problems dealt with the following areas:

- A. Qualifications of personnel.
- B. Managerial conflicts.
- C. Public relations.

Concerns were expressed with the ability of employees of a small, rural utility district in being able to adequately function in a newly regionalized system. Without proper training and an upgrading of skills, some of these employees may lose their job under the new system.

The appointment of managers for the newly regionalized system was also seen as a problem. Decisions as to who would be manager was seen as an issue which created conflicts during the regionalization process. Also, the lack of objective and accurate information dissemination through public relations methods was seen as a problem. It was stated that both the advantages and disadvantages of the regionalization process should be presented to the public so that they will be well informed about all aspects of the issue.

The last category related to problems encountered during the regionalization process included those concerned with legal aspects. These problems were concerned with the following areas:

- A. Legal status of loans.
- B. Impact of state and federal regulations.

Respondents stated that some utility districts have mortgaged their tax base away from its current holder to another entity which creates legal problems and constraints for their acquisition by another organization. Also, state regulations concerning the water quality of small utility districts was expressed as a problem because some of these districts are not meeting legal requirements, which in turn makes them unattractive candidates for inclusion in a regional water system.

Regionalization Survey Issues

The second question of the survey, "Other than the problems expressed in question number one, what do you believe are the most relevant concerns in the regionalization of small water utility districts in East Tennessee?," generated a list of issues and concerns the respondents believed were the most important ones to be considered during the regionalization process. These responses were compiled into categories according to the nature of the answer. The categories utilized in the analysis of question two were the same as those used for question one with the exception of the geographical category which contained no responses for question two. The frequency of occurrence for each of these categories is contained in Table 2.

Economic and financial issues and concerns constitute the first category of analysis here. These concerns were organized and grouped into four areas under this classification heading. These areas include the following:

1. Rate structures.
2. Status of district debts and bonds.
3. Costs for improving facilities and services.
4. The availability of grant money.

The majority of responses dealt with rate structures and the ability of water systems to keep them from increasing

TABLE 2
FREQUENCIES OF CATEGORIZED RESPONSES TO QUESTION TWO

Rank	Issue Category	Frequency
1	Economic and Financial	18
2	Management and Personnel	16
3	Physical and Technical	10
4	Political and Governmental	10
5	Cultural	7
6	Legal	2
TOTAL		63

markedly with regionalization. The ability of the regional system to keep water rates reasonable was seen as very difficult because of state and federal regulations which increase operating costs. These costs were not seen as directly related to the treatment and distribution of water, but are an important factor in setting rate schedules.

As with question one, the issue of system debt and outstanding bonds is a concern expressed by the respondents to question two. Each separate utility district could have varying amounts of indebtedness and this in turn would affect water rates, maintenance, and future improvements to the systems. The decision as to whether or not to issue new bonds for these utility districts is a complex decision and was expressed as a possible remedy for this condition.

Another concern in this category is that of costs for improving the facilities and services of water systems. Difficulties arise for smaller utility districts in identifying a source to provide the necessary capital once the system is ready to make improvements. Included in this category were responses which indicated that the costs of improving water quality in order to comply with federal drinking water regulations may continue to increase beyond some systems' ability to pay. In addition, there was a concern expressed that the costs of overcoming topographical constraints in regionalized systems would be cost prohibitive

because of the increased costs of additional water lines in a larger regional system.

The second category of responses for question two included issues dealing with management and personnel. The major issues in this category were as follows:

1. Issues related to quality of service.
2. Personnel and staff matters.
3. Management conflicts.

The most frequently listed issue dealt with the ability of a newly regionalized system to provide efficient and quality service to water customers. Other issues listed under this category included the reliability of service, system improvements, duplication of services, and expansion and adequacy of the services. It was also stated that utility districts far removed from urban areas may be better able to serve their own customers than a city water department.

The next issue listed under this heading included those related to the management of the water system. The need for training programs for unqualified employees was seen as a way of mitigating employment loss of staff members who are not properly trained to carry out their responsibilities effectively. These training programs could be formulated within larger municipal systems which have a professional staff experienced in water resource issues.

Also seen as a consideration in this category was the transitional process for employees in relation to their supervision, pay rate, benefits and other specific job-related problems encountered under a new organization. This was viewed as an after effect of the regionalization process, but it was seen as important for employees to be placed in the new system if they desired to continue their employment.

The final concern in this category dealt with the conflicts which may exist and/or arise between managers of the water systems and the customer. It was stated that these types of conflicts often arise in larger regional systems due to disagreements over who should be managing aspects of the newly regionalized water system. The relationship between management and the customer is often seen as more remote in a regional system. Consequently, the customer may often resent the fact that management is not readily available to provide personal service as was the case before.

The major physical and technical concerns listed by the responses can be grouped into the following three areas:

1. Issues related to water quality.
2. Physical facilities and equipment.
3. Topographical characteristics of the region.

To begin with, smaller water systems were characterized as having inadequate procedures and poor compliance records

in water quality. This could be due to the staff's lack of resources and/or knowledge of acceptable levels of water quality. One respondent stated that systems which are not meeting water quality standards may not wish to merge if there is no improvement in water quality.

The physical facilities and equipment of the water systems were seen as a factor which should receive some consideration in regionalization. Overcoming the incompatibility of water line sizes between merging systems was seen as a problem which retarded regionalization. In addition to these concerns, it was also stated that regionalization may leave some facilities abandoned and unnecessary if one regional plant was used for an entire region. The overabundance of water plants and a shortage of water lines to serve them may make regionalization a very economically inefficient process to implement.

The final concern in this category consisted of issues related to the topography of the area. The East Tennessee region contains many areas where the severity of topographical changes restricts the construction of certain utility facilities and equipment. These changes can cause specific problems in water systems such as lack of pressure and head losses. The inability to surmount physical land constraints often prohibits regionalization arrangements from being realized.

The next set of issues presented are related to the political and governmental factors surrounding regionalization and include the following:

- A. Decision making issues as to whether the the smaller utility district should be sold to the larger system.
- B. Questions of how a city that annexes a territory may purchase the smaller system and the equitable nature of such a process.
- C. How the newly regionalized utility district will operate and what effects the governing board has on these actions.
- D. Identifying and securing area-wide and/or regional planning mechanisms.
- E. The appointment of the regional authority.
- F. The distrust board members have of governmental regulations.
- G. Questions of who will be the controlling authority for the regionalized system.
- H. Loss of local political power and control to an outside agency.
- I. Questions of discrimination by unfair representation on the governing board.

The wide range of responses in this category exemplifies the variety of political and governmental concerns which exist in regionalized water systems.

The next category of issues examined were those which were categorized as cultural. These concerns were divided into four separate areas as follows:

1. Lack of education.
2. Distrust of outside authorities.
3. Fear of losing a small system with personalized service.
4. Need for public participation.

These responses indicate the need for education concerning regionalization issues so that the customers will have an accurate information base which identifies both the advantages and disadvantages of the process.

The second area of concern in this category deals with the distrust many communities harbor for larger governing bodies. It was stated that small communities are often fearful of large systems because they have the ability to alienate customers. In addition, responses indicated that customers which rely on another utility district or city to provide their water may be afraid that if problems arise, their water service may be interrupted. This potential problem could be alleviated beforehand by informal or

contractual agreements, but the community beliefs are difficult to change where the customers have been served by the same small system for decades.

Another issue under this heading included the community's fear of losing their system to a regional authority. Personal attachments to a community system were seen as barriers to overcome in attempting to gain public support for a new regional system. A way of dealing with these cultural concerns was suggested in some of the responses. One idea revolved around making public participation programs mandatory in a regionalization process in order to avoid alienating the public.

The last category of issues pertaining to question two consisted of those related to the legal aspects of regionalization. These issues were divided into the following two categories:

- A. Regulations and enforcement.
- B. The additional costs of meeting regulations.

First, the matter of whether the state effectively enforces health requirements on all smaller utility districts' water supplies was a concern. The ability to improve the quality of water to meet drinking water standards has pushed many systems to consider a regional system.

Secondly, concerns over the new amendments to the Safe Drinking Water Act which went into effect in 1986 have increased the overhead costs of monitoring and testing water quality. These requirements have increased the costs of laboratory time, labor cost, and travel to a level which many smaller systems are unable to afford. Again, the possibility of joining a system which has the resources to meet these standards is appealing to many smaller systems.

Appropriateness of Regionalization in East Tennessee

The third question in the survey was, "Based on your experience, how appropriate and/or successful would the regionalization of small water utility districts be in the East Tennessee area?" It was aimed at discovering the reasons why regionalization may or may not be a viable organizational alternative. The responses to this question were categorized into three groups based on the nature of the answer. These groups included those responses which stated that this process would be appropriate, those which stated that it may or may not be appropriate depending upon the particular circumstances, and those responses which stated it would not be appropriate.

Those responses which supported the appropriateness of regionalization in East Tennessee were compiled into a list based on the reasons for the support. These reasons in support of regionalization include the following:

1. Improvements with regulations compliance.
2. Economic benefits.
3. Improvement in service.
4. Pooling of equipment.
5. Statements indicating general benefits.
6. Planning issues.
7. The effects of drought.
8. Legal issues.
9. Water quality.

A closer examination of these individual factors which support the concept of regionalization can provide insight into the reasons behind this support.

The process of regionalization was seen as being appropriate in this area because if it were accomplished, it would assist the districts in meeting the more stringent water quality standards of the state and federal government. Further, it was stated by some respondents that regionalization may be the only means of survival for the very small, rural utility districts. Regionalization was seen as a way to provide stable and dependable supplies of water into the future. It was suggested that the politicians of a district considering this alternative should put aside their political disagreements and follow the lead of water professionals in establishing an effective and efficient regional system.

The regionalization process was also seen as appropriate for economic and financial reasons because it is viewed as a way to save money and provide stable rate schedules. If one large regional plant was established in place of smaller ineffective ones, regionalization could be successful. The increase in the customer base would require professional bookkeeping and billing procedures, which may in turn reduce costs for service in the long run.

Other responses to this question indicated that regionalization could benefit the customers in terms of economies of scale and improvements to the area's infrastructure. Many small systems are seen as inefficient water providers because they are poorly documented and unregulated water supply systems. Regional arrangements are seen as a method of reducing the burden of monitoring and testing for the Tennessee Department of Health and Environment because they would not have to track down and test the multitude of small, rural water systems.

The improvements in the areas of service to customers and the facilities and equipment were seen as a reason supporting regionalization. The upgrading of the quality of service through improvements in facilities, equipment, and personnel were seen as possible by the additional financial and management resources found in regionalized systems. One of the benefits which could be realized through regionalization is when equipment is placed in a pool and used by each area

of the region as needed. Activities such as servicing, meter reading, and construction could be more efficient. It was stated that initial costs of this system would be high, but that this could be recovered in a few years as additional accounts were added to the customer base.

The remaining reasons which support the concept of regionalization involve planning and governing issues, water quality, and the effects of droughts. It was stated that the areas served by a regional system should be run by a regional authority which provided water at a bulk rate to individual distributors.

Long-term planning and future projections of water resource needs are seen as components of a regional system which smaller systems do not have the resources for. Also, the combining of water lines would provide a system that would be of such a magnitude as to ensure continuing safe water in the wake of increased regulations.

The effects of drought on water supplies was seen as a reason for the implementation of regional systems because small systems often run short of water during drought conditions. Regional systems are seen as having the capabilities of dealing effectively in water provision during drought conditions.

Another category of responses to question three included those which stated that the success or failure of regionalization is contingent on specific conditions and

factors. Four of the eight responses in this category stated in general that regionalization may or may not be appropriate depending upon a variety of factors. It was stated that the prospects ran from very favorable in several areas to nearly impossible in other areas of East Tennessee.

Other respondents stated that the concept of regionalization may only be appropriate in times of emergencies. Utility districts are subject to disaster and emergency situations which could temporarily render them unable to furnish water to their customers. As a result, a regional arrangement of interconnected districts could help to alleviate this potential problem as the districts could aid one another in the provision of water during periods of shortages. However, it was stated that each individual system should be responsible for its own share of the costs to operate its own system and would retain autonomy in non-emergency situations.

Responses to this question also indicated that regionalization could be appropriate in many cases subject to certain conditions. Preeminent among these conditions was the fact that regionalization would require a legislative mandate for implementation. This is so because there is no power to force this process on a utility district because districts are self perpetuating until a customer base of 1,500 is reached in the area served by the district. When consolidated, the commissioners of the governing authority are appointed by the

county executive from information supplied by the utility district. As a result of this legal process, the utility district is not publicly accountable for its actions.

Other responses indicated that regionalization would be successful in general if the problems and barriers could be overcome. It was stated in one response that the process should be one which takes a gradual path and wins public consensus during the process. Rapid and hostile takeovers of other utility districts have often resulted in increasing conflicts. As a result, some of these disagreements are taken to a court of law to be settled.

The ability of a system to successfully regionalize was seen as contingent on its commitment to a variety of issues. The capability to obtain outside funding was seen as a factor that is a prerequisite to regionalization. Another factor was seen as the ability of local officials to set aside adverse personal feelings and competition in order to develop effective systems.

The other two responses in this category were related to annexation issues and the size of water lines. First, the complexities of providing services to annexed areas was seen as an issue which must be addressed before regionalization could be successful. The decisions as to how to go about provision of water in areas served by small water systems involve issues such as whether to purchase a system which is currently serving the area. Secondly, the regionalization

process was seen as less of a problem if the utility districts were required to provide water line sizes that would be approved for fire protection. This would create more compatibility of water lines and would also ensure adequate pressure for customers.

The third category of responses for question three included answers which indicated that regionalization would not be appropriate in East Tennessee. Of the four responses supporting this possibility, two were of a political nature. The first response stated that the overall political climate of an area could create insurmountable barriers to regionalization.

The second response under this heading indicated that the Tennessee Association of Utility Districts (TAUD) is such a strong lobbying group that they would organize to fight many regionalization attempts. It was felt that this association maintained its power base through having large numbers of district members and they did not wish to lose any members through absorption by larger systems. Another response which stated that regionalization would not be appropriate indicated that small utility districts have a better working relationship with the public and that their response time is better than larger systems.

In addition, the fourth response in this category stated that attempts to force regionalization on smaller utility districts has created anger, hostility, and distrust of larger

systems. The smaller systems often fear that they may incur higher rates without additional benefits if they are joined with a system which has faulty operations and high indebtedness.

Regionalized Utility Districts in East Tennessee

The purpose of question number four, "Could you please identify and list examples of small utility water districts in the East Tennessee region which have been unified using consolidated organization or successfully organized using a regional approach?," was to compile a list of specific water systems in East Tennessee which have been involved in a successful regionalization process. The utility districts in this list were candidates for the case studies.

The following utility districts were listed in response to this question:

- A. The Anderson County Utility Board consolidated with Marlow Utility District in 1982.
- B. Knoxville Utilities Board consummated a takeover of East Knox Utilities.
- C. The City of Rogersville and Big Creek Utility District consolidated.
- D. The City of Kingsport consolidated with portions of the North Kingsport Utility District.

- E. First Utility District of Hawkins County and portions of Kingsport water system merged.
- F. Hiwassee Utility Commission produces water for Cleveland Utilities, the City of Athens, and several other utility districts.
- G. Lookout Valley Utility District joined Tennessee-American Water Company.
- H. North Bradley Utility District joined Cleveland Utilities.
- I. Tellico Area Services Systems operates a regional production plant and sells water to several other utilities.
- J. Fountain City and Suburban Utility Districts merged into Knoxville Utilities Board in the 1960's.
- K. Fincastle Utility District merged into LaFollette Water System in the late 1960's.
- L. First Anderson Utility District was absorbed by Clinton Utilities.
- M. Cocke County Utility District and Newport Utilities Board merged.
- N. Greene County Water Systems buy their main supply from the City of Greeneville.
- O. Johnson City has purchased several utility districts in the past several years.

- P. Watts Bar Utility District has been involved in regionalization arrangements.
- Q. Sevierville, Gatlinburg, and Pigeon Forge are investigating a jointly-owned supplemental treatment facility.

It should be noted that the forms of regionalization for these systems are not similar in nature. Rather, there are several different forms of regionalization arrangements represented by these systems.

Question five in the survey, "Could you please identify and list examples of small utility water districts in the East Tennessee region which have experienced problems in implementing regional organizational schemes?," was designed to produce a list of systems which could be compared with those in question four. The comparison assisted in understanding how successfully regionalized systems overcame some of the problems experienced by unsuccessful regional schemes.

The following is a list of systems the respondents categorized as having experienced problems in the regionalization process:

- A. Russellville-Whitesburg Utility District and Bulls Gap Utility District.

- B. The City of Kingsport and Fall Branch Utility District.
- C. Johnson City and Colonial Heights Water System.
- D. Copperhill, Tennessee and McCaysville, Georgia.
- E. LaFollette Water System and Caryville/Jacksboro Water System.
- F. Anderson County Utility Board has attempted a merger with Andersonville Utility District.
- G. Knox County Utility Districts.
- H. Utilities surrounding Grundy County.
- I. The utilities in the Copper Basin, Polk County.
- J. The utilities in Hamilton County.
- K. Huntsville Utility District and City of Oneida.

The inclusion of a water system in this list does not indicate a failure of a regionalization process. Rather, the list is one which reflects the experiences and opinions of the respondents to the survey question.

The lists produced by questions four and five were used for the purpose of identifying specific water systems involved in regionalization in East Tennessee. Specifically, question four provided a list of water systems from which five case

studies were chosen. Question five identified water systems which have experienced problems with regionalization. Further investigation of these systems provided insight into the major issues causing these problems.

Summary

The survey generated a broad array of issues and problems concerning regionalized water systems. Political and economic problems associated with regionalization are important in that more than half of the total number of problems identified fell into these two categories. Cultural and physical problems constituted the next two most frequently occurring categories of problems. Management, geographical, and legal problems were listed less frequently.

A major political problem identified was the fear of governing boards of losing political control and power. The vested interests of board members in the continuing operation of a small water system in order to promote their self interests is seen as a constraint to the objective consideration of regional alternatives. The political power and autonomous authority given to some governing boards is seen as a constraint to the implementation of a regional agency in areas once served by several utility districts.

The next two political problems are disagreements between board members and representation on the board. A major area of disagreement is over the type of operational and management

structure that will be implemented in a regional system. The issue of representation on the regional board is seen as a problem in areas where customer needs were not identified and served by the existing water system authority.

Another political problem identified was the failure of board members to make politically unpopular decisions which may be necessary in order to improve a water system. It was stated that decision makers must address the long-range needs and demands of an area objectively in order to provide ample supplies of water in the future. Other political problems listed include apathy among political officials in attending to water resource issues, conflicts surrounding annexation, personal rivalries between board members, and the general political barriers and climate to regional systems.

A lack of capital was identified as a major financial problem encountered by small water systems. The inability of small systems assisting in the financing of a regionalized water system presents an economic burden. Another problem is the potential for higher rates under a regional system. Customers of smaller water systems do not want to pay higher water rates if their system is providing adequate water already.

The liability resulting from outstanding debt of utility districts was seen as another problem area. These debts must be paid off or assumed by the absorbing system. A regional water system should have the capability to incur a bond debt

if one exists. Among the other financial problems identified were difficulties with obtaining outside funding, disagreements concerning who will pay for system improvements, repair, and maintenance, and questions of economic efficiency.

A major cultural problem associated with regional water systems is the rivalries and hostilities between neighboring cities and communities. The competitive nature of communities makes it difficult to gain a consensus for a regional organization. Other cultural problems identified included community pride, protective attitudes toward the community, personal feelings against a neighboring community, and a fear of losing the identity that comes with being a small independent community.

Improvements and repairs to equipment and facilities are the main physical and technical problems for water systems. Attention to the physical aspects of water provision is seen as the first step in upgrading the overall quality of service. Other problems which exist include questions concerning the choice of raw water source and its compatibility with other systems' supplies, the size and conditions of water lines, and the quality of water.

The geographical problems are expressed in terms of the proximity of facilities and offices to the service area. It was stated that customers often desire a service facility and/or administrative office in close proximity to take care of their needs with prompt and personal service. A loss of

service and administrative activities by a small, local water system to a larger organization is seen as a source for apprehension.

Problems in the management and personnel category dealt with the conflicts between managers and the qualifications of personnel. Problems with managers occur in two areas. First, decisions concerning regionalization alternatives are sometimes made difficult by disagreements in systems with more than one manager. Secondly, the question of who will manage the regional water system may cause conflicts if a manager has not already been appointed.

The final category of problems identified involved legal aspects. The inability of some water systems in meeting water quality regulations has made them less desirable for purposes of consolidation. Also, the question of who is legally responsible for the debt of a utility district can impede the progress of system acquisition by another entity.

The most important issues concerning the regionalization process were grouped into the same categories as those used in the identification of problem areas. The majority of the responses dealt with economic and financial issues. The specific economic issues generated were similar to those expressed as problems. These reasons were discussed earlier and covered the following components: (1) rate structures, (2) status of debts and bonds, (3) costs for improving facilities, and (4) the availability of grant money.

The major issues identified in the management and personnel category revolved around the quality of service provided by the water system. It was stated that training programs may be one solution available to upgrade the skills of unqualified personnel making the transition to a regional water system. The relationship between a staff which is adequately qualified and the quality of service delivered was stressed as one which is a key to the successful operation of a regional system.

Issues dealing with the physical facilities and the topography of an area were identified as major physical concerns. The compatibility of equipment and facilities of different systems merging into a regional scheme is seen as an important issue. The matching of facilities to present and future water demands is seen as imperative for an economically efficient system. Concerns were also expressed over the East Tennessee topography and the constraints it may present for development of water plants and lines. However, this was seen as only a minor problem as severe physical constraints could be avoided by not developing in these areas.

The political issues identified surrounding regionalization covered a wide array of concepts. These included many of the responses which were also seen as political problems including: questions of representation on the governing board, loss of political power, annexation, and the governing and operation of a newly regionalized water

system. Other political issues identified in addition to these included decisions involving the sale of utility districts, the formulation of regional plans, and the distrust board members have for certain governmental regulations.

The major cultural issue is seen as a need to educate the general public. Informing the public concerning both the advantages and disadvantages of regionalization is seen as a way of eliminating many misperceptions about this process. It was stated that a more aggressive public participation program in communities may aid in reaching a consensus concerning decisions of organizational alternatives. These may reduce the alienation experienced by the public by informing and involving them in the entire process.

Another area of concern expressed dealt with the distrust some communities have for outside authorities. It was stated that customers may be reluctant to support a new form of water provision after being served by the same one for years. The customer's confidence in the ability of their water system to provide quality service is seen as important in the overall acceptance of a new system.

As with the problems related to regionalization, the major legal issues were identified as those associated with water quality regulations and standards. The costs of monitoring and testing water has been increasing with the more stringent water quality regulations passed in the mid 1980's. As a result, the inability in meeting these regulations by

some of the systems has provided the impetus for these systems to merge with others which have the resources to upgrade water quality.

The majority of responses generated from the survey indicated that the regionalization of water systems in East Tennessee either would be appropriate, or may appropriate subject to certain conditions. Four respondents stated that, in general, this process would not be appropriate for the area. The major advantages of a regional system were expressed as improvements in regulatory compliance, economic benefits, and improvements in service.

Regionalization was seen as a way of providing clean and dependable water through a diversified resource base. Some respondents stated that, in the wake of more stringent water quality regulations, this process may be the only way to ensure the existence of rural utility districts into the future. Also, establishing one regional plant and/or distributor to replace ineffective ones may eventually produce lower rates than would be experienced by multiple agencies. The regional water system was seen as a way of upgrading facilities and operational procedures through the additional financial and managerial resources of a larger system.

The successful implementation of regional water systems was seen as a process which is contingent on a gradual movement toward a centralized system. The sudden takeover of a utility district by another entity often leads to

insurmountable barriers and resentment of a regional system. If carefully planned and analyzed, regional water systems are seen as providing many specific advantages over old organizational arrangements. These include a larger inventory of physical equipment which may be pooled for use, improved utility planning and development, a reduction of drought impacts, and improvements in water quality.

Another set of responses from the survey indicated that regionalization may be appropriate subject to certain conditions. It was stated that in general, the prospects for regional water systems in East Tennessee ranged from very favorable in some areas to almost impossible in other areas. The ability to obtain outside funding and the reduction of political conflicts between local officials were both seen as important issues to resolve before implementing a regional scheme.

The next set of responses indicated that regional water systems would only be appropriate in times of emergencies. This concept revolves around the idea that a cooperative effort of need identification and water delivery would result only in times of water shortages due to droughts, disasters, or some other type of emergency situation. A coordinated system provides water in situations and to places which are experiencing difficulties. This type of arrangement currently exists in some areas in an informal way. A major concern

expressed is that each member of this type of arrangement would assist in financing the system.

In addition, the regionalization of water systems and its relationship to annexation issues in a particular area was noted as an important consideration. It was stated that many residents believe that the creation of regional systems is a preliminary action to annexation. The consideration of annexation and regionalization at the same time may create unnecessary conflicts and clouding of issues that would not result if regionalization was being considered alone.

The survey also produced responses which indicated that regionalization would not be appropriate in East Tennessee. The main reasons stated for this were political in nature. First, the general climate of an area was seen as a major constraint to regional water systems. The vested interests and unique local nature of decision making are seen as strong enough barriers in themselves to prevent a regional system from being developed.

Secondly, it was stated that the lobbying group for utility districts in the state of Tennessee balks at many efforts to consolidate districts. The responses indicated that this organization maintained its strength through the number of members it is able to enlist. Lessening the number of members through consolidation of districts into one regional authority is seen as a process which this group would resist through legislative channels.

In addition to these political barriers to regionalization, other problems were seen in the areas of community hostilities and quality of service. The anger and dissension which results from a forced takeover of a small water system can create distrust of larger systems. The prospect of higher water rates from a system which the customers fought against and did not want is seen as an insurmountable problem for regionalizing water systems. Also, it was stated that the smaller independent water systems are able to provide personalized service to its customers with a better response time than larger systems.

The regionalization survey provides insight into the problems, issues, constraints, and barriers affecting this process in East Tennessee. The respondents who participated in the survey all have experience with this topic and were able to characterize problems which will be encountered and issues which must be faced.

CHAPTER IV

REGIONALIZATION CASE STUDIES

Case Study MethodologyPurpose

The issues and problems related to regionalized water systems are diverse and complex. In order to better understand the factors which influence this process, it was necessary to examine specific water systems in East Tennessee. The analysis of these systems provided more information concerning the problems, issues, constraints, and barriers to regionalization. The case studies furnished additional information to the research which was not available through the literature review and survey.

Sample

The selection of the sample was undertaken in a systematic way. To begin with, a list of regionalized water systems in the East Tennessee area was generated from the survey. This list contained seventeen water systems which have regionalized, or have been involved in regionalization plans. Some of the cases involved the regionalization of several systems. The list also contained both publicly and privately-owned water systems.

The instances of regionalized water systems on the list were grouped into three geographical areas based on development districts in East Tennessee and the counties they serve. These districts included the East Tennessee Development District, the First Tennessee Development District, and the Southeast Tennessee Development District.

Five water systems were selected for the research in order to provide adequate diversity in the sample. Certain criteria was formulated for the selection of case studies. This was done in order to provide a representative sample of regionalized water systems in East Tennessee which would contribute useful information to the analysis of this subject. The criteria consisted of the following: the type of organization, their geographical area, the number of customers served, and the projected population growth of the area served.

The case studies consisted of two in the East Tennessee Development District, two in the First Tennessee Development District, and one in the Southeast Tennessee Development District. Table 3 lists each of the five water systems selected for case studies. These systems represent a cross-section of organizational characteristics, management techniques, population served, geographical location, and facility sizes. The case studies included a variety of organizational arrangements and at least one utility district was involved in each regional system which was studied.

TABLE 3
REGIONALIZATION CASE STUDIES

Water System	Development District	Population Served
Knoxville Utilities Board	East Tennessee	151,379
Clinton Utilities Board	East Tennessee	12,531
City of Kingsport	First Tennessee	71,172
City of Rogersville	First Tennessee	6,462
Tennessee-American Water Company	Southeast Tennessee	177,147

The research was focused on small utility districts with a population served of less than 50,000. Although three of the case studies have a service population over 50,000, there were utility districts with population bases under 50,000 involved in the regionalization with larger systems. Thus, the study is not limited to only the regionalization of small water systems with one another, but also included small systems absorbed by larger systems.

The Interview Format

The findings in the case studies are based on information collected through a series of interviews with key members of the water system's staff. Table 4 lists the persons interviewed during this process. The research on the case studies was supplemented by an examination of documents, reports, maps, and other literature related to the regionalized water system.

The water systems were contacted by telephone in order to set up an interview schedule. After appointments were secured with individuals within the water system, an outline was mailed prior to the interview. This was done in order to familiarize the participants with the types of information they would be asked to provide.

The outline for the case studies was used as a guide during the interviewing process. The interviewees were advised to add additional comments and suggestions during the

TABLE 4
LIST OF INTERVIEWS

Water System	Interviews	Title
Knoxville Utilities Board	Larry Fleming	Superintendent, Bureau of Water/ Waste Water
Clinton Utilities Board	Byron Hale	General Manager
City of Kingsport	Evans Carr	Director, Community Services
	Daniel Wankel	Environmental Engineer
City of Rogersville	Phyllis Golden	Bookkeeper, Water Department
	Scott Horn	Water Superintendent
Tennessee-American Water Company	Richard Sullivan	Vice President and Manager

process of addressing the items on the outline. The interviews were taped in order to ensure that the information would be accurately presented in the thesis. The interviews ranged from one hour in length to two and one-half hours.

At the conclusion of the interviews, the participants were asked to sum up the issues and problems with regionalized water systems. This was done in order to identify any important information which may have been overlooked during the completion of the outline items. The responses provided the thesis with information which was unique due to the different local environments surrounding each regional water system.

Knoxville Utilities Board

Background

The consolidation of Knoxville Utilities Board (KUB) and East Knox Utility District (EKUD) officially took place on June 1, 1988. KUB is an independent municipal utility under a charter which gives it the authority to purchase, produce, and distribute water for the City of Knoxville, Tennessee. KUB is the main provider of utility services in Knox County including electricity, water, waste water, and gas. KUB is also free from the jurisdiction of city officials and the city council. The water system serves a population of 151,379 and

produces approximately thirty-two million gallons daily (mgd) of water.

East Knox Utility District (EKUD) was a utility provider for the area made up of the eastern portion of Knox County. The utility district was originally organized in a manner similar to other utility districts in the state of Tennessee. The district was formed by state legislation as a quasi-governmental agency under the authority of the county executive. The service area of EKUD was adjacent to KUB's and EKUD was the main water supplier to this area of its jurisdiction.

EKUD served residents of an area approximately seventy-five square miles bounded by the Tennessee, Holston, and the French Broad Rivers to the Knox County line. The raw water source for EKUD was the French Broad and Holston Rivers. The provision of water was handled primarily by two water plants. One plant was located at Holston River while another plant was situated in the Forks of the River Industrial Park. The water system was staffed by eighteen employees and served a population of approximately 4,200 residents. There were approximately 150 miles of water lines in the system. There were no unusual topographical characteristics in this area which created major barriers to the provision of water.

KUB is financed through revenue bonds sold on the market. This revenue-based entity may borrow money and issue bonds within specific legal limitations. EKUD was also financed by

revenue bonds in addition to a Farmer's Home Administration loan. These low-interest loans have been used by many utility districts when originally organized. The financial resources of EKUD were seen as adequate for the provision of water. However, the high cost of providing sewer service was viewed as a major barrier to the continued existence of this utility district. Development in the area required additional sewer facilities which EKUD was not able to finance.

The quality of water being delivered by EKUD was seen as fairly clean and healthy. However, the state of Tennessee had only provisionally approved the water quality for EKUD. This means that the district could still provide water to its customers and conduct business. However, this also means that specific problems with water quality had been identified and reported to the state. There had been reports of red water within the EKUD water system, but no serious hazardous conditions concerning water quality existed in the system.

The Regionalization Process

The impetus for the consolidation of KUB and EKUD came out of discussions which started in the mid-1980's. EKUD was managed by two persons and one of the managers contacted KUB concerning the acquisition of EKUD. Also, there was support for this process in its initial stages from at least one member of the EKUD Board of Commissioners. The discussions between management and the commissioners of EKUD and KUB

eventually evolved into a discussion concerning the most efficient way to implement this regional arrangement for water provision.

There were several reasons given as to why the consolidation of these two entities took place. Many of these factors stemmed from the major problems with the water system of EKUD. These included:

1. Limited fiscal resources for future developments in the system.
2. Inadequate utilities to support future land use growth and development in the area.
3. Low level and quality of service.
4. Difficulties meeting water quality regulations.

One of the major problems with EKUD was that its financial base was not sufficient enough to finance improvements in its sewer facilities and service. The costs of providing sewer service is extremely high compared to that of water. The capital for financing water systems comes more easily as it is based on water consumption. However, sewer service relies on gravity for the movement of its contents rather than a pumped pressurized system. As a result, non-gravity driven parts of the system are expensive to operate because of the costs of pumping equipment.

The ability to provide sewer service was seen as a prerequisite for land development in the service area of EKUD. The availability of water and sewer service was seen as necessary to be in place early in the land use development stage of the area. Many tracts of land in this area were already served by water and the addition of sewer service was seen as necessary for development in the future. Providing sewer service to complement water service was seen as possible through regionalization with KUB, but the provision of sewer service was not a viable alternative for an independent EKUD.

Another reason for the consolidation was that the level and quality of service was seen as improved under a regional system. Although rated fair overall as a water system, EKUD had been characterized as having poor customer service in a few areas. The addition of KUB finances, management, services, and personnel were seen as improvements in the water service to residents, businesses, and industries in the area. KUB was viewed as an established utility provider which had been successful in its operations and services. The large size of KUB relative to EKUD was seen as an advantage because of its broad-based resources.

As stated earlier, EKUD had experienced some problems with the quality of water within its system. The problems with water chemical make-up and substandard drinking water were seen as insurmountable by a small system with limited resources, equipment, and personnel. The potential for an

improvement in water quality through consolidation was seen to be possible by the addition of a well-trained and full-time professional staff in KUB's Water Quality Division. KUB could test and monitor water quality and also possessed the resources needed to correct deficiencies which EKUD could not.

Several other issues were mentioned as being less important to the process of regionalization which occurred between these two entities. The state legislation providing for the consolidation of utility districts was not a problem for the regionalization of these systems because the process was basically a straightforward legal procedure. The main concern with the financial aspects of the regionalization process was with the bonds held by EKUD. Some bonds were so old and dated that KUB could not find out who the owners were. Eventually though, EKUD's bonds were bought by KUB and the district became part of KUB's system.

Other issues seen as having minimal impact and importance on this process were annexation and drought. The location and nature of the land area served by EKUD and its proximity to the Knox County line contributed to making annexation a non-issue in this regionalization process. Also, drought or the potential for drought was not a contributing reason for this process. KUB officials feel this area is well supplied with water and is not susceptible to water shortages.

There were minor problems with the compatibility of water lines and physical facilities as the two systems combined.

However, no major problems have been encountered which affect the provision of water to this area's water customers. At this time, facilities and equipment of EKUD are still being integrated into KUB's system. Although no new facilities have been constructed, the probability is high that some new plants will be built as plants such as Wooddale on Riverside Drive close.

The culmination of discussions and meetings concerning the consolidation of KUB and EKUD resulted in the district dissolving and becoming absorbed by KUB. The agreement concerning the consolidation was a long-term process which included agreements on the issues mentioned earlier. Before the consolidation was officially implemented on June 1, 1988, certain final considerations had to be completed.

First, a complete buy out of all of the outstanding bonds of EKUD was completed and the utility district moved under the financing of KUB. Secondly, the issue of liability insurance for the directors of the water system was important as they did not want to be personally liable for any activities which occurred in the former utility district. Other issues agreed upon included discussions of employee-related concerns and service to the customer. After certain difficulties with attorneys and engineering firms were overcome, the regionalization was complete.

The Regional Water System

After completing the regionalization process, EKUD was no longer an entity providing utility services. The charter of EKUD was taken and legally merged into KUB. The Board of Commissioners terminated its responsibilities and the KUB Board became the authority over the utilities in this area. Also, all EKUD personnel which desired to continue their employment were absorbed by KUB and became employees under the supervision of KUB management.

The regionalization of these entities in this instance was seen as a straightforward process which had few unique characteristics or problems as compared to other regionalization schemes in East Tennessee. The consolidation was seen as successful because the transition for the EKUD system and its customers encountered no major problems. The provision and quality of water in the area was maintained and improved following the consolidation. The process was made more successful because the actors involved had to sacrifice little. Minimal impacts on the system, its employees and customers allowed the consolidation to take place without much dissent.

The specific geographical area served by KUB remained the same as that of EKUD. As stated earlier, this included the territory bounded by the Tennessee, Holston, and French Broad Rivers in the eastern part of Knox County. In addition, KUB provides utility services to a limited portion of Jefferson

and Sevier Counties in this area. The raw water source had remained as the three rivers in this vicinity. Integration of water plants took place in order to provide for efficient provision of water. Water plants in the Forks of the River Industrial Park and at French Broad River provide water for this area and the French Broad River Plant has won several awards for its operations. The plant is being integrated into the KUB system more easily because its costs for production were similar to those being experienced by other KUB water plants.

At the present time, KUB is spending a large sum of money on physical facilities and equipment in this area in order to increase the efficiency of water provision. Investments are also being made in sewer systems and water plants to expand capacity. Storage capacity was seen as a neglected issue in the past but it received increased attention after the consolidation.

It was stated that the costs of developing sewer systems under a regionalized system is lower than what may have taken place by an independent EKUD. While funds were being allocated to upgrade the utility facilities in this area, care was being taken to balance the amount being spent and the quality of service being provided. KUB is taking the relationship between utility service and growth and development seriously as they try to coordinate this process

effectively with servicing the needs of residents, businesses, and industries.

The investment to upgrade the physical facilities and equipment in this area was seen as a way of improving water quality. Whereas the EKUD water system was only provisionally approved, the water quality was improved so that the system is now fully approved by the state. KUB has a seventeen-person staff responsible for monitoring and testing water. Two aspects of water quality have been emphasized since the consolidation of the systems. First, the upgrading of distribution facilities has been the major method for improving water quality. In addition, the replacement of old water lines with new and larger ones has eliminated some of the sediments and deposits which pollute the water.

Along with the consolidation of this utility district came changes in administrative procedures. EKUD had maintained a branch business office in its service area and it was closed following the consolidation. KUB also had a branch office in this area and it now serves in the capacity of the closed EKUD office. The administrative operations of the water system changed to follow those of KUB. The close proximity to Knoxville made the delivery of services in this area an easy transition after consolidation.

The employees and staff which desired to join the KUB system were provided with employment opportunities by KUB. This process of transition was seen as orderly because EKUD's

staff was well-trained and able to adapt to KUB's system of operations with minimal difficulties. However, there were some problems encountered with the technical aspects of EKUD. An upgrading of the quality of maps, metering records, and inventories of water line sizes was instituted to erase deficiencies in the documents. KUB maintains that it has the resources and staff to improve the technical aspects of the water facilities in this area.

After EKUD dissolved and the area it served became KUB's responsibility, the KUB Board of Commissioners became the governing authority of this area. This board consists of seven-persons appointed by the mayor for seven-year terms. The need for longer terms was seen as a way of providing continuity in the long-term planning required for utility systems. No board member from the EKUD system is on the KUB Board of Commissioners. However, KUB assures that the needs of this area are identified and planned for using professional management and supervisory procedures.

Since the consolidation was made official two years ago, there are certain problems and benefits which have surfaced. The general problems of the process were seen as minimal and the consolidation has been characterized by KUB officials as a win-win situation for both entities. The main area of concern was the waste water plant in the Forks of the River Industrial Park which was a chronic violator of water standards and regulations. However, KUB has implemented plans

to alleviate the problems caused by this inadequate facility. The areas of administration, personnel, governing, and operations were not seen as hindrances to this process.

Benefits of the consolidation were realized in several areas. The most important benefit produced by the consolidation was lower water rates for former EKUD customers. The rates being charged by KUB for utility services were actually lower than the rate schedules of EKUD at the time of consolidation. This in turn relieved many of the potential conflicts which could arise when one system merges into another with higher rates. Advantages through economies of scale for KUB resulted in their lower rates which the smaller EKUD system was not able to achieve. Table 5 displays the water rates of Knoxville Utilities Board for residents living both inside and outside of the city limits:

TABLE 5
KNOXVILLE UTILITIES BOARD WATER RATES

Cubic feet Consumed	Monthly rate per 100 cubic feet Inside City	Monthly rate per 100 cubic feet Outside City
First 300	\$6.25	\$9.35
Next 9,700	1.64	2.45
Next 30,000	1.11	1.64

Source: Knoxville Utilities Board, 1990.

Another benefit is that deficiencies in services were eliminated. The broad-based inventories of personnel and resources of KUB has allowed a more effective and efficient delivery of water to customers to occur. A lack of quality services and slow response times were major problems with EKUD. At the same time, water quality has been enhanced and presently meets or exceeds state water standards and regulations.

Utility service capable of supporting future growth and development was seen as another benefit of the regionalization of these systems. EKUD was an effective provider of water when originally established. However, this type of utility district became outdated as the pressures of development increased in East Knox County. As a result, the consolidation of EKUD and KUB was seen as a way to provide needed utility services. Urbanizing areas require higher levels of service than residential or rural areas and also command greater investment to meet the demands of its inhabitants.

Assessment

The consolidation of East Knox Utility District with Knoxville Utilities Board was basically a smooth transition. Officials from EKUD instigated the discussions and analysis of this particular process. As a result, the hostilities and conflicts which often arise when one entity attempts to take over an unwilling participant were avoided. All-in-all, it

appears that both water systems benefitted from this regionalization.

EKUD pursued this organizational arrangement in order to improve several deficient characteristics of their water system. The limited financial resources of EKUD restricted them from providing necessary utility services to the growing population in their service area. This was especially true in their inability to finance costly sewer system improvements. In addition, EKUD looked to KUB and its resources for assistance in upgrading their services, facilities, and water quality.

The major benefits of the consolidation were realized in the areas of rate schedules and the provision of service. The rates for water users in the area formerly served by EKUD were lower following the consolidation. At the same time, the level of service to customers was improved following the installation of KUB operational procedures. The fact that EKUD, KUB, and the customers had to make little or no sacrifice during the consolidation contributed to its unfettered completion.

Clinton Utilities Board

Background

Clinton Utilities Board (CUB) became involved in the regionalization of utility districts through its acquisition

of First Utility District of Anderson County (FUDAC) in 1986. CUB provides water service to the Town of Clinton, Tennessee located in Anderson County. The utility board also provides electricity and sewer service to the city and portions of the surrounding counties. CUB presently serves 4,929 water customers and also sells water to the other utility districts in the area.

The Clinton Water Treatment Plant is the main water source for CUB's service area and draws its supplies from the Clinch River. Three tanks with capacities of 3,000,000 gallons and one tank with a capacity of 200,000 gallons are used for the distribution of water. During the first half of 1990, the water system was pumping approximately 1,700,000 gallons daily of water. Water is carried through the system by lines ranging in size from 3/4 of an inch to sixteen inches.

FUDAC operated a water system in south Anderson County which served approximately 1,800 customers. Three commissioners composed their governing board and the system was operated by one manager, one office employee, and three staff persons. Two wells and one water tank were the sources of water and were supplemented by water purchased from Anderson County Utility Board (ACUB). Following negotiations between CUB and the utility district, FUDAC was completely dissolved and its operations became the responsibility of Clinton Utilities Board.

The Regionalization Process

The impetus for the consolidation in this particular instance stemmed from the annexation of a portion of territory in the FUDAC service area. A referendum was devised for the residents of the area because they desired to be incorporated into Clinton. After the town acquired this territory, CUB was assigned the duty of extending water and sewer services to the area. The utility board provides utility services for all city residents and the annexation expanded CUB's service area to this portion of south Anderson County.

Negotiations between officials of the two water systems concerning the acquisition of the utility district by CUB stretched over a two-year period. The consolidation did not legally become valid until four to five years after the annexation referendum was passed. The delay was due to the resistance of the FUDAC Board of Commissioners in relinquishing their authority to CUB. The struggle over authority of FUDAC was finally settled after several years of legal battles. After spending approximately \$50,000 in legal expenses, CUB officially gained full control of the area formerly served by the utility district.

Following the acquisition of the utility district, CUB absorbed both the assets and liabilities of the dissolved system. Clinton Utilities Board possessed the financial resources to incur the outstanding bond debt of FUDAC. CUB officials felt that in this particular case, a total takeover

of the district's debt would be the most economically efficient action to undertake. This was due to the legal costs CUB might have incurred if only a portion of the liabilities were acquired. It was stated that FUDAC would not be able to maintain payments on any outstanding debts if the system lost its customer base. Further, the utility district may have filed a legal suit against CUB if all financial liabilities were not acquired.

The rate schedules for the area formerly served by FUDAC were adjusted after the consolidation. Table 6 displays the rates for water service provided by CUB:

TABLE 6
CLINTON UTILITIES BOARD WATER RATES

Gallons Consumed	Monthly rate per 1000 gallons: Inside Town	Monthly rate per 1000 gallons: Outside Town
First 2,000	\$6.40	\$7.90
Next 8,000	2.04	3.06
Next 10,000	1.88	2.83
Next 20,000	1.76	2.64
Next 60,000	1.68	2.53
Over 100,000	1.60	2.40

Source: Clinton Utilities Board, 1990.

The rates for city residents who were annexed actually declined after the consolidation. The larger economic and customer base of CUB was expressed as the major factor in the reduction of rates.

The Regional Water System

The legal consolidation of First Utility District of Anderson County and Clinton Utilities Board occurred in 1986. CUB assumed full responsibility for the management and operation of the water and sewer systems in the area formerly served by FUDAC. The governing obligations of the Board of Commissioners for the utility district were terminated and the employees were absorbed by CUB. The manager of FUDAC was retained on a consulting basis for three years following the consolidation. The six-member CUB water system staff assumed responsibility for the operation of the water system in the FUDAC service area.

The governing body of CUB consists of a five-person board with four at-large members and one member who is also on the Board of Mayor and Aldermen. The ownership of the bonds, property, and land for CUB is legally in the name of the Town of Clinton. Rate schedules for the service area are established by the Clinton Board of Mayor and Aldermen. Officials from CUB submit recommendations concerning appropriate rate schedules to the board for their consideration prior to any final legislative decisions.

In addition to the consolidation with FUDAC, Clinton Utilities Board maintains agreements with other area utility districts for the purchasing and selling of water. Formal contracts have been established between the water systems to cover these types of agreements. This action is necessary at times in order to provide assistance to one another in the provision of water to areas not served by each respective water system's main water sources. CUB sells approximately 3,500,000 gallons of water a month to Andersonville Utility District (AUD). Also, CUB purchases approximately 10,000,000 gallons a month from Anderson County Utility Board and Hallsdale Powell Utility District in Knox County sells a minimum level of water to CUB.

Water provision to the area formerly served by FUDAC has been improved slightly. One well in the area was shut down shortly after the acquisition and the other well was put out of operation recently. One tank remains in the area to supplement the water provided by CUB. There have been some problems with leaks and faulty equipment in the acquired system and CUB has been attempting to correct these problems since the consolidation.

The effects of climate and topography on the CUB service areas have caused only minor problems with the provision of water. First, the drought of 1988 caused a drain on the CUB water system, but no interruption of service occurred and no water shortages were experienced in the system. This was due

to the reliability of the Clinch River in providing sufficient water supplies even during extremely dry conditions. As for the topography of the area, it is characterized by scattered steep slopes and low valleys. Additional pumping equipment is required in some areas of the system, but service and pressure has been adequately maintained in these areas.

There have been several problems with the sizes of water lines since the consolidation. There is no state requirement mandating that water line sizes be large enough to provide adequate pressure for fire protection. When a municipality acquires a utility district it must extend fire protection to the area. If the line sizes are smaller than six or eight inches, there is not enough pressure to pump water from fire hydrants through fire hoses. As a result, the construction of larger water lines is an expensive endeavor for a utility district which acquires another system with small lines. CUB has been able to adequately extend fire protection to the area which it acquired in 1986.

Physical facilities and equipment within the FUDAC system were not up to the standards of CUB's water system. Specifically, the quality of materials for taps was seen as poor and had to be improved after the consolidation. The lack of resources and personnel limited the ability of FUDAC employees in improving water line quality and eliminating leaks within the system. FUDAC also did not add reservoirs as needed because of their limited financial resources.

The major benefits of the consolidation were realized in primarily two areas. First, a common management scheme was applied to the operation of the acquired area and it became part of the overall CUB system. The qualified staff of CUB has been able to identify problems in the area and has implemented actions to rectify them. Improvements have been made in trunk lines and CUB has extended sewer service to the area.

Secondly, the customers of the area were able to realize lower water rates following the consolidation. This was due to the increase in the customer base which allowed CUB to buy water in larger quantities at reduced rates. As a result, water was delivered to customers at a lower cost and the savings were passed on to the water users in the form of lower rates. This helped to improve customer satisfaction in the area as they received slightly better service at a lower rate than they had experienced under FUDAC.

Clinton Utilities Board has recently considered a consolidation with Andersonville Utility District. The main reason for these discussions was the possible annexation by Clinton of a portion of territory in this district. Another contributing factor was the potential industrial growth in the area and the increased demand this land use would have on water sources.

Clinton officials feel that CUB can improve the provision of utility services to meet the demands of the developing area

within Andersonville Utility District. The system was characterized as operable, but certain problems stand in the way of establishing regional arrangements between the district and CUB. The negotiations have been suspended at this time because the utility district is unable to pay for increasing the sizes of water lines. CUB does not wish to incur the economic burden of improving the facilities and equipment of the district while also absorbing its outstanding debts.

Assessment

The consolidation of Clinton Utilities Board and First Utility District of Anderson County was the direct result of annexation. CUB extended water and sewer service to the area which was incorporated into the Town of Clinton. FUDAC was dissolved and CUB assumed total governing, managing, and financial responsibility of the service area. CUB has been upgrading the water system's operational procedures and facilities since its acquisition.

The issues surrounding this process are present in many of the regional water system in existence in East Tennessee. The FUDAC Board of Commissioners did not want to surrender their political power to another entity. The legal procedures used to obtain authority from the board required several years to complete. Once legal proceedings were finalized, CUB was in complete control of the area formerly served by FUDAC. At

this juncture, CUB began to slowly make improvements in the facilities, operations, and management of the water system.

The county executive of Anderson County and officials from Clinton Utilities Board envision the consolidation of the area's utility districts in the future. At the present time, CUB is not assuming an aggressive stance toward the regionalization of the water systems. CUB officials maintain that their system exists as a non-political municipal utility which responds to decisions made by the legislature of the Town of Clinton. Any real progress in the consolidation of these systems would have to originate and be pursued actively by officials from the Town of Clinton.

City of Kingsport

Background

The City of Kingsport, Tennessee has been active in the consolidation of utility districts for the past twenty years. A total of eight water systems have been acquired by Kingsport since 1970. The process used to consolidate each these districts was similar in nature. As a result, analyses of the issues and problems surrounding each process were combined into one information set.

The water systems acquired by Kingsport include the following: Southern Water Company, South Kingsport Utility District (SKUD), North Kingsport Utility District (NKUD), East

Kingsport Utility District, Sullivan Gardens Utility District (SGUD), Tri-County Utility District (TCUD), Consolidated Utility District (CUD), and Fall Branch Utility District (FBUD). A list of the characteristics of the water systems acquired by Kingsport is presented in Table 7.

The City of Kingsport operates a municipal water system to serve approximately 32,000 city residents. In addition, the city provides water to areas outside the city limits. Kingsport's main source of water is provided from the water plant at the south fork of the Holston River in Sullivan County. The average daily production of water is approximately sixteen mgd, or 80 percent of a capacity of twenty mgd. Water customers are served by water lines ranging from 3/4 of one inch to thirty inches, with the majority of the lines measuring six inches in diameter. There is a staff of sixty-five employees in the Kingsport water system including administrative, engineering, operations, and maintenance personnel.

The examination of the regionalized utility districts absorbed by Kingsport was completed through an examination of the overall processes which have occurred rather than case-by-case. However, references will be made to specific water systems when appropriate. The same basic procedures have been followed by Kingsport in all of the consolidation processes undertaken.

TABLE 7
REGIONALIZED UTILITY DISTRICTS IN THE KINGSPORT AREA

Water System	Year Regionalized	Number of Customers
Southern Water Company	1970	40
South Kingsport Utility District	1974	600
North Kingsport Utility District	1974	3,000
East Kingsport Utility District	1977	3,000
Sullivan Gardens Utility District	1980	400
Tri-County Utility District	1981	325
Consolidated Utility District	1986	3,500
Fall Branch Utility District	1990	835
TOTAL		11,700

The Regionalization Process

There has been no one individual or one specific reason for the acquisition of utility districts by Kingsport. Rather, a combination of circumstances which evolved over time led to this type of organizational arrangement. First of all, water quality regulations were made stricter by the federal government during the 1970's through the Safe Drinking Water Act. This in turn led to more stringent state laws in Tennessee for public water systems. The inability of smaller utility districts in meeting these regulations pushed them to seek consolidation with water systems which possessed the resources to provide clean water.

A second reason for regionalization of utility districts was to provide a basis for city development and expansion. Kingsport officials realized the importance of the relationship between the provision of utility services and future expansion of the city into other parts of Sullivan County. In the past, the acquisition of a utility district has not been a signal that an area is under consideration for annexation. Rather, city officials have maintained the foresight to recognize that expansion of Kingsport would occur and if utilities were available, the process of annexation would result with fewer problems and barriers.

Related to this concept was the idea of land use transition in Sullivan County from agricultural to residential. The South Kingsport Utility District was an

example of this phenomenon. This district was established in 1964 when the majority of the area it served was farmland. As subdivision development increased, SKUD was unable to adjust its rates to adequately match the level of service required by the increased intensity of the area's land uses. As a result, Kingsport consolidated with SKUD primarily due to their unmanageable debt which had resulted from the changing land uses.

Drought was another factor in the regionalization of Kingsport-area utility districts. The water systems which suffered water shortages during droughts were purchasing water from the Kingsport system to supplement their inadequate source. This was particularly a problem with districts that relied on springs and wells for their source of water. During the late 1970's, droughts caused many utility districts to buy 100 percent of their water from Kingsport. Fall Branch Utility District experienced severe water shortages during the past decade which eventually led to their consolidation with the Kingsport water system.

Throughout the eight instances of regionalization Kingsport has undertaken, the impetus for this action has rested primarily on the residents and decision making officials of the water systems which were acquired. The City of Kingsport has made it a policy not to take an aggressive stance toward consolidation. City officials maintain this by stating that not one of the acquisitions completed to date

have been seen as hostile takeovers. However, the recent consolidation of Kingsport with FBUD did incur certain political constraints before it was officially adopted in 1990.

The regionalization with FBUD provided Kingsport with a unique problem. The consolidation of utility districts in the state of Tennessee is decided through a hearing process in which the county executive decides whether or not to accept the application. However, in the case of Fall Branch the district existed within Washington County instead of Sullivan County. This territory within Washington County had a private act established which stated that the legislative commission must approve the consolidation of the utility district. As a result, Kingsport had to lobby the commission in order to ensure the passage of a decision which would make the utility district part of the city water system. After some amount of disagreement in the political arena, the commission decided in favor of the consolidation.

After the utility districts were acquired by Kingsport, the area formerly served by the districts became financed under the capital improvements portion of the city budget. The bond holders from the utility districts were contacted and the bonds were purchased from them by the city. The acquisition of bonds by the city resulted in financial advantages to the former bond holders, which in turn contributed to their acquiescence of the consolidation. The

debts of the majority of the utility districts have been paid in full while the city continues to pay off the few remaining outstanding debts on more recently acquired systems.

In addition to a change in financing, the acquired utility districts became active beneficiaries of the city's capital improvements program. The City of Kingsport plans and projects its utility needs in ten-year increments. Appropriations are increased based on the identification of the area's needs and demands. Planning analyses of the relationships between future growth in the city and the role which utility services will play in this development are conducted by the city.

The Regional Water System

The consolidation of the water systems identified here with the City of Kingsport has resulted in the substantial expansion of land area served by the municipal water system. These utility districts and water companies no longer exist as authoritative entities which provide water to their respective areas. The authority for the water systems transferred to the Kingsport Board of Mayor and Aldermen.

The rate schedules maintained by the City of Kingsport are divided into two separate rate schedules. One rate is set for residents inside the city limits and another has been established for those outside of the city. A 15 percent rate increase went into effect on July 1, 1990 and residents

outside of the city limits pay twice as much monthly for water consumed. Consolidated water systems are often outside the city limits and pay the higher rate. The higher rates exist in part to finance the facilities and services added by non-city residents who live greater distances from the city water system. The water rates for the City of Kingsport are displayed in Table 8:

TABLE 8
CITY OF KINGSFORT WATER RATES

Gallons Consumed	Monthly Rate per 1000 gallons: Inside City	Monthly Rate per 1000 gallons: Outside City
First 2,000	\$1.69	\$3.38
Next 13,000	1.37	2.74
Next 35,000	1.06	2.12
Over 50,000	.73	1.46

Source: Kingsport Water Department, 1990.

Several deficiencies have been identified with the physical facilities of the acquired water systems. The majority of time and effort has been focused on upgrading and repairing the existing equipment, specifically water main valves. The expansion of the main water plant in Kingsport is a top priority for city officials as approximately \$3,000,000 is being invested to expand its capacity. There

have also been improvements made to pump stations and new water reservoir construction has begun as a supplemental method of upgrading both the city and acquired water system facilities.

After the completion of regionalization processes there have been reports of problems with the compatibility of water in the two systems. The treated water of the city mixes with the water from another system and sediments are often knocked loose causing rusty water. As the acquired water systems are upgraded, this problem has been alleviated and the water quality of Kingsport currently meets or exceeds all water quality standards and regulations.

The regionalization of the water systems has resulted in minimal personnel and service changes. No additional administrative personnel have joined Kingsport from any systems which were acquired. Employment opportunities have been provided for the former utility district employees in maintenance and operations positions who desired to continue their employment.

The growth in the number of city water department employees through consolidation has been slight. Although the number of staff is presently recognized as being adequate, city officials suggest that more personnel are needed to improve service in the Kingsport area. The quality and level of service to water systems which have been acquired has improved over what it was. The consolidation of these systems

into Kingsport has provided service areas which are manageable and in close proximity to administrative office and maintenance facility locations.

City officials in Kingsport maintain that the benefits from regionalized water systems far outweigh the problems. The only major problem identified by water resource managers in the city has been in the financing of water system upgrading. Although this constraint hinders the efficient upgrading of the area's facilities, the financial problems are apparent and planned for by city officials. The acquisition of utility districts has been a break-even proposition financially thus far for the city, but these financial liabilities are being eliminated as the bonds are paid off. Kingsport is beginning to gain increased revenue from the areas formerly served by these systems and this assists them in financing developments in their water system.

The improved quality of service and financial benefits are seen as the main advantages resulting from the consolidation of utility districts into Kingsport's water system. First, the utility districts which joined Kingsport often did so because their level of service was inadequate. Kingsport provided a stronger and more diversified resource base needed to deliver dependable and quality water. As stated earlier, the systems themselves requested that the city acquire them due to the inability of the utility district in continuing adequate service.

The second benefit realized by the systems which consolidated is a stronger financial base. The city is an established and dependable entity which has a good credit rating for selling bonds. This was seen as important because the city can acquire the capital needed to finance large and expensive water projects. A utility district with a high level of indebtedness is often unable to upgrade their system because of their failure to secure adequate financing. The possibility of becoming a territory under city jurisdiction has been an appealing prospect for the capital-poor districts.

Assessment

Kingsport has a great deal of experience with regionalization as evidenced by its acquisition of eight water systems since 1970. The city maintains a resource base which the small utility districts in the area have had to tie into in order to provide adequate water. The same basic procedures have been followed in each case and no major problems have been realized during the processes.

Future city growth and annexation has been the major reason that Kingsport is willing to acquire inefficient utility districts. City officials acknowledge the fact that utility services are an important component to an area which may eventually become part of the city. Although Kingsport does not maintain a policy of regionalizing utility districts in areas which are being sought through annexation, city

officials do recognize that some level of city growth will take place in the future.

Regionalization schemes in the Kingsport area have been characterized by the districts themselves requesting to be acquired. Although water rates are higher outside of the city limits, the inadequacy of water sources and poor service has required the utility districts to seek relief through consolidation with the city. Kingsport has the capabilities of upgrading the acquired water systems to a level which meets their own requirements.

City of Rogersville

Background

The City of Rogersville, Tennessee located in Hawkins County provides water to the area's utility districts in addition to its regular city customers. Approximately 4,800 persons reside inside the city limits and the water department maintains a customer base of approximately 2,300. Another 2,000 water customers in four area utility districts are served by the Rogersville Water Department. These districts include Big Creek Utility District (BCUD), Persia Utility District (PUD), Lake View Utility District (LVUD), and the Striggersville Utility District (SUD). Both formal and informal organizational arrangements exist between the city and the districts for the provision of water.

The Rogersville Water Department operates under the direction of three commissioners which formulate policies and enforce rules and regulations. The commissioners' actions are subject to the legislative approval of the Rogersville Board of Mayor and Aldermen. A staff of eighteen employees handle the administrative, operations, and maintenance responsibilities for the city's water department. The four area utility districts are composed of unincorporated communities with customer bases ranging from approximately 200 to 550.

The service area for the city's water system encompasses a ten to twelve-mile radius from the central business district. Water provision is conducted primarily from the Rogersville Water Plant which draws its water from Big Creek. In addition, two wells have been constructed as supplemental sources of water supply for the city's water customers. The water treatment plant maintains a storage capacity of 2,000,000 gallons with average daily production being approximately 1,200,000 mgd. Water is distributed through the system by water lines ranging in size from 3/4 of one inch to twelve inches.

The Regionalization Process

As stated earlier, the Rogersville Water Department supplies water to several of the area's utility districts. The acquisition of management responsibilities for the Big

Creek Utility District was completed in 1986. This district currently serves 210 customers and still exists as a legal entity only for bond purposes. An agreement between the district and Rogersville relieved the district of all responsibilities other than its outstanding bond commitment to Farmer's Home Administration.

A complete legal consolidation of BCUD and the city did not occur because Rogersville officials wished to avoid absorption of the district's outstanding debt. The rationale for leaving the district in existence on paper was that it would have created an economic burden on the city. Although the city has an adequately financed water system, the acquisition of the debt was seen as a limiting factor to their ability to finance expansion and improvements in their water system. Rogersville maintains two different sets of bookkeeping records, one for their city system and one for BCUD. All other governing, operations, and maintenance activities are conducted by the city's water department since the consolidation.

The impetus for the consolidation of these water systems came from within the utility district itself. BCUD was governed by three commissioners and a limited staff conducted its daily operations. The BCUD Board of Commissioners decided that they did not want the responsibility of managing and operating the system any longer. As a result, officials from

BCUD requested that Rogersville assume all responsibilities for the district's operation.

The agreement to transfer management of BCUD to the city was the result of meetings between BCUD commissioners, Rogersville city officials, and representatives from the FHA. The FHA was included because their organization originally financed the formation of the utility district. A consensus was reached between all parties to relieve the district of its authority and management responsibilities of water service to its customers. Rogersville has taken over the responsibilities for governing and managing the system although the Big Creek Utility District still exists as a legal entity.

The Persia, Lakeview, and Striggersville Utility Districts purchase their water from Rogersville's water system through contractual agreements. These districts serve approximately 1,800 customers and rely on Rogersville for the billing of their customers. However, each of these districts maintains their own Board of Commissioners and handle the management of their water systems independently of Rogersville. There has been an increasing need for assistance in the areas of management and maintenance from the Striggersville Utility District recently. Although, these utility districts use the Rogersville water system as their main supplier of water, they have not expressed a desire to enter an agreement with the city such as BCUD has done.

The Regional Water System

The consolidation of BCUD with Rogersville was seen as a process amenable to officials from both the district and the city. The city's water system had the facilities and personnel to effectively carry out the additional responsibilities stemming from the merger. Rogersville officials state that they can provide the same level of service to the other three utility districts in the area if conditions warrant this action. The consolidation of BCUD with Rogersville has caused no major changes with the administration, operation, or maintenance of the area formerly served by BCUD.

Rogersville has not encountered any major problems since assuming the management responsibilities for BCUD. Although the area formerly served by BCUD was residential in character, Rogersville has the capacity to provide water for more intense uses. This is evidenced by the existence of seven industries in the city which draw a majority of their water from the city system. Several of these plants have expanded and increased their demand for water in the past fifteen years and the city has been able to adequately furnish the additional supplies. Even during the drought of 1988, the city experienced no major water shortages, loss of pressure, or interruption of service.

The financing of the Rogersville Water Department is secured through bonds, grants, and loans. Their financial status was characterized as fairly healthy even though they

avoided incurring the outstanding debt of BCUD. As for the other three utility districts in the area, Rogersville has made no investments in any of these water systems. Officials from Rogersville's water department indicate that no major capital outlays are foreseen in the water system.

The rate schedules for customers in the area formerly served by BCUD were increased following the merger. Table 9 displays the current rates charged by Rogersville:

TABLE 9
CITY OF ROGERSVILLE WATER RATES

Gallons Consumed	Monthly rate per 1000 gallons: Inside City	Monthly rate per 1000 gallons: Outside City
First 1,000	\$5.00	\$7.50
Next 4,000	2.09	3.14
Next 5,000	1.76	2.64
Next 10,000	1.54	2.31
Over 20,000	1.20	1.80

Source: Rogersville Water Department, 1990.

This action occurred mainly due to the inappropriate rates which were being charged by the district. In many cases, the costs of supplying the water by the utility district were more than the rates paid by the customers.

Rogersville's water department officials adjusted the rates so that the customer's rate adequately financed the delivery of water to its point of use.

The major benefits of the consolidation were seen in three areas. First, the management of the water system improved with the addition of a full-time staff identifying the water needs of the community. Secondly, improved service was experienced in the area because the Rogersville Water Department had the facilities, equipment, and personnel to respond to water problems much more quickly than the limited staff of BCUD. Finally, administrative tasks such as bookkeeping, billing, and auditing improved because these responsibilities were shifted from a part-time person in BCUD to an experienced and well-trained office staff in Rogersville.

Assessment

The organizational arrangement between Big Creek Utility District and the City of Rogersville was implemented at the request of officials from the district itself. The consolidation is an example of a phenomenon which occurs frequently between water systems in East Tennessee. Utility districts serving only several hundred customers often seek the assistance of a water system with a stronger and more diversified resource base. The arrangements for water provision between the city and the other three utility

districts examined here are also common to the region. Water systems encountering water shortages frequently purchase water from an adequately-supplied system in the vicinity without entering into any formal organizational commitments.

The utility districts surrounding the service area of Rogersville have formed over the past twenty years. During this time, the districts have developed adjacent to the city's service area. Thus, the utility districts have restricted the city's potential for expansion and growth. Rogersville officials have expressed a desire to acquire and regionalize the utility districts in the area if the districts will consent to such an arrangement. The city has an adequate supply of water and all of the managerial attributes to operate a regionalized system which would serve the entire area.

Tennessee-American Water Company

Background

A plan for water supply in Hamilton County, Tennessee has provided the basis for Tennessee-American Water Company's (Tennessee-American) involvement in the process of regionalization. Although this water system has not yet participated in the regionalization of utility districts, the company's staff has produced a report concerning this topic. The regionalization plan for Hamilton County profiles the

eight utility districts in the area and presents recommendations for their effective regionalization (American Water Works Service Company, Incorporated, [AWWSC] 1986, p. 1). The vast amount of research conducted on this subject by the company and the reaction to the plan by the area utility districts provided a useful arena in which to study this process.

Tennessee-American is a private investor-owned water company which provides water to approximately two-thirds of the customers in the Hamilton County area. The eight utility districts in the area supply the other one-third of the customers. Approximately 20 percent of the water supply systems in the United States are investor-owned entities in an industry where the majority of agencies are public water systems. Thus, with the Chattanooga area being the only area in Tennessee served by Tennessee-American, this company provided a unique organizational arrangement for water provision.

Water provision in the Hamilton County area has been conducted by a private company for the past one hundred years. After the Civil War, the water system in this area was auctioned off to investors rather than being turned over to the City of Chattanooga. Late in the 1800's, Tennessee-American acquired the system from the investors and has been the purveyors of water in the area ever since.

The service area of Tennessee-American includes the southern part of Hamilton County and also stretches into Catoosa, Dade, and Walker Counties in Georgia (AWWSC, 1986, p. 2). Water provision for the remaining customers in the area is provided by eight utility districts including Hixson, Eastside, Soddy-Daisy Falling Water, Walden's Ridge, Savannah Valley, Union Fork-Bakewell, Mowbray Mountain, and Sale Creek. A profile of each of the district is contained in Table 10.

Tennessee-American's service area is not constrained by political boundaries or jurisdictions. During the development of the Hamilton County area, utility districts have been created adjacent to the service area of Tennessee-American. Thus, two dissimilar sets of water systems exist in close proximity to one another. The utility districts are directed by their own Board of Commissioners and have political boundaries mandated by state legislation. On the other hand, Tennessee-American is governed by the Tennessee Public Service Commission which is responsible for enforcing the regulations concerning the company's rates, procedures, and operations.

The raw water source for Tennessee-American is the Tennessee River and the Citico Main Treatment Plant distributes water. During the 1960's and 1970's, Tennessee-American was pumping approximately fifty-four mgd of water to its users. At the present time, the average daily production is thirty-eight to forty mgd with a water plant capacity of seventy-two mgd. As a result, the Tennessee-American system

TABLE 10
HAMILTON COUNTY AREA UTILITY DISTRICTS

Utility District	Number of Customers	Average Daily Production (mgd)
Hixson Utility District	16,600	3.000
Eastside Utility District	10,088	3.150
Soddy-Daisy Falling Water Utility District	3,380	1.060
Walden's Ridge Utility District	1,833	0.470
Savannah Valley Utility District	1,600	0.730
Union Fork-Bakewell Utility District	560	0.170
Mowbray Mountain Utility District	360	0.067
Sale Creek Utility District	350	0.240
TOTAL	34,761	

has the capacity to pump an additional thirty-two to thirty-four mgd of water making expansion from a physical facility perspective no problem.

The reduction in production over the past three decades is the result of a shifting economy in the Hamilton County area. Whereas the area formerly was home to a substantial amount of heavy industry, the economy is now characterized by service-type industries. The demand for water for production purposes by industry was much greater than the quantity required by service-oriented businesses.

The interest in regionalizing water systems in the Hamilton County area has increased during the past decade. The Chattanooga-Hamilton County Planning Commission completed a report in 1980 assessing the operations and facilities of the area's utility districts. In general, the report concluded that the local utility districts were not capable of supporting industrial or urban development of any great magnitude. As a result, the commission suggested that new ways of assisting, coordinating, and improving the utility districts should be developed (AWWSC, 1986, p. 18). The addition of the American Water Works Service Company's regionalization plan in 1986 created renewed interest in this process.

The Regionalization Process

The only utility district acquired by Tennessee-American recently was the Lookout Valley Utility District in 1981. Rather than being a part of a regionalization process, the acquisition was a byproduct of the annexation of this area by the City of Chattanooga. Lookout Valley Utility District had been purchasing water for resale from Tennessee-American prior to its acquisition. After this area was annexed, the utility district was turned over to the city. The city has an agreement with Tennessee-American that water provision in annexed areas will be conducted by this company.

The exception to this rule is in the Hixson Utility District. A portion of land area in this district was annexed, but Hixson still provides water to the residents. Tennessee-American did not have the political clout or desire to get involved in the process of attempting to take over water provision in this area.

The instigation of a regionalization process in the Hamilton County area came from several sources. Tennessee-American has expressed a desire to provide water for the residents of this entire area. The company maintains the position that it has an established record of dependable water provision during the past one hundred years and they should provide water to this area. They also maintain that they possess the resources to solve supply and service problems in

the area while also providing the needed water utilities in the area to support future land use development.

Although Tennessee-American has suggested regionalization as a solution to the area's water ills, it maintains that it will not force a regional plan on the area's utility districts. The commissioners of the utility districts in the area have discussed organizing their own regionalized utility districts among themselves in order to avoid regionalization with Tennessee-American. Tennessee-American has developed a formal plan for regionalization, but maintains it will not implement it without the approval and cooperation of the area's utility districts.

There are several reasons as to why regionalization has been considered a viable alternative in this area. The more stringent regulations of the Safe Drinking Water Act has increased costs for monitoring and testing water. Additional equipment and personnel may be required to test for contaminants which formerly were not included in the regulations. Tennessee-American maintains it can assist the areas now served by the utility districts in improving their water to meet all regulations. The company possesses a \$2,000,000 laboratory at its main water plant staffed by a full-time crew which monitors and tests water.

The limited supply of water provided by the springs and wells of the utility districts is another catalyst for regionalization. Many of these supply sources are near their

maximum operating levels. The inadequacy of the water sources during droughts has been realized in the area, especially in Eastside and Savannah Utility Districts. Tennessee-American is selling water to Eastside Utility District during dry periods of weather now because their water source is inadequate to meet demands. The growth in land use development in the future in Hamilton County will put immense pressure on these limited water sources.

The financing of a regional system under the direction of Tennessee-American would come from the company's investments. At the present time, the company has not received any federal or state grant money to assist in the funding of its water system. The company would assume the approximately \$20,000,000 in debts from the eight utility districts if a regional scheme were implemented. In order to make regionalization economically feasible, the utility districts with large customer bases would have to agree to participate in this process. The small utility districts such as Sale Creek with 350 customers do not have a strong enough economic base to make them an attractive and potentially profitable regionalization candidate.

Under the regionalization plan presented by Tennessee-American, several improvements have been identified for the physical facilities and equipment of the area's water systems. The improvements include a general upgrading of facilities and construction of new water lines to replace deteriorated ones.

No major problems were seen with the compatibility of physical facilities between Tennessee-American's water system and the utility districts.

The major improvements proposed to the water systems of the utility districts deal with several areas. These include providing emergency power generating capacity, installing additional pumping stations, interconnecting facilities to improve supply, replacing and upgrading water lines, and improving leak detection and metering procedures. Several specific improvements have been identified in each of the area's served by the eight utility districts and cost estimates have also been calculated (AWWSC, 1986, p. 33).

The Regional Water System

A regional water system for the Hamilton County area is likely to occur in one of two ways. First, the eight utility districts could be acquired by Tennessee-American's water system. A second alternative is that a regional arrangement could be developed through the consolidation of the eight utility districts into a separate water system separate from Tennessee-American. Discussions have indicated that the eight utility districts have considered regionalizing into two utility districts with each one containing one of the two largest districts, Eastside and Hixson.

A major issue affecting the selection of a specific organizational arrangement deals with the rate schedules of

the system. Presently, Tennessee-American's water rates are approximately 20 percent higher than Eastside and Hixson Utility Districts and approximately 35 percent higher than the remaining districts in the area. The small-scale nature of these utility districts' operations compared to the other districts in the area contributes heavily to their lower production costs. However, the small utility districts with only a several hundred customers have higher rates than Tennessee-American due to their limited economic and customer base. The water rates charged by Tennessee-American are displayed in Table 11:

TABLE 11
TENNESSEE-AMERICAN WATER RATES

Gallons Consumed	Monthly rate: Inside City	Monthly rate: Outside City
Up to 3,000	\$7.330	\$7.330*
Each 750 thereafter	1.956	1.956*

*Additional charges may be applied to cover costs of pumping water to elevated areas.

Source: Tennessee-American Water Company, 1990.

The commissioners and customers of the eight utility districts have expressed great concern about the potential for higher rates under a regional system led by Tennessee-American.

There are several problems impeding the regionalization of utility districts by Tennessee-American. The vested interests of the Board of Commissioners in each utility district presents a problem because they do not wish to give up their authority to a regional system. At this time, the political climate of the area indicates that the utility districts do not wish to become part of Tennessee-American's regional system.

Public opposition to regionalization is also present in the Hamilton County area. Many customers believe that their service is adequate and rates are reasonable and as a result, there is no need for any organizational changes in water provision. The customers may not realize the need for expansion of their water systems in the future in order to support additional growth and development in the area.

The debts of the utility districts would be absorbed by Tennessee-American under a regional water plan. The company maintains a strong economic base which would allow them to incur this debt without any substantial loss of revenue. During the regionalization process, Tennessee-American would borrow funds through a bond issue and receive aid from their parent company, American Water Works Service Company, in order to pay off the outstanding debt of the utility district.

The regionalization of Tennessee-American and the eight utility districts would result in one water system serving the entire Hamilton County area. Under this system, Tennessee-American estimates that an additional thirty to sixty employees would join its current employee base of 170. A major concern with regionalization has been with employees of the utility districts and their transition to a new company. Tennessee-American maintains that the employees of the former utility districts would continue employment for their company. As employees retire or vacate their jobs, their positions may or may not be filled depending on the circumstances.

Tennessee-American maintains that one regional water system will provide optimum water provision in the Hamilton County area. The system possesses the resources, water source, facilities, and professionally-trained staff to improve the area's water provision. The inadequacy of service and unreliable water sources for the utility districts may be mitigated as Tennessee-American officials state that they can provide the necessary upgrading of these areas. In order for the utilities of the area to support land use development into the future, Tennessee-American officials feel that its diversified and expandable system would best serve this future scenario.

Assessment

The climate surrounding the issue of regionalization in the Hamilton County area exists in stark contrast to the previous case studies. Tennessee-American has devised a formal plan for the regionalization of the eight utility districts surrounding its service area. However, leaders within these districts have organized themselves against any such proceedings. The commissioners of the utility districts believe that Tennessee-American wants a county-wide privately-owned water system to replace the existing arrangements. Although Tennessee-American officials have expressed a desire to provide water to the entire area, they state that they will not force a takeover of the districts without the consent of the individual districts.

The regionalization plan prepared for the Hamilton County area is one of the most comprehensive analyses of this process in East Tennessee. Specific improvements to physical facilities and their associated costs have been formulated and are presented in the plan. Tennessee-American has recognized that the source of water for the majority of the area's utility districts is limited and may not be able to adequately serve the growing population base. As a result, Tennessee-American has a plan of action to implement if the time comes when the districts decide to join their water system.

The prospects for the regionalization of this area's water systems are not favorable at this time. The political

atmosphere within the utility districts is one of resistance to any consolidation schemes directed by Tennessee-American. At the present time, it appears that only a crisis situation with the supply of water would stimulate the organization of the utility districts into a regional plan with Tennessee-American.

CHAPTER V

CONCLUSION

The findings from the research show that regionalization and/or consolidation of water systems is a legitimate organizational arrangement in East Tennessee. The failure of utility districts to provide dependable and clean water has given rise to the investigation of ways to improve water provision. The major advantages realized through regionalization include improved management practices and increased financial resources. These important components of water provision can be enhanced through the consolidation of small, weak water systems into one regional agency.

The concept of regionalization cannot be applied uniformly to all situations in which an alternative form of water provision is being considered. As evidenced by the case studies, there is great variety in the organizational structures used to deliver utility services. Each system exists in its own unique environment and operates under different circumstances. As a result, a uniform regionalization scheme cannot be applied in the same manner in all circumstances.

Each case must be analyzed in the context of its own local environment in order to identify the specific organizational needs of the water system. A general set of

principles concerning regionalization may provide a framework in which an analysis of individual cases may be conducted. Only then can decisions be reached concerning the appropriateness of regionalization in certain instances. The important concept to keep in mind is that regional water systems can exist in a variety of organizational forms and do not always entail a total consolidation of all aspects of each system involved.

The research identified several reasons for the increased attention toward regionalization alternatives. The potential for improving the quality of service and adequacy of water supplies are major catalysts for agencies in pursuit of regional water systems. The addition of professional employees with a strong resource base to an area which has been served by unqualified personnel with outdated equipment is an attraction of regional arrangements. Also, water systems using limited sources of water such as springs and wells are often forced to identify supplemental water sources. Well-stocked systems using a proven source of water supply often fill the role of assisting these water systems in meeting their water demand needs.

Although the research indicates that the majority of regional water systems have occurred in large metropolitan areas, special attention should be given to smaller systems which are ineffective in their provision of water. Small, rural utility districts have limited economic and tax bases

which restrict the financing of system improvements. If these systems are able to join more efficient regional systems, they often enjoy the advantages of a stronger and more diversified resource base. This is due to increased economies of scale because costs are spread over a larger customer base. The addition of more paying customers lowers the costs of maintenance, operations, and repair and reduces rates for customers.

The importance of utility services in the growth of communities is another factor in the increased interest in the regionalization of water systems. The provision of utility services in areas of potential growth is a major factor in the ability of a community to expand. Regional utility systems possess the resources and planning capabilities to extend water and sewer services to these areas. Smaller systems are often preoccupied with the daily operation and maintenance of their system and cannot provide any extension of their present services. This in turn can constrain the potential growth and development of the community.

A specific component of community growth which often leads to consolidation is annexation. When a territory is annexed by a city, the city becomes responsible for providing utility services to the area. If a county or community utility district has been serving the customers of the area, they may be requested to merge their operations with the utility system that serves the city. This particular action

is not a legal requirement in the state of Tennessee. On the contrary, many utility districts continue serving portions of their service areas which have been annexed. However, the majority of city officials interviewed expressed a desire to maintain one utility system for the entire service area within the city limits.

The more stringent water regulations contained in amendments to the Safe Drinking Water Act in 1986 were also identified as reasons supporting regional water systems. The regulations added more contaminants to the list of those prohibited in drinking water. As a result, the costs of monitoring and testing water will increase beyond the affordability of some capital-poor water systems. The research indicates that if these regulations are strictly enforced, consolidation with a regional system may be the only means of survival for some water systems.

The research also identified several institutional problems which must be addressed during an examination of regional alternatives. The major problem which surfaced through the entire research process was with political aspects of regionalization. The controlling authority of utility districts, the Board of Commissioners, is established by state legislation. The members of this commission often balk at relinquishing their political power to a regional authority.

The failure to surrender this power was seen as the result of two main factors. First, many commissioners feel

that the extinction of their utility district will leave the service area with no representative body to identify their needs. Secondly, the vested interests of the commissioners often causes them to resist loss of their position and its associated political power.

The economic liabilities associated with the acquisition of an inefficient utility district is another major barrier to regionalization. Many smaller utility districts have outstanding debts which must be paid off before the district can be legally dissolved. If one system is considering the acquisition of another and cannot afford to assume its debt, consolidation may not be undertaken. Overall, officials in an economically efficient system want consolidation to be profitable in the long run.

Problems with the commissioners' inability to recognize the ineffectiveness of their system hinders regionalization. The commissioners of many systems often serve decades in this capacity and may not be able to objectively identify the changing needs of the area. The focus on the daily operations of a small system, a neglecting of long-range planning, and resistance to change all cause some commissioners to discount the viability of regional approaches.

In addition to the resistance of the commissioners to regionalization, there is often public opposition to changes in the management and operation of a utility district. Customers are primarily concerned with receiving clean and

dependable supplies of water regardless of what type of entity is providing it. The possibility of increased rates due to a shift to a regional system often creates hostilities toward this type of arrangement. If the transition is made with minimal impact to the customer, there is little concern by the customer what type of arrangement is implemented.

The overall prospect of wide scale regionalization in East Tennessee's utility districts is not favorable at this time. The proliferation of utility districts in the last half of the twentieth century has embedded them in the utility industry. The disbanding of the districts and their subsequent consolidation is characterized as a long-term process. The utility districts are not likely to change their organizational arrangements unless severe problems are encountered.

The research indicates that forced takeovers of utility districts by another entity rarely leads to successful consolidation. Regionalization processes which have occurred in East Tennessee are mainly the result of officials of an ineffective district asking to be acquired. Their limited sources of water and low levels of service cause the systems to seek relief through regional approaches.

The fact that crisis situations are seen as the main impetus for wide scale regionalization reflects the fact that long-range planning is a neglected component of water system management. Many systems do not have the resources to

adequately plan for the provision of utility services in the future. The development districts in East Tennessee could provide assistance to the districts in identifying their service capabilities and the limits of their water sources. At this point, structural adjustments could be made if major organizational changes were needed in order to continue serving an area.

The regionalization of utility districts must be a gradual process to be successful. Utility districts and water systems should have a plan in place prior to a crisis situation so that decision makers will be informed concerning the merits of a regional approach. Careful planning can help avoid the devastating effects of a breakdown in a water system's ability to deliver water. The effective and efficient management of this vital resource is imperative to guarantee human survival.

BIBLIOGRAPHY

BIBLIOGRAPHY

- American Water Resources Association. Regional and State Water Resources Planning and Management. Bethesda, Maryland: American Water Resources Association, 1984.
- American Water Works Association. "Regionalization of Water Utilities: Needs and Issues." AWWA Journal. Bethesda, Maryland: American Water Works Association, December, 1979, p. 698.
- American Water Works Association. "Regionalization of Water Utilities: A Survey." AWWA Journal. Bethesda, Maryland: American Water Works Association, December, 1979, p. 702.
- American Water Works Service Company, Inc. Comprehensive Planning Study. Haddon Heights, New Jersey: American Water Works Service Company, Inc., 1987.
- American Water Works Service Company, Inc. Hamilton County Water Supply Regionalization Plan. Haddon Heights, New Jersey: American Water Works Service Company, Inc., 1986.
- Bakken, J. Darrell. "Evolution of a Regional System." AWWA Journal. Bethesda, Maryland: American Water Works Association, May, 1981, p. 238.
- Batie, Sandra S., and J. Paxton Marshall, eds. Emerging Issues in Water Management and Policy. Starkville, Mississippi: Farm Foundation and the Southern Rural Development Center, February, 1983.
- Baumann, Duane D. Water Resources for Our Cities. Washington, D. C.: Association of American Geographers, 1978.
- Baxter, Laurence D. Regional Politics and the Challenge of Environmental Planning. Davis, California: University of California Institute of Governmental Affairs, 1974.
- Bennett, Jeffrey R. "The Big Challenge of Small Water Systems." American City and County. Atlanta, Georgia: Communication Channels, Inc., February, 1985, p. 34.

- Bowen, George E. and Timothy Gangaware. Institutional Barriers to Implementing 208 Water Quality Management Plans in the Southeast. v. 1, Knoxville, Tennessee: The University of Tennessee, Graduate School of Planning, 1981.
- Bowen, George E., Timothy Gangaware, and Gary Ferguson. Problems, Issues, Constraints, and Barriers to Water Quality Planning and Management in Urban and Urbanizing Areas (SMSA'S in Tennessee). Knoxville, Tennessee: The University of Tennessee Water Resources Research Center, 1983.
- Brewer, Dudley E. A History of the Knoxville Utilities Board. Knoxville, Tennessee: Knoxville Utilities Board, 1975.
- Bumstead, John C. "The Politics of Regionalization: A Public Perspective." AWWA Journal. Bethesda, Maryland: American Water Works Association, December, 1979, p. 708.
- Burke, Roy. Collective Decision Making in Water Resource Planning. Lexington, Massachusetts: D. C. Heath and Company, 1975.
- Burkhardt, Daniel A. and Merry L. Mosbacher. "The Changing Capital Structure for Water Utilities." Public Utilities Fortnightly. Arlington, Virginia: Public Utility Reports, Inc., April 2, 1987, p. 44.
- Coelen, S. P. Selected Works in Water Supply, Water Conservation and Water Quality. Washington D. C.: U. S. Army Corps of Engineers, 1981.
- Cox, William E. "An Overview of Water Allocation Law in the Southeastern United States." Symposium Proceedings Unified River Basin Management-Stage II. Bethesda, Maryland: American Water Resources Association, 1981.
- Cox, William E. and Leonard A. Shabman. Institutional Issues Affecting Water Supply Development: Illustrations from Southeastern Virginia. Blacksburg, Virginia: Water Resources Research Center, March 1983.
- Cox, William E., Leonard A. Shabman, Sandra S. Batie, and J. W. Looney. Virginia's Water Resources: Policy Management Issues. Blacksburg, Virginia: Virginia Water Resources Research Center, 1981.

Crew, Michael A. The Economics of Public Utility Regulation. London, England: Macmillan Company, 1986.

Davis, Robert K. The Range of Choice in Water Management. Baltimore, Maryland: The Johns Hopkins Press, 1968.

East Tennessee Development District. Annual Report to the Region. Knoxville, Tennessee: East Tennessee Development District, 1988-1989.

East Tennessee Development District. A Staff Report on Water and Wastewater Alternatives for Roane and Morgan Counties. Knoxville, Tennessee: East Tennessee Development District, unpublished report, June, 1978.

East Tennessee Development District. A Staff Report on Water and Wastewater Alternatives for Scott County. Knoxville, Tennessee: East Tennessee Development District, December, 1979.

East Tennessee Development District. Water and Wastewater Plan for the Douglas-Cherokee Subregion. Knoxville, Tennessee: East Tennessee Development District, August, 1979.

East Tennessee Development District. Staff Report on Goals and Policies for Utilities. Knoxville, Tennessee: East Tennessee Development District, 1975.

East Tennessee Development District. Water and Wastewater Alternatives for Loudon and Monroe Counties: A Staff Report. Knoxville, Tennessee: East Tennessee Development District, July, 1980.

East Tennessee Development District. Water and Wastewater Plan for Claiborne and Union Counties. Knoxville, Tennessee: East Tennessee Development District, April, 1981.

Federal Water Pollution Control Act. Statutes at Large. Sections 201 and 208. v. 86, 1972.

Field, Donald R. Water and Community Development. Ann Arbor, Michigan: Ann Arbor Publishing, 1974.

Forouzesh, Farhad. A Case Study of Public Water Supplies in the East Tennessee Development District. Knoxville, Tennessee: Master's Thesis, The University of Tennessee, 1977.

- Frederick, Kenneth D. Scarce Water and Institutional Change. Washington, D. C.: Johns Hopkins University Press, 1986.
- Fohs, Linda H. "Eliciting Public Participation." AWWA Journal. Bethesda, Maryland: American Water Works Association, May, 1981, p. 246.
- Goodman, Alvin S. Principles of Water Resources Planning. New York, New York: McGraw-Hill Company, 1985.
- Gormley, William T. The Politics of Public Utility Regulation. Pittsburgh, Pennsylvania: University of Pittsburgh Press, 1983.
- Grigg, Neil S. Urban Water Infrastructure: Planning, Management, and Operations. New York, New York: Wiley Publishing Company, 1986.
- Grigg, Neil S. Water Resources Planning. New York, New York: McGraw-Hill Company, 1985.
- Hartman, L. M. Water Transfers: Economic Efficiency and Alternative Institutions. Baltimore, Maryland: The Johns Hopkins Press, 1970.
- Hatcher, Kathryn J., "A Systems View of Integrated Water Resources Management," Unified River Basin Management-Stage II, American Water Resources Association, Minneapolis, Minnesota, 1981.
- Hatcher, Kathryn J. and James E. Kundell. "Institutional Arrangements for Integrated Water Management in the Southeast." Athens, Georgia: Institute of Natural Resources, 1983.
- Helweg, Otto J. Water Resources Planning and Management. New York, New York: Wiley Publishing Company, 1985.
- Hesse, Richard J. "A Regional Approach to Public Water Supply." Energy and Water Use Forecasting. Denver, Colorado: American Water Works Association, 1980.
- Hofkes, E. H. Small Community Water Supplies. New York, New York: John Wiley and Sons, 1981.
- Hooker, Donald. "A Regional Response to Water Supply Emergencies." AWWA Journal. Bethesda, Maryland: American Water Works Association, May, 1981, p. 232.

- Howells, David H. "A Summary Report: Southeast Conference on Legal and Administrative Systems for Water Allocation and Management." Chapel Hill: Water Resources Research Institute, April, 1978.
- Humphrey, Nancy Patricia and Christopher Walker. "Innovative State Policies for Aiding Community Water Supplies." AWWA Journal. Bethesda, Maryland: American Water Works Association, May, 1987, p. 34.
- Hurd, Merna. "Regionalization Opportunities and Obstacles: A Case Study." AWWA Journal. Bethesda, Maryland: American Water Works Association, December, 1979, p. 713.
- Hurd, Merna. "The Challenge of Change: Water Management in the 1990's." American City and County. v. 104, Atlanta, Georgia: Communication Channels, Inc., November 1989.
- Jermar, Milan K. Water Resources and Water Management. Amsterdam, New York: Elsevier Science Publishing Company, 1987.
- Jones, Jack D., Vincent A. Sikora, and Jane Woodward. Study of Tennessee Water Resources Law: Legal Considerations for Effective Water Management Under Conditions of Shortage. Research Report Number 97, Knoxville, Tennessee: Tennessee Water Resources Research Center, November 1983.
- Keller, Shirley R. Knox County Governments. Knoxville, Tennessee: Knoxville/Knox County League of Women Voters, 1988.
- Kim, H. Youn and Robert M. Clark. "Economies of Scale and Scope in Water Supply." Regional Science and Urban Economics. Amsterdam, New York: North-Holland, November 1988, p. 478.
- Korbitz, William E. Modern Management of Water and Wastewater Utilities. New York, New York: Garland Press, 1981.
- Lamb, Berton L. Water Quality Administration. Ann Arbor, Michigan: Ann Arbor Science Publishing, Inc., 1980.
- Lazaro, Timothy R. Urban Hydrology. Ann Arbor, Michigan: Science Publishing, Inc., 1979.
- Lewis, W. Cris, Jay C. Anderson, Herbert H. Fullerton, and B. Dellworth Gardner. Regional Growth and Water Resource Investment. Lexington, Massachusetts: D. C. Heath and Company, 1973.

- Loucks, Daniel P. Water Resource Systems Planning and Analysis Planning. Englewood Cliffs, New Jersey: Prentice-Hall Publishing Company, 1981.
- Major, D. C. and R. L. Lenton. Applied Water Resource Systems Planning. Englewood Cliffs, New Jersey: Prentice-Hall, 1979.
- Major, David C. Multiobjective Water Resource Planning. Washington, D. C.: American Geophysical Union, 1977.
- Mather, John Russell. Water Resources: Distribution, Use, and Management. New York, New York: Wiley Publishing, 1984.
- Moore, James W. Balancing the Needs of Water Use. New York, New York: Springer-Verlag, 1989.
- Moreau, David H., Karl Elfers, Gilbert S. Nicolson, and Kuniyoshi Takeuchi. Regional Water Resource Planning for Urban Needs: Part 1. Chapel Hill, North Carolina: Water Resources Research Institute, March 1973.
- North, Ronald M. "Financing Water Resources." Proceedings of a Conference on Water Problems of Urbanizing Areas. Engineering Foundation Conference, July, 1978.
- Okun, Daniel Alexander. Regionalization of Water Management: A Revolution in England and Wales. London, England: Applied Science Publishers, 1977.
- Okun, Daniel A. "State Initiatives for Regionalization." AWWA Journal. Bethesda, Maryland: American Water Works Association, May, 1981, p. 243.
- Petersen, Margaret. Water Resource Planning and Development. Englewood Cliffs, New Jersey: Prentice-Hall, 1984.
- Pfeiffenberger, Catherine. "Financing Water Systems Challenge Local Governments." American City and County. Atlanta, Georgia: Communication Channels, Inc., November, 1989, p. 39.
- Postel, Sandra. Water: Rethinking Management in An Age of Scarcity. Washington, D. C.: Worldwatch Institute, 1984.
- Prasifka, David W. Current Trends in Water-Supply Planning: Issues, Concepts, and Risks. New York, New York: Van Nostrand Rienhold Company, 1988.

- Safe Growth Team. Priority Recommendations for Improving Water Management: A Fifteen Point Plan. Nashville, Tennessee, 1982.
- Safe Drinking Water Act. Statutes at Large. Section 3.
v. 88, 1974.
- Sargent, Frederic O. Rural Water Planning. South Burlington, Vermont: Sargent Publishing, 1979.
- Schmandt, Jurgen. State Water Policies: A Study of Six States. New York, New York: Praeger Publishers, 1988.
- Seibel, Gene. "Utility Sharing is Like Getting Married." AWWA Journal. Bethesda, Maryland: American Water Works Association, May, 1987, p. 12.
- Sewell, J. Richard. "Demystifying Utility Myths." Public Utilities Fortnightly. Arlington, Virginia: Public Utility Reports, Inc., August 20, 1987, p. 10.
- Sheer, Daniel P. "Improving Management of Water Resource Systems." National Forum: Phi Kappa Phi Journal. Baton Rouge, Louisiana: The Honor Society of Phi Kappa Phi, Winter, 1989, p. 8.
- Sikora, Vincent A. A Model Code for and Allocations of Water to Public Water Systems. Research Report Number 96, Knoxville, Tennessee: Tennessee Water Resources Research Center, January 1984.
- Smith, Rodney T. "Water Transfers, Irrigation Districts, and the Compensation Problem." Journal of Policy Analysis and Management. New York, New York: John Wiley and Sons, Inc., Summer 1989, p. 446.
- Smith, William R. "Regional Allocation of Water Resources." AWWA Journal. Bethesda, Maryland: American Water Works Association, May, 1981, p. 227.
- South Central Tennessee Development District. Regional Water Systems Survey. Columbia, Tennessee: South Central Tennessee Development District, 1981.
- Southern Rural Development Center. Future Waves: Water Policy in the South. Memphis, Tennessee: Southern Rural Development Center, 1983.
- Speidel, David H. Perspectives on Water: Uses and Abuses. New York, New York: Oxford University Press, 1988.

Tennessee Code Annotated. Nashville, Tennessee, Sections 7-82-202, 7-82-302, 7-82-601, 7-82-602. v. 2B, 1985.

Tennessee Department of Public Health. Water Quality Management Plan: Summary and State Strategy. Nashville, Tennessee: Department of Public Health, May, 1979

Thackston, Edward L., Frank L. Parker, Michael S. Minor, William S. Goodwin, and James D. Bowen. Water Policy in Tennessee: Issues and Alternatives. Research Report Number 94, Knoxville, Tennessee: Tennessee Water Resources Research Center, April 1983.

Trauth, Kathleen M., Billy J. Claborn, and Lloyd V. Urban. "A Water Resources Audit for Small Communities." AWWA Journal. Bethesda, Maryland: American Water Works Association, May 1987, p. 48.

Trelease, Frank J. "New Water Legislation: Drafting for Development, Efficient Allocation, and Environmental Protection." Land and Water Law Review. v. 12, University of Wyoming, 1977.

United States Army Corps of Engineers. Water Resources Development in Tennessee. Cincinnati, Ohio: United States Army Corps of Engineers, Biennial.

United States Environmental Protection Agency. Environmental Progress and Challenges: EPA's Update. Washington, D. C.: U. S. EPA, August 1988.

Upper Cumberland Development District. Water and Wastewater Plan Update of the Upper Cumberland Development District. Cookeville, Tennessee: Upper Cumberland Development District, 1979.

Viessman, Warren. Water Management: Technology and Institutions. New York, New York: Harper and Row, 1985.

Virginia Water Resources Research Center. Legal and Administrative Systems for Water Allocation and Management, Options for Change: Seven Perspectives on Aspects of Water Resource Planning in the Southeastern States. Blacksburg, Virginia: Virginia Water Resources Research Center, 1983.

Wallace, James Robert. Water Conservation and Alternative Water Supplies. Atlanta, Georgia: Environmental Resources Center, 1979.

Warner, Dennis. Water and Sewer Development in Rural America.
Lexington, Massachusetts: D. C. Heath and Company,
1975.

Webster's New World Dictionary. New York, New York: Warner
Books, Inc., 1987.

Wehbring, Kurt. Institutional Problems of Water Quality
Planning in the Pacific Northwest. Washington, D. C.:
U. S. Department of Interior, OWRT, September, 1980.

Wolfe, Dennis D. An Analysis of Institutional Mechanisms for
Water Planning and Management. Knoxville, Tennessee:
University of Tennessee, 1978.

Wyatt, A. Wayne. "Institutional Aspects of Water Management."
Water Issues for Today, for Tomorrow. College Station,
Texas: Texas Water Resources Institute, 1982.

APPENDIXES

APPENDIX A
SURVEY COVER LETTER

May 21, 1990

East Tennessee Water System

Dear Sir/Madam:

A research project sponsored by the Water Resources Research Center is currently being conducted at the University of Tennessee's Graduate School of Planning dealing with issues in the regionalization of small water utility districts in East Tennessee. The enclosed questionnaire is one component of the data which will be utilized to understand this issue. The responses obtained from this questionnaire will be useful in formulating an initial understanding of the issues and problems of existing regionalized water utility districts.

We ask your cooperation in completing the questionnaire and mailing it back in the enclosed envelope at your earliest convenience.

Thank you very much for your assistance and participation!

Sincerely yours,

Mark E. Hairr

APPENDIX B
REGIONALIZATION SURVEY

The following questionnaire is designed to obtain information concerning the regionalization of small water utility districts in East Tennessee. The responses obtained will be important in identifying specific systems which are relevant to this research project and in providing an initial understanding of the problems, issues, and barriers concerning the regionalization of water utility districts. Please utilize the space below each question for your responses.

1. Based on your experience, what do you feel are the greatest problems, constraints, and barriers to the regionalization of small water utility districts in East Tennessee?

2. Other than the problems expressed in question number 1, what do you believe are the most relevant concerns in the regionalization of small water utility districts in East Tennessee?

3. Based on your experience, how appropriate and/or successful would the regionalization of small water utility districts be in the East Tennessee area?

4. Could you please identify and list examples of small utility water districts in the East Tennessee region which have been unified using consolidated organization or successfully organized using a regional approach?

5. Could you please identify and list examples of small utility water districts in the East Tennessee region which have experienced problems in implementing regional organizational schemes?

6. Could you provide the names and addresses of other people who may be useful contacts regarding this research and have a knowledge of the subject of regional water utility districts?

APPENDIX C
OUTLINE COVER LETTER

July 6, 1990

East Tennessee Water System

Dear Sir/Madam:

This letter is to confirm our conversation concerning your agreement to participate in the case study analysis portion of a research project being conducted at The University of Tennessee's Graduate School of Planning. We would like to thank you for agreeing to take part in this study of regionalized water systems in East Tennessee.

As discussed over the telephone, I am enclosing an outline describing the types of information we are seeking in relation to this subject. We would like to use this outline as a general guide during our meeting. After you have had time to review the outline, we will contact you by telephone in order to set up a time to discuss this issue. We would like to complete the case study analysis portion of this research project during the month of July. As a result, the sooner we may meet and discuss this issue, the better

We look forward to the opportunity to discuss this subject with you. Thank you again for your time and participation!

Sincerely,

Mark E. Hairr

APPENDIX D
REGIONALIZATION INTERVIEW OUTLINE

OUTLINE FOR CASE STUDIES OF REGIONALIZED WATER SYSTEMS

The following outline has been prepared and sent to your office in advance of our visit so that you will be aware of the kinds of information we are seeking. This outline contains statements and questions which will be covered during the case study analysis of the regionalized and/or consolidated water system which you are familiar with. This is not an inflexible instrument which must be followed exactly. We realize that you will not be able to address each issue covered in this outline. Rather, this outline is to serve as a general guide to the relevant issues surrounding the regionalization process. Additional comments and suggestions are welcome from you during the case study analysis.

BACKGROUND OF WATER SYSTEMS INVOLVED IN REGIONALIZATION PROCESS.

- 1) Please identify each specific water system which was involved in the regionalization process.
- 2) Please provide a profile of each system involved in this process including:
 - A) The type of water system (i. e., municipal, private etc.).
 - B) The water systems' storage capacity, average daily daily production, the number of staff, the size of the water lines, the location of the main water plant, number of customers, and rate schedules.
 - C) What area was served by each water system?
 - D) What was the source of the each system's water supply?
 - E) What were the characteristics of the topography of the area served by each water system?
 - F) How was each system being financed?
 - G) Was each water system seen as providing adequate service to its customers?
 - H) Was the water quality up to standards and was it regularly monitored and tested?

THE REGIONALIZATION PROCESS

- 1) Who and/or what instigated the regionalization process?
- 2) What were seen as the major reasons for undertaking this process?
- 3) Was there agreement among decision makers and the general public to proceed with this process?
- 4) Was one water source to be used or a combination of sources for water supplies?
- 5) Was annexation of territory an issue in the regionalization process?
- 6) What kind of financing arrangements were considered and were there financial constraints in existence?
- 7) What were the major legal issues encountered in the creation of the new regionalized system?
- 8) Was drought and the potential for drought conditions in the area an issue in this process?
- 9) Was the construction of new facilities for water supply considered during this process?
- 10) Were there problems with the compatibility of physical connections of lines and facilities during the regionalization process?

ISSUES CONCERNING THE RESULTANT REGIONALIZED WATER SYSTEM

- 1) What type of regionalized water system resulted? (Administrative, legal, physical facilities, or a combination of these types of arrangements)
- 2) Is the form of regionalization which resulted unique from other organizational arrangements that you are familiar with?
- 3) Were new physical facilities constructed and were improvements and repairs made in existing facilities?
- 4) What specific geographical area is served by the regionalized water system?

- 5) Who and/or what is the governing body or authority over the resultant system? Is there fair representation on the governing board?
- 6) Were there changes in administrative, governing, operation, and maintenance personnel? Did a more qualified staff result from the regionalization?
- 8) What is the regionalized water system's storage capacity, average daily production, hours of operation, number of staff, water line sizes, location of main water plant, and rate schedules?
- 9) Does the water quality of the area served by this water system meet standards and regulations?
- 10) Are the administrative, maintenance, and service areas of the water system in close proximity?
- 11) What is the water source of the regionalized system?
- 12) Are there any problems currently being encountered by this regionalized water system?
- 13) What are seen as the major benefits of the regionalized water system over the way water was handled prior to its existence?
- 14) Is any expansion of physical facilities or services planned in the future?

VITA

Mark Edward Hairr was born on September 28, 1964 in Des Plaines, Illinois. He graduated from South Mecklenburg High School in Charlotte, North Carolina in 1982. He then attended the University of North Carolina at Charlotte, where in 1988 he received a Bachelor of Arts Degree in Sociology with a Minor in Political Science. He then entered the University of Tennessee's Graduate School of Planning, where he was presented the School's Outstanding Academic Achievement Award. He received the Master of Science in Planning Degree in December of 1990.

The author has worked with the Town of Farragut, Tennessee in city planning and administration. He hopes to pursue a career in this or a related area.