

DATA REQUIREMENTS FOR ALTERNATIVE STATE APPROACHES TO
LAND AND WATER RESOURCE CONSERVATION IN KANSAS

by

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INTRODUCTION

Land and water resource planning and management by any level of government requires an adequate information base. In most states, the provision of needed information has become an increasingly burdensome task. There are a multitude of problems that are inevitably encountered with attempts to establish a land and water resource data base. The major problems can be categorized as: the availability of information, the form of the information, the complexity of the issues and problems, and the cost of providing information. These problems must be squarely met if land and water resource planning and management are to be successful.

The availability of information is often a two-sided problem. First, a great deal of information pertaining to natural resources is presently available. In fact, there is such a volume of information that it is often difficult to determine what information is best suited for a particular analysis. On the other hand, it is not uncommon for the essential information to be unavailable either in the required time frame or within the established resources. Most of the information gathered by the state is useful to some degree, however, without a broad based assessment of data needs, it often becomes difficult to fit existing information into the desired planning and management process.

Much of the information gathered by state governments is in response to single purpose programs with little or no concern given to broader needs or applications. In most planning studies, the characteristics of information are often more important than its physical availability. For those studies, information that is not in the desired form cannot be considered usable for that particular function. The characteristics of information include such

factors as scale, resolution, vintage, aggregation, method of collection, accuracy, reliability, and format. These characteristics should be dictated by the nature of the problem or study and often cannot be compromised. It is a most difficult task to provide individual programs with their own specific information needs and still provide information for a variety of land and water resource planning and management programs. Again, a piecemeal approach to data provision can only serve to further complicate the problem.

Experience has taught us that land and water are complicated resources.¹ Two of the major complicating factors are the way in which man views the ownership of land and the intricate interrelationships between and within environmental systems. The ownership of land is often thought of as a right of every citizen and only a few constraints on an individual's use of his land are tolerated. The private market does not recognize the public character of land and, therefore, land and water planning are faced with a system that places little value on management for the benefit of the land. Resource management questions are also complicated by the interrelatedness of nature. In ecological systems, each element is tied so tightly together that a small change in the characteristics of one element can produce significant changes in the entire system. To properly understand the interdependencies within ecological systems one must develop a sophisticated analysis.

The cost of establishing an information system often becomes the most difficult problem faced by those charged with the system's development. The first three problems, availability, form, and complexity are largely technical problems that require technical solutions. Cost, on the other hand, is essentially a political problem. Rarely are decision-makers aware of the cost, time, and personnel needed to develop a comprehensive information system. The size and type of system are all too often a result of political considerations rather than a perceived need of a particular group.²

In the 1960's, many states became aware that the resource base of the nation is largely fixed and that the wasteful use of natural resources could not be justified to future generations. Accordingly, almost every state has become involved in varying degrees, in the management of their land and water resources.³ In addition, a number of states recognize that many resource related problems do not conform to established political jurisdictions, thus requiring a broader approach. The federal government has also increased the states' roles by mandating some level of state involvement in specific problem areas. The federal government dictates the level of involvement, allowing each state to determine the most appropriate response to meet the federal goals. In all, the states are emerging as the leaders in the management of land and water resources.

State governments are in a unique position in terms of data collection. State agencies often possess more data-gathering expertise and equipment than the local units of government. Statewide surveys normally result in economies of scale (lower cost per county) due to the full time employment of experts. States are also in a better position to undertake studies that look beyond the local boundaries.

The federal government, with agencies that specialize in data collection, is even more capable of gathering information than any individual state. On the other hand, the federal government has had difficulty providing information that is tailored to the needs of diverse state and local programs. The federal government can only provide the general data needs of state and local governments. Because of this, state governments are generally recognized as the most appropriate level of government to gather and organize land and water resource information.

Kansas has a particular motive for becoming involved with the provision

of data pertaining to land and water resources. The state is in the process of developing a statewide planning process for the management of the state's resource base. The Division of State Planning and Research has been charged with the responsibility of developing a state planning process as a part of the state management system. The Division is to provide for the coordinated development of the state's resources through long-range comprehensive planning and policy formulation. The management of the land and water resources of the state is but a part of the comprehensive effort, however, it is a vital part. If the state is to more effectively guide its future development it must provide for more efficient management of its land and water resources and this, to a substantial degree, is dependent upon the ability of the state to provide for its informational needs.

A state, in order to effectively assess its data needs, should first determine its role in the management of its land and water resources and evaluate the particular problem area it faces. These two issues are, however, dynamically intertwined. The state's role, or the level of its involvement, will affect its perception of the problems, and, therefore help determine the policies and programs of the state. In contrast, the characteristics of the problems, especially their severity, will directly influence the formulation of the state's role and the evaluation of its problems that the data requirements can be determined.

The determination is not an easy one to make. The state may decide upon a different role or level of involvement for each of the problem areas or categories. For instance, a state may have an active role or high level of involvement on water quality problems, but have a low level of involvement on the preservation of wildlife habitat. Also, the level of the state's involvement and the nature of its problems may change over time. As old

problems are solved new ones tend to emerge and the state's perception of the problems is in a continuous process of change and revision. One must conclude that the data requirements for the state's policies and programs will be in a continuous cycle of change.

This report is an investigation into the minimum data requirements for three different levels of state involvement in the management of land and water resources of Kansas. The minimum data sets have been constructed from the interplay between the recognized problems in resource management and assumed policies of three hypothetical models (role models) of state involvement. The state is currently evaluating its role in the management of its land and water resources and it is hoped that this report will provide some input into that process. The study is intended to provide a workable tool for decision makers by increasing their knowledge and understanding of the data implications of different state roles in land and water resource management.

The study has concentrated on land related problems rather than the wide range of problems faced by state government. For this reason, only limited socio-economic information has been included in the study. It is recognized that this information is essential for land and water resource management programs, but it is felt that the inclusion of this information would be beyond the purpose of this report.

The study has also concentrated on assessing the data requirements for policy formulation and high level program development. It is not the intention of this report to address the specific needs of programs of line agencies. Policy and program development can be the most demanding activities in terms of information requirements and this study is an attempt to address these needs. This study makes no attempt to design an information system for the

State of Kansas. The needs and problems associated with information systems are discussed only to illustrate some of the costs of providing information.

The study has been divided into four parts: an overview of existing documents, the development of three role models of state involvement, the determination of data commitments by role model, and finally, a review of the Kansas situation. Each of the sections build upon each other until the final section which contains the recommendations of the study.

Kansas has expended considerable time and effort in identifying its existing policies and its present and expected land and water resource problems. The results of these separate efforts are summarized in a number of documents which will be reviewed in Part One of this study. The purpose of this review is to provide an initial assessment of the adequacy of the data collection efforts in addressing the resource management needs of the state. This overview will be of the documents themselves and might not accurately depict the actual situation. That type of analysis would require a much broader approach. The overview is, however, intended as a starting point in the assessment of the data collection efforts of the State of Kansas.

Part Two of the study will develop three hypothetical role models that explain the level of involvement a state government might have in land and water resource management. The role models are necessary since they allow the categorization of different state approaches into a workable framework. It is assumed that the level of involvement of the state government will differ with each problem encountered in the state and its perception of that problem. The three role models are designed in recognition of this situation. The role models are: State Exclusive Control, State-Local Partnerships, and State Advisory Role. Part Two presents reviews of land and water management

efforts in other states to illustrate the utility of the role models.

The third part of the study will be the synthesis of the first two sections. Part Three begins with a brief introduction to the needs and characteristics of information systems and points out that the data requirements of a program are very much a part of the design of an information system. The second section of Part Three deals with the clarification of the problems listed in Part One in light of the three role models (Part Two). This is followed by the listing of the data requirements in each problem category for each role model.

The last part of the study, Part Four, will tie the first three parts together and indicate what roles Kansas appears to be performing in each of the problem categories. As part of this analysis, a general comparison of the existing data gathering efforts with those elements suggested from Part Three will be examined. Part Four will conclude with a recommendation section covering the findings from all four parts.

PART ONE

OVERVIEW

Before a state can make decisions about its future it must first know where it is today. The purpose of Part One of this report is to provide an initial assessment of the actions of the state towards developing a land and water resource management system. The special concern of this overview is with the adequacy of the data handling activities within a management system.

The assessment of where Kansas is today will be attained through a review of existing state-level natural resource documents. The state government of Kansas has spent considerable time and effort in identifying both the problems and the policies of the state in the natural resource area. The result of this work is summarized in four policy documents and four problem identification/needs assessment documents. In addition, the state has developed a catalog of natural resource data sources. These documents will be the primary sources for this part of the study. A full list of the reviewed documents appears in Appendix One.

Methodology and Approach

The process used in the overview has been to extract from the existing documents those policies, problems and data elements that relate to the management of land and water resources. The extracted policies have provided the framework for this section and have been divided into twelve topical categories that best describe the nature of the policies. The extracted problem statements have been attached to the policy listing by also using the twelve category breakdown. Care was taken to attach the problem statements to the category and policies that appeared to best address the issue raised in each of the problems. Finally, the extracted data elements were added to the

listing, thus completing the process.

The assessment of the existing documents has been made by use of the listing and has been divided into three sections: conflicting policies, policy-problem discrepancies, and data limitations. The primary interest in this study is in data handling operations, but it is recognized that data requirements are normally a result of the interaction between recognized problems and operational policies. In this way, all three areas must be evaluated.

Specifically, the overview deals with three areas. First, the policies have been examined to determine if areas of conflict exist. If these areas of conflict are not resolved, inconsistencies in data handling operations may result. Second, the problem statements have been analyzed to determine if the stated policies adequately address the needs outlined by the problems. Again, inconsistencies between the problems will likely complicate the provision of information. Finally, the analysis will turn to the data elements themselves. The data elements have been examined to determine if unfulfilled data needs (as expressed in the policies and problems) exist, if there is any duplication in the data elements collected by state agencies and if there are areas in which coordination of data provision efforts are needed, but not expressly provided for.

The overview presented in this study should not be considered a definitive review of the land and water resource management activities of the State of Kansas. The overview is only of the existing documents that describe the activities, and not an analysis of the activities themselves. This study must concede the possibility that the existing documents do not present the entire story. Policies may be operational, but not stated; problems may exist, but are not expressed, and the documents may express problems and

policies that are not accepted by the state government.

In defense of the process used in this study, it must be pointed out that considerable care has been taken in the preparation of the existing documents. Often these documents have been subjected to rigorous reviews by a number of state agencies. It is felt that these documents are reliable for the type of review conducted in this study and it is assumed that they are in fact accurate.

The analysis of existing documents is presented in three sections. The detailed analysis is presented in a list format in an attempt to increase its readability.

POLICY CONFLICTS

It would be absurd to suggest that a state government would deliberately enact policies that result in direct conflict. Conflicts in state programs and policies seldom, if ever, occur by design, however, it is entirely possible that inadvertent conflicts do exist. All too often policies are formulated with little or no concern for their affects upon each other. In most cases the degree to which a policy is operationalized determines whether a conflict in policies actually exists. In this review it has been assumed that all policies are enforced equally and to the fullest practical extent. Under this assumption, policies that call for opposite actions will be presumed to be in conflict unless modified in such a way as to avoid conflicts. Special attention shall be placed upon policies that attempt to resolve conflict between policies.

The policy conflicts, outlined below, appear to be a result of competing uses of land and water resources. Generally, these types of conflicts can be divided into three areas: conflicts between policies of conservation and expanded use of resources, conflicts between policies of environmental quality and economic development, and conflicts within policies for the provision and

use of water resources. The policy conflicts will be listed by using these three areas.

Conservation vs Expanded Use

- A. Policies of the Conservation of Natural Areas Section may conflict with policies of agricultural expansion.
 - 1. Policies call for the conservation of areas such as forests, woodlands, soil, and waters, however, agricultural policies encourage the expansion of agricultural land, at times at the expense of these natural areas (problems I-1, 2, 3, and 4).
 - 2. The administration of conservation policies are split between the Park and Resource Authority, the local watershed districts, and the Kansas Geological Society. It appears that the jurisdiction of these agencies overlap and this apparent overlap is not addressed in policy.
- B. Policies in the Wildlife Preservation section also appear to conflict with the policies of the Agricultural Conservation section.
 - 1. Numerous policies are aimed at protecting both wildlife species and wildlife areas, yet, the expansion of agriculture often destroy the habitats of wildlife (problems XI-3, 4, 5, 7, 8, 9, 12, and 13).
 - 2. The increase in agricultural land is often accompanied by an increase in chemical use and higher sediment loads which have adverse affects upon the aquatic wildlife (problem XI-14).
 - 3. Policies of agricultural conservation tend not to allow for the diversification of wildlife habitats and, therefore, restrict the number and kind of wildlife species (problems XI-3, 4, 5 and 7).
 - 4. The policy in the Wildlife Preservation Section that controls the use of chemicals may result in a reduction in the use of agricultural chemicals which will reduce farm profits. The cumulative effect may

be to discourage the development of agriculture.

5. Policies of agricultural conservation encourage the expansion of agricultural land, often at the expense of wetlands and wetland habitats through the drainage of pot holes, etc., (problems XI-13).
- C. The policies of Flood Control appear to be in conflict with the policies of Wildlife Preservation.
1. The policies that allow the widespread construction of flood control structures and water course channelization has placed strains upon the aquatic wildlife populations (problem XI-14).
 2. The destruction of floodplain vegetation as a result of flood control structures and the construction of reservoirs has reduced the population of wetland related wildlife (problems XI-8, 12, and 13).
- D. The policies in the Recreation Section appear to conflict with the policies of the Conservation of Natural Areas.
1. The intensive development and use of natural areas may limit the potential to preserve these areas as natural pristine areas.

This investigation has found only one instance in which a policy exists that is directly intended to reduce conflict between competing uses of land. A policy exists in the Wildlife Preservation Section which instructs the watershed districts to restore wildlife habitats disturbed by construction, improvements, or other operations of watershed districts. In view of the unstated priority placed upon agricultural expansion, the amount of actual conflict between the operation of state policies is more than likely limited. Regardless, there are no policies that resolves the apparent policy conflicts.

Environmental vs Economic Development

- A. The policies of Agricultural Conservation appear to conflict with the policies of the Water Pollution and Quality Section.

1. The intensive use of land for agriculture and the use of chemicals for agriculture have become the largest source of water pollution (problems IX-1, 3, and 5).
 2. The expanding use of irrigation has increased the saline content of some Kansas waterways (problems IX-4 and 9).
- B. The policies of Water Pollution and Quality are in conflict with the policies promoting active mineral extraction.
1. The inappropriate disposal of mineral wastes has resulted in the pollution of water courses (problem IX-7).
- C. The policies of Agricultural Conservation appear to conflict with the policy of the Air Quality Section.
1. The intensive use of land for agriculture has resulted in an increase of particulate matter in the state (problem V-1).
- D. The policies in the Land Use Section appear to conflict with the policies of Water Pollution and Quality.
1. The policies related to solid waste authorizes cities to construct disposal sites, but no review is conducted. In a number of cases solid waste disposal sites have been constructed in floodplains, thus increasing the potential of water pollution (problem IX-10).

No policies have been found in this section that are aimed at reducing possible conflict areas. It should also be pointed out that much of the state's involvement in environmental protection is a result of federal mandates and this might account for much of the conflict between environmental quality and economic development.

Water Provision and Use

- A. Policies with the Water Use and Conservation Section appear to conflict with policies in the Groundwater Section.

1. Policies in the Water Use Section call for the conservation of water in a balanced approach, yet the groundwater policies have been inadequate in reducing the rate of groundwater withdrawal (problem VII-1 and 2).
 2. The rapid use of groundwater has reduced surface flows of some water courses (problem VI-3).
- B. The policies which encourage the impoundment of water appear to be in conflict with policies in other areas.
1. The development of large scale reservoirs takes large quantities of land out of agricultural production. This land, being in the river valleys, are often the more productive lands (problem II-1).
 2. The development of reservoirs and river channelization often destroy or significantly alter archeological sites (problems XII-3 and 4).
 3. The development of reservoirs limits the range of recreational facilities within the state by covering potential sites and limiting major recreational sites to only reservoirs (problem XII-1).

As with the previous section, policies are lacking that would reduce policy conflicts.

It has been demonstrated that the policies in the natural resource area have not been developed in a comprehensive fashion and that policy conflicts are likely to exist not only from the manner in which the policies are written, but also in the manner in which the policies are actually carried out. The majority of the policy conflicts arise from the competition of different interests for the limited land and water resources. The analysis has pointed out the need to study the apparent policy conflicts surfaced in the previous discussion in an effort to determine to what extent policy conflict is operationalized and to what extent policies may be modified to reduce policy conflicts.

PROBLEM-POLICY DISCREPANCIES

One of the central issues in this analysis is the adequacy of the adopted policies in addressing the identified problems. The review provided in this section of Part One has been developed through a comparison of the policy areas and problem statements in each of the twelve topical categories. The comparison was conducted by evaluating the ability of the policy areas to address the stated problems. Special attention was placed upon the lack of a policy for a problem or group. In a number of cases it was necessary to assume that if a policy existed in a given area that it was adequate to address problems in that area. It is impossible at this point to determine if a policy is actually being implemented in such a way to correct a problem area.

The problem-policy discrepancies shall be presented in a list format by use of the twelve topical categories.

Conservation of Natural Resources

1. The problems in this section are stated in fairly specific terms while the policies are expressed in broad terms and are, therefore, subject to broad interpretation.
2. Forest and woodland areas are identified as needing protection. These areas are covered, broadly, by the policy statements.
3. The tall grass prairies, wetlands, and marshlands are stated as in need of protection, but no policy specifically calls for this action. In the 1977 legislative session a bill was introduced that would establish conservation easements to protect the tall grass prairies. The bill was, however, never passed.

Agricultural Conservation

1. The policies expressed in this section are generally consistent with the expressed problems. The majority of the problems and policies

relate to the loss of agricultural land through either man-related activities or natural phenomena.

2. The decrease in the number of farms and the increasing average size of farms is expressed as a problem yet no policy directly addresses this issue. Use value property assessment of agricultural land is an attempt to encourage small farm ownership, however, it has not been demonstrated that higher assessed value has forced small farmers to sell and, therefore, it is uncertain what affect this policy will have in addressing the problem area.

Energy

1. The problems in the energy section predominately deal with energy shortages and the imbalance of energy distribution within the state. The state lacks any comprehensive policies dealing with energy conservation and the reduction of energy demand.
2. The state lacks any policies which provide incentives for the conservation of energy except in the area of solar energy in which tax incentives are offered.
3. No policies exist that call for the research and development of alternative energy sources.

Geology

1. The problems in this section center upon the significance of geological hazard areas while the policies relate to the use or development of geological resources. The policies make no mention of geologic hazards.
2. There are no policies that address the dangers of earthquakes, tornados, land slides, and subsidence or collapse zones, yet these are specifically stated problem areas.

3. No policy exists that addresses the loss of rare geologic features whether of economic significance or not, yet the loss of rare geologic features is a recognized problem.

Air Quality and Noise Pollution

1. Only one policy exists in this section, but it does address the problem of air quality, although the policy is expressed more as a goal than a policy.
2. The policy of this section does not specifically address the problem of sulfurdioxide in Kansas City or carbon monoxide in Wichita, yet the policy calls for the maintenance of air quality standards.
3. No policy addresses the problem of noise pollution around airports and transportation corridors.

Water Use and Conservation

1. The problems expressed in this section appear to be well covered by the policies.
2. Localized water shortages are beginning to become a problem in Kansas. The policies probably will not solve the problem, but they do provide some measure of protection.
3. Two solutions to the water provision problem appear to exist to increase the supply of water and to limit water consumptive development in areas facing water shortages. No policy addresses the second solution, but a policy of increased weather modification attempts to partially achieve the first solution.
4. No policy exists that resolves the conflict between the use of groundwater and the corresponding reduction of surface flows. This is, however, a recognized problem.

Flood Control

1. The three problems stated in this section appear to be well addressed

by the policy statements.

2. This section seems to fail to recognize the cumulative affects of flood control projects. Each flood control structure has the potential of changing the flood characteristics of downstream portions of river courses. Policies do not exist that require flood structures to be part of an integrated system.

Groundwater

1. The rapid depletion of the groundwater in certain areas of the state is expressed as a major problem. The state has policies that call for the best use of the state's groundwater resources, but no policy exists that calls for the reduction of groundwater use.
2. The policies encourage the formation of groundwater management districts, but their authority to bring about water conservation is limited.
3. The state lacks a policy which regulates the use of nitrate fertilizers in agriculture even though this practice has been linked to groundwater pollution in certain areas.

Water Pollution and Quality

1. This section identifies land runoff as the greatest source of water pollution, yet no state policy exists that calls for the control of non-point sources of water pollution.
2. The state lacks an expressed policy relating to sediment control, yet this type of policy would address the problems associated with the lack of sediment control.
3. Policies that call for the control of sewage disposal through assisting cities with the construction of waste treatment facilities do address the water quality problems, but these policies tend to under-

state the problems. Very few communities in Kansas can presently meet the federal pollution standards and it is felt that most will not be able to meet the requirements by the stated deadline.

Land Use Considerations

1. No problem statements were attached to this section due to the special nature of this section. The Land Use category was intended to contain those policies that specifically relate to the use of land. It was found that the policies in this area were very specific and more detailed than would be expected from the problem identification documents. The policies exist for a reason and it can only be assumed that each policy also expresses a problem.

Wildlife Preservation

1. A number of problem areas have been identified in this section and for the most part they are well addressed by the policies. This is especially true in the more specific problem areas.
2. Two problems state the need for additional wildlife management areas, however, no policy calls for an increase.
3. The loss of diverse habitat areas is expressed as a problem area and no policy addresses this issue.
4. The destruction of aquatic habitats due to water pollution is a recognized problem, but the state lacks a policy calling for sediment control.

Recreation

1. The state lacks any policies that specifically call for the protection of historic and archeological sites although the majority of the expressed problems deal with this issue.
2. The policies of this section do call for the increase and maintenance

of recreational areas. The insufficient amount of recreation space in Kansas is recognized as a problem.

This section of the report has indicated that a number of discrepancies appear to exist between the policies and the problems. For the most part, the discrepancies have been a result of the absence of a policy to address a recognized problem. Two explanations are possible. A problem may be managed through administrative regulations rather than legislative policy. In this way the problem is addressed without making it a policy issue. The second explanation is that the problem exists, but no solution is offered at the state level either because of philosophy or the inability of the government to face the issue. It is impossible to determine the explanation for each of the apparent discrepancies.

One factor that makes it difficult to analyze the proper setting of the apparent discrepancies is the lack of prioritization of both the policies and the problems. There is no indication of whether the state government views one area as more important than another. In this way it is difficult to determine the true relationship between the policies and the problems.

DATA LIMITATIONS

The policies and the recognized problems of a state have a direct relationship upon the data elements the state collects. The policies express the concerns of the state along with the limitations of what actions are acceptable. The way in which the problems are expressed define the nature of the issue. The two combine to determine the set of data that is required to address the issues. If gaps, duplications or inconsistencies exist between and within the policies and problems, this will be reflected in the data collection efforts. The discussions of the policy conflicts and the problem-policy discrepancies have provided a reference point for a discussion of data

limitations.

The data limitations have been identified in a fashion similar to the previous section, problem-policy discrepancies. The data elements were analyzed within each topical category. The analysis was expanded to include inconsistencies between data elements of different topical categories. The data limitations will be presented in a list format by use of the twelve topical categories.

Conservation of Natural Resources

1. There appears to be some duplication of information on the amount of pasture land collected by the Water Resource Board and the Board of Agriculture. The aggregation of this information is different, however, both agencies are collecting very similar information.
2. A similar situation exists between the Water Resource Board and the Kansas State Forestry and Extension. Both agencies collect data on the acreage of forest and woodland areas. The information is aggregated at different scales, however, the data appears to be the same.
3. The policies and problems of this section appear to indicate a need for detailed land cover information, yet only general land cover information is available. The existing land cover information is at too small of a scale and too generalized for most natural resource conservation programs.
4. Other missing data elements that are implied as needed by the policy and problem statements are: private property and ownership maps, trend information on natural features, and an inventory of the state's wetlands and other natural areas.

Agricultural Conservation

1. The state's county soil survey program is only partially complete

with a number of counties lacking this information. This information, when completed, can prove to be valuable in a number of ways to agricultural conservation efforts.

2. The designation and mapping of the state's prime agricultural land is also incomplete with only a few counties with completed reports.
3. Some degree of overlap appears to exist between three state agencies; the Conservation Commission, the Department of Revenue, and the Board of Agriculture. Each of these agencies collect data on agricultural land use, with apparent duplication of the result.
4. There are data elements that are indicated as valuable by the policy and problem statements, but are not currently being collected. These include: the extent and rate of urbanization, the loss of agricultural land to urban development, erosion rates and erosion potential, and agricultural property ownership.

Energy

1. Some duplication might exist between the Kansas Geological Survey and the Corporation Commission, however, because of the different purposes and needs of the two agencies, it is likely that the duplication is necessary for the agencies to carry out their respective functions. Both agencies collect information on oil and gas production.
2. Information on projected energy demands does not exist. This information will be needed if the state is to develop a plan for the future collection of energy resources.

Geology

1. In this section, land subsidence, the loss of rare geologic features, and geologic hazards are identified as major geologic problem areas, yet no information appears to be collected that specifically addresses

these areas of concern.

2. The policies of this section mainly deal with economic and development interests while the problems deal with broader concerns. Most of the geologic data reported as collected is consistent with the policies and deals with the economic and development issues.
3. The geologic data does identify important geologic features, but only economic value is placed upon these features.

Air Quality and Noise Pollution

1. Data in this section is collected with no apparent duplications and the data elements appear to meet the requirements of both the policies and the problems.
2. The noise level and pollution information is limited. Information is only available at the state level for projected highway corridors with no information available on airports and existing highway corridors. Noise pollution is obviously considered a local problem.

Water Use and Conservation

1. Some duplication might occur between the Kansas Geological Survey and the Forestry, Fish and Game Commission in that both agencies are collecting similar information on river characteristics. The Commission is collecting data on the Neosho River for monitoring the effects of the Wolf Creek nuclear power plant. The survey collects similar data for all rivers in Kansas. It is unclear whether duplication actually exists in terms of the specific data items collected.
2. The state lacks updated information on completed dams (although some exist through the watershed data) and on water related data sources.
3. The state lacks any information on the effects of the weather modification programs.

4. Most of the water related data is aggregated on the basin or sub-basin level and is, therefore, incompatible with other information sources.
5. Data on individual irrigation wells does not appear on the data list, however, it is available from the Board of Agriculture, Division of Water Resources. Until 1976, this information was incomplete since water permits were not required.
6. The data listing does not indicate that biologic stream habitat information is used in conjunction with chemical quality information to measure water quality. If this is true, it may result in a misrepresentation of the true water quality.

Flood Control

1. Flood hazard boundary maps are developed by both the Board of Agriculture and the State Conservation Commission. It is possible that a duplication of effort exists.
2. With the exception of Butler and Conley counties, the flood hazard information does not indicate the potential of hazards or the need of stream modifications.
3. Information is lacking on drainage district programs, existing stream modification projects, and the extent of urban expansion in the floodplains. All of this information will be needed to address the policies and problems of this section.

Groundwater

1. A number of state agencies collect groundwater related data, but it is unclear if duplication exists.
2. The State Corporation Commission collects data on irrigation acreage, the Water Resources Board collects data on groundwater use and

levels and the Board of Agriculture keeps information on water rights and groundwater levels. It is unclear whether this information is integrated or if it is a duplication of effort.

3. Both the Kansas Geological Survey and the Department of Health and Environment collect groundwater quality information.
4. There appears to be a lack of information on groundwater management districts and on the contamination of groundwater by salt brine, although both data elements are important to the state.

Water Pollution and Quality

1. As with groundwater, the Kansas Geological Survey and the Department of Health and Environment collect surface water pollution data. The monitoring locations appear to differ as well as the specific quality of tests performed. It is possible that no duplication exists.
2. Stream sedimentation data is reported only at the state level, yet it is likely that it is collected at the sub-basin level. It is unclear as to why it is reported available only at the state level.
3. The land use information available at the state level appears to be inadequate to determine the influence of alternative land use patterns on water pollution.

Land Use Considerations

1. The land use/cover information listed in this section is at a large scale and insufficient for resource conservation decision making.
2. Currently, efforts are underway to update the land use/cover information at a smaller, more usable scale. As yet, this update has not been completed.

Wildlife Preservation

1. The policy statements encourage the development of wildlife conser-

vation programs on private property, but the data list does not indicate any information on this effort.

2. An inventory of the mink and muskrat populations does not appear to exist, yet it is identified as needed in the problem statements.
3. The general wildlife distribution information appears to be somewhat limited, yet called for.
4. Waterfowl migratory patterns are not indicated as available as well as an inventory of endangered species.
5. The rural letter carrier wildlife survey does not appear to be compared with other inventories. A comparison may produce interesting results even though different methodologies are involved.

Recreation

1. It is unclear whether private recreation data is compared with public recreation data, or if the private data is considered in the state's projections of need.
2. Two agencies, the Park and Resources Authority, and the State Conservation Commission, prepare recreational potential data. It is unclear if this is a duplication and if the two sources are compatible. It appears that the two agencies have developed quite different criteria for determining recreation potential.
3. An inventory of archeological sites that are not along projected highway routes does not seem to exist.
4. It appears that data does not exist that compares natural areas to proposed recreational development to see if this development is compatible with the environment of the natural area.
5. There is a lack of information on urbanization and its influence on potential recreational sites.

General Data Elements (Data elements in this section are so general as to be impossible to categorize under any one of the twelve topical categories).

1. No real duplication appears to exist in this section with the exception of the aerial photographs provided by the Kansas Geological Survey and the Department of Transportation. The scale of the Department of Transportation photographs is not noted so it is impossible to determine if any duplication exists.

The data limitations section suggests that a number of inconsistencies exist within the data provision efforts of the state. The majority of these inconsistencies appear to be a result in the lack of coordination and the lack of a comprehensive approach to data provision. The analysis has, however, been limited by its sole reliance upon the natural resource data catalog. It has been assumed that this report is complete and accurate, yet due to the size of the task it is conceivable that omissions exist. Before a final determination is made regarding the data limitations discussed here, the validity of the assumption should be tested.

SUMMARY AND CONCLUSION

Part One has attempted to identify the problems, inconsistencies, and deficiencies of the Kansas approach to the conservation of land and water resources as reported by the existing policy, problem identification and data documents. It has been assumed that the existing documents are complete and accurate and, therefore, can be used to gain knowledge about the actual conservation efforts.

It must be concluded that, with a few exceptions, the inconsistencies and deficiencies found in this analysis have not been major or pose no real problem to the state's programs. The study does show that a more careful

examination of the existing documents is warranted. The study has also demonstrated that there is a need for improvements in the coordination of the data collection and handling procedures of the different agencies. No central coordination exists in the data area. The feasibility of providing this coordination should be investigated.

In spite of increased coordination efforts, it is likely that data inconsistencies and deficiencies will continue as long as conflicts exist in and between the policies and problems. The key to solving many of the data inconsistencies and deficiencies discussed in Part One lies with the dynamics between the policies of the state and their relationship to the recognized problems.

PART TWO

ROLE MODELS

State governments have increasingly become involved in the management and conservation of their natural resources. This concern for the management of natural resources stems from a number of stimulants and, therefore, each state's response to resource management problems vary considerably. An attempt to analyze the range of responses is a difficult task without the development of a framework to compare the divergence of responses. This part of the report will develop a framework which will aggregate different responses in an attempt to simplify the task of evaluating the efforts to conserve land and water resources.

The framework developed in this study will involve the development of role models that categorize a range of responses into one role a state may play. The role models are built around different levels of involvement that a state may perform in their attempt to provide the orderly use of its resource base. The first section of Part Two will outline the development of three theoretical role models that seek to explain the variety of possible levels of state involvement. The second section of Part Two will illustrate how these theoretical role models fit into what is occurring in a number of states.

ROLE MODEL DEVELOPMENT

The purpose of developing the three role models is to isolate some of the factors in state programs which directly affect the provision of information. This technique allows a conceptual framework to be developed that provides some insight into changes in a state's data requirement as a result of an increasing or decreasing level of involvement in various land and water resource problem areas. The technique also does not limit the analysis to a particular level of involvement, but instead, recognizes that a state's level

of involvement will differ with different problem areas.

Each role model will call for a different approach or response to the resource problems of that state, which in turn, will result in different priorities being placed on the recognized problems. The different approaches, with their respective priorities, will distinguish the data elements required for each role model. The data requirements of one problem area will normally be different from one level of a state involvement to another level. It is, however, possible that some data elements will be common regardless of the level of involvement.

The number of role models (3) has been determined through a compromise between the ability to identify measurable characteristics in each category and the desire to have a number that could easily be worked with. The role models have been defined by a number of criteria: the objective of the state role, the structure of the planning process, the institutional setting, the nature of the programs, the relative level of state financial and manpower commitment, the degree of leadership, the response to federal programs, the role delegated to sub-state regional organizations, and the response to public participation. The following is a presentation of the general characteristics of the three role models: State Exclusive Control, State/Local Partnership, and Advisory State Role.

I. State Exclusive Control

This role model has been developed on the premise that the state would exercise almost exclusive control over the preservation of those areas designated as critical for conserving the state land and water resources. In this model the state would either administer, or have review and approval authority, over the resource conservation programs. The state would develop selection criteria and designate those areas in which it would control development.

The controls used by the state would be both positive, outlining what a land owner will do, and negative, spelling out what an owner will not do.

The input of local units into the state programs would, of course, be encouraged, but at this level of involvement the state would have final administrative authority over lands designated as being of state concern. It would be unlikely that the state would take away the powers of the local governments, but state controls would be considered an additional control on development. In this way, a double veto system would be common in which the meeting of either a local or a state requirement would not guarantee the approval of the other government's requirements. The state also would not control all land or all types of development. It would attempt to encourage a more active involvement of local governments in those areas not directly controlled by the state.

The designation process would utilize a statewide inventory of the state's resource base, requiring a substantial commitment to information provision. A central state agency would be charged with the responsibility of coordinating data gathering and conservation program implementation. Interagency coordination might also be achieved through a formalized standing committee with effective implementation authority. The state would attempt to be anticipatory rather than reactive.

The state would have a substantial financial commitment with the majority of the funds coming from the state, and supplemented by federal sources. The manpower commitment would also be substantial, and utilize both centralized and field personnel. The substate bodies would be actively involved in the process and play a vital role in the implementation of conservation programs. Public participation would be encouraged through the regional mechanisms. In either case, close coordination between the state and sub-

state districts would be thought of as essential. Local governments would be encouraged to take an active role in conservation programs of local interest.

II. State/Local Partnership

As implied in the title, the partnership role involves the state protection of designated areas with considerable assistance from the local governmental units. The state would establish guidelines and rely heavily upon the local governments to provide the actual implementation. Areas of critical state concern would be designated through criteria developed by all levels, state, regional, and local, and through a process that would involve each level.

The responsibility for a state resource inventory would be given predominately to the state government, but with notable assistance from regional agencies. The target areas to be controlled would be determined from this inventory. Affected local governments would be brought into the process before an area received final designation. After the areas are designated, controls would be developed and administered by the local governments. State guidelines would establish the parameters of the locally administered controls and the state would perform a review function. Participation in the conservation programs would be mandatory.

The state would be predominately concerned with problems perceived as of statewide significance, but it would provide technical assistance and guidance to the local governments for critical areas that would be considered of purely local concern. The coordination of the state and the local conservation efforts would be provided through one central agency. No standing committee would exist and interagency coordination would be achieved through the central agency or a task force committee dealing with special problem areas.

The land and water resource management programs would be considered as an additional functional area of the state government and not a focal area. The state's financial commitment would be moderate compared to the Exclusive Control role model. Federal funding would be heavily relied upon and the local governments would be required to provide some financial commitment. The manpower commitment at the state level would also be moderate.

Regional planning bodies would be used and relied upon to provide technical assistance. Their chief duties would be to assist in the development of critical area designation criteria, collect data specific to the region, to provide information and technical assistance to local governments, and to serve as a public forum. Although the state would require local involvement, much of the program direction would be determined by the local governments themselves. The state would also allow the local governments to enact controls for local areas that meet specific guidelines established by the state.

III. Advisory State Role

This model differs considerably from the other two in that it calls for only a minimal involvement by the state in land and water resource management. The state's principle role would be to provide technical assistance and incentives to local governments so that they can effectively conserve their natural resources with the exception of the management of state owned property. The state would authorize the local governments to undertake certain critical areas programs. The problems addressed at this level would be essentially local.

The state would conduct a general inventory of its land and water resources and develop guidelines for the development of voluntary local programs. Much of the state's data collection efforts would be directed at the

needs of its functional areas and some of the technical assistance needs of local governments. The level of detail and the level of comprehensiveness would be less than the two previous models.

No state level official coordination mechanism would necessarily exist. The conservation of land and water resources would have only a moderate priority at the state level, and the state government's commitment in terms of funds and manpower would be limited. The state would, however, provide some financial support to local governments for conservation efforts. The role of the regional planning agencies would be dictated by the local governments, within state guidelines, but it is assumed that their resource managements would be limited. They would not be given direct conservation functions from the state and their ability to direct active management programs would be restricted.

STATE EXAMPLES

The three role models of alternative state roles have provided a generalized description of possible options available to state governments, yet they appear to be abstractions. For these role models to be of value, they must be capable of being related to real world situations. This section of the study shall present a number of state examples that illustrate the nature of the three role models. No state does or could exhibit a pure role model approach to every problem or every situation. For this reason, the states have been placed in the role model that seems to best explain the role or approach taken by the state. In those cases in which a state exhibits more than one model, these different roles will be examined and attributed to the appropriate role model even if the state has been categorized as an example of a different approach. Five states have been selected to illustrate each role model. The selection has been on the basis of the uniqueness

of each state's approach.⁴

I. Examples of State Exclusive Control:

Vermont. Vermont entered the 1970s unprepared for the rapid growth and development that it faced. The completion of new freeways in the late 1960s, increasing the state's accessibility to the population centers along the eastern seaboard, coupled with the increase in leisure time resulted in heavy pressures for recreational and second home development, thus threatening the very nature of the state. Many of the land development proposals would have altered the population to such an extent that the long term residents would become a minority. Collectively, the local governments lacked the necessary resources to meet the demands and strains of this rapid growth.⁵

The controversy over growth reached its apex in 1968 when the International Paper Company announced its plan to develop a 20,000 acre recreational, second home complex in southern Vermont. It was abundantly clear that the proposed location was ecologically unsuited for this type of development and that it would have adverse effects upon neighboring communities. The mechanisms to stop the development, however, did not exist at that time.⁶ In response to the severity of the situation, the Governor established a Commission on Environmental Control to study the situation and propose remedies. In 1969, the Commission recommended immediate adoption of statewide subdivision regulations and the enactment of an environmental control law.⁷

The following year the Environmental Control Act, Act 250, was passed. The act established a development permit system that applies to all development of a certain size, including subdivisions with more than ten lots, construction of more than ten housing units, and development of commercial or industrial property of more than one acre. Development above the eleva-

tion of 2,500 feet requires a permit regardless of the size. Forestry and agricultural activities were exempt from the permit requirement if they were below the 2,500 feet elevation. No construction activity requiring a permit can begin until a valid permit is issued.

The permit program is administered through nine (now seven) district environmental commissions established especially to oversee the program. Appeals are taken to a state environmental board and then directly to the state supreme court.⁸ The permits were originally based upon ten environmental criteria. The act established a statewide environmental planning process that would produce three plans to eventually replace the ten environmental criteria. The first two plans have been adopted, but the last plan has had difficulty and, at the time of this writing, has not been officially adopted.⁹ Each applicant for a permit is scrutinized in a public hearing. Generally, a few applications are outright denied, but it is normal for special conditions to be placed upon the development.

The Vermont permit program does not replace local controls, and, in fact, encourages local planning and regulations. The system constitutes a double veto system in which a developer must meet both the state requirements and the local requirements. Normally, the local regulations will be considered in the state's public hearing, but on occasions the state and local decisions are in conflict. When this situation presents itself, and neither government is willing to compromise, the development is denied.¹⁰

Florida. No state is more closely identified as a vacationland resort area as Florida, and much of this vacation, recreational and second home development has presented the state with innumerable problems. Forty-eight percent of the Florida landscape is wetlands; 22% fresh water wetlands and 26% coastal wetlands. With this amount of wetlands one might not expect

Florida to face water resources problems, but this is the state's major resource problem. The height of the tourist season is in Florida's driest months and, in addition, the rapid development has reduced the recharge areas. The Florida environment is dependent upon the fragile aquatic balance and increased population and development threatens to displace this balance.¹¹

In 1972, Florida enacted a number of bills to protect their natural resources. The more important of these bills are the Environmental Land and Water Management Act, the Land Conservation Act, the Florida Water Resources Act, and the Florida Comprehensive Planning Act. All these acts are related, but have established different programs and, thus, have resulted in some coordination problems.

The Environmental Land and Water Management Act was enacted "to protect the natural resources and environment of the state, and to plan for and guide growth and development."¹² The act includes two programs: the critical area program and the program for development of regional impact. The critical area program has been limited to only 5% of the state's land area. This is a severe restriction since one-half of the land area of the state is unsuitable for intensive development.¹³ Exceptions have already been made to this 5% limit. The state legislature has established over 1.5 million acres of the Big Cypress Swamp as a critical area. This is a large exception since the 5% limit would allow only 1.8 million acres to be classified as critical.¹⁴

The critical area program is a mixture of state and local controls, but the state is the primary force in the regulation of these areas. If a critical area is established by the state legislature, being exempt from the 5% limitation, the state planning agency has the responsibility to develop and enforce controls. If the Governor's Cabinet designates critical areas,

then it is the responsibility of the local governments to control development in these areas. The local governments are subject to state guidelines and the state has the authority to impose regulations if the local governments fail to adopt suitable regulations.¹⁵

The development of regional impact programs is more closely related to a partnership model than an exclusive control model. Under the program, the regional planning organizations are given review powers over certain projects of specified sizes and types. This review does not constitute a veto, but an appeals process can result in the termination of the project. The program allows the regions to appeal to the Governor and his cabinet to stop any project where the local governments have ignored the region's objections to a project. The state has the final decision unless either the region or the developer takes legal action.¹⁶

Other important legislation passed in 1972 exhibit aspects of the exclusive control approach. The Land Conservation Act authorized the state to purchase environmentally endangered lands for preservation or recreation. This act calls for the state to directly purchase and manage environmentally sensitive lands. The Comprehensive Planning Act requires local governments to undertake comprehensive planning. In 1975, this act was amended to place sanctions on local governments that fail to adopt plans and to authorize the planning agency to develop local plans if the local governments do not.¹⁷ The Water Resources Act is an attempt to initiate water budgeting through a regional review of a water use permit system.¹⁸

New York. New York has not as yet adopted a comprehensive growth policy, but the state planning office has prepared an overall state development plan and is in the process of refining its development policies.¹⁹ The state has an active planning program that relies heavily upon the cooperation of regional and county planning agencies. The state requires the local governments to

regulate development in floodplains and the state provides extensive technical assistance and guidance in this area. If the local governments fail to develop regulations, the state has the option of imposing regulations. The state also plays an active role in strip mining through a state administered permit program. Strip mining is prohibited unless a reclamation plan is submitted and approved. The state determines the siting of power plants.

Two programs are important in this discussion of exclusive control measures: the Adirondack Park Agency and the state's agricultural districts. The Adirondack Park Agency has developmental authority over a six million acre area whether the land is held in private or public control. The agency is to develop a land use and development plan for the area, and control the type and density of development until the designated developable lands are completed.²⁰ The agricultural district program is administered through the Department of Environmental Conservation. Under the program, the Department can designate unique and irreplaceable agricultural lands as districts. The land area must be at least 2,000 acres. Once the district is established, all development not congruous with agriculture is prohibited and property owners receive preferential tax assessments. Local initiative is not required, however, most designated districts have come about by local initiative.²¹

New York is one of the leading states in the development of land use information systems. The state has developed a land use and natural resources inventory (LUNR) system from the use of aerial photographs. The system identifies land use in 51 categories and utilized one acre grid cells. The system is very versatile and is compatible with other forms of data. Improvements are currently underway to enlarge the scale and detail so that the information system will be more usable at the local level.²²

California. California in the 1960s was characterized by rapid population growth with a growth rate of 27% for the decade. This expansion is expected to decline slightly, to between 22% and 24%, for the 1970 decade. The state's population is 91% urbanized, but agriculture is very important to the state economy, making up 14% of the value of the state's production. The state has restricted land management capabilities for much of its land area since the federal government controls 45% of the land area. The state lacks any single comprehensive land use planning program, although several programs take a direct control approach.²³

California has taken an exclusive control approach in certain areas, not by action of the government, but by vote of the citizens. Environmental groups had tried, unsuccessfully, to have the state enact coastal development regulation from the 1970 to the 1972 legislative sessions. When their efforts failed, the groups decided to place the proposition on the general election ballot. The proposition, Proposition 20, is unique in that it is wholly written by environmentalists. Despite extensive public information efforts on the part of the development interests to defeat the proposition, it won handily by a 55 to 45 percent margin.

Proposition 20 created six coastal districts that were given approval power over all development from the high tide mark to 1,000 yards inland. They also had power over almost all filling, dredging and discharge activities. Each district was to develop a plan for the development of the coastal strip. The proposition was to be a temporary measure until permanent implementation measures could be explored and recommended to the legislature. The coastal districts were given three years to develop recommendations on legislation.²⁴

California is active in other areas. The state requires state and local governments to prepare environmental impact reports for all projects that may

have a significant effect on the environment. This requirement includes both public and private projects, but it is the government's responsibility to develop the report. The state has also developed an environmental goals and policy report to assist in developing future programs. The emphasis of the report is on urban growth and expansion. The Department of Water Resources is responsible for the development of the California Water Plan. The plan serves as a guide for the control, protection, conservation, development, and utilization of water resources. The plan has a significant effect on the location of growth throughout the state.²⁵

Maine. Like its New England neighbors, Maine is experiencing rapid growth in its coastal areas. It is expected that this growth rate will accelerate in the future. The remainder of the state, nearly 90%, is forest. The wood processing industry is the backbone of Maine's economy, however, manufacturing and tourism generate the greatest economic gain for the state. In total, the natural resources of Maine are the key to the state's economic well-being.²⁶

Maine does not have a comprehensive statewide land use program, but it does have a number of *programs* of the state direct control variety. In 1970, the state enacted the Site Locational Development Act. This act requires that all commercial, industrial and residential development of a certain size or type obtain a permit before construction operations begin. The permits are judged by the following four criteria: traffic movement, financial capacity, soil stability and no adverse effects on the natural environment. Conditions may be placed upon the development as part of the approval process.

Fifty-one percent of Maine is unorganized, lacking any local government. The Maine Land Use Regulation Commission has been formed to determine areas in need of protection and to administer land use controls in these unorganized areas. If an area incorporates, the controls remain in effect until the

area adopts regulations that are at least as stringent as the Commission's. The state has also passed legislation that requires local governments to adopt shoreland zoning and subdivision controls. This act pertains to both inland water bodies and coastal areas. If the local governments fail to adopt suitable ordinances, the state is authorized to impose controls. Maine's coastal areas are subject to another control. All alterations of coastal wetlands require a permit. This program is administered by the local governments, but reviewed by the Land Use Regulation Commission (a partnership role). The state has also initiated a critical area program. The state is responsible for designating critical areas and the local governments are required to adopt controls within six months.²⁷

II. Examples of State/Local Partnership:

Colorado. Colorado is divided economically, socially, and physically by its geographic features. The predominate population centers are on the eastern half of the Rocky Mountains while the other half of the state is sparsely populated. The western half gets relatively plentiful rainfall while the eastern populated half receives inadequate rainfall. The western regions look favorably to development of their oil shale, and other resources while the eastern half is generally in favor of limiting growth and development. The federal government owns approximately one-third of the state which is generally resource rich and further complicates the growth issue. The state has a large growth rate and increasing recreational and second home development.

In response to the growing crisis, the state has established the Colorado Land Use Commission. The Commission consists of nine citizens appointed by the Governor and is charged with the task of developing a state land use planning program that establishes the future growth goals

and policies of the state. The Commission is responsible for the administration of the state land use planning functions and the implementation programs.

The state has also established a critical areas program. Under this program, the state has established broad guidelines for the designation of critical areas or activities. The local governmental units are responsible for the actual designation of areas that they feel meet the requirements. The local governments have the power to impose interim development moratoriums while permanent restrictions to guide development are developed. If the Land Use Commission feels that an area is missed or that the controls are inadequate, they can appeal to the Governor who can issue a cease and desist order, but the Commission does not have veto power over local government controls.

The responsibilities for planning, growth management, and land use controls have been given to the local governments with the state providing general guidelines, financial encouragement, and other technical assistance. The regional planning agencies have mandatory review of local plans, but have no veto power. All counties are required by state law to form a planning commission which must develop a plan for all incorporated areas within the county and adopt subdivision regulations to implement the plans. Also, regional plans are advisory only except when a local planning commission adopts the regional plan. In these cases, the local government must follow the plan and no public building or facilities may be constructed unless approved by the regional planning commission.

In all, the authority and responsibility for the conservation of land and water resources is split between the state and the local governments. The state does not conduct conservation related programs, but it does require

some involvement on the part of local governments. The predominate authority of the state is the provision of incentives to local government and recommendations from the review of local actions.²⁸

Nebraska. Nebraska is one of the leading farm states in the nation with two-thirds of the value of goods produced in the state being derived from agricultural production. Almost five million acres of land are irrigated, making Nebraska the leading irrigation state. The two most valuable resources continue to be soil and water, and conservation efforts are concentrated on these resources. The state has low population growth and is expected to continue to grow at a rate below the national average.

In 1975, the state legislature passed Resolution 97 which directed the Senate Agriculture and Environment Committee to investigate the most practical method of approaching land use legislation that provide for the best allocation of resources. It is anticipated that this study will result in either consitutional amendments or new legislation relating to land use regulations. The state has also established an advisory team made up of 21 state agencies to review all state comprehensive plans and goals. The standardization of information sources is another statewide planning activity currently being pursued.

Nebraska is the only state in which investor owned electric utilities are prohibited. Electric power is supplied by state-owned facilities. The state is organized into public power districts which are under the Water Resources Department. Citizen input is guaranteed through public hearings and the public election of the power district managers.

Nebraska has a series of local planning requirements imposed by the state. The state designates flood prone areas and mandate local governments to impose restrictions on development within one year. If the local govern-

ments fail to comply, the state will impose controls. The state requires communities with populations over 1,000 to prepare comprehensive plans, and the state is in the process of developing county plans. Cities and counties have been given both zoning and subdivision control powers, yet only those cities with populations over 5,000 have been given these home rule powers. The state, in 1974, enacted use-value assessments for agricultural land and also included a deferred tax provision.²⁹

North Carolina. North Carolina's diverse population and varied landscape requires that the state be able to face a wide variety of problems. These include coastal zone problems along the Atlantic shore, urban sprawl in the central Piedmont, and second-home development in the western mountains. The state's economy is as varied as its topography. Manufacturing accounts for four-fifths of the value of all goods produced with textiles, tobacco products and furniture being the major industries. Agriculture is also an important sector of the state's economy. The population growth of North Carolina has been about equal to the national average, yet growth pressures are felt in certain areas.

The state, in anticipating development problems, has enacted three separate pieces of legislation. The first act, the Coastal Management Act, created a 15 member Coastal Resources Commission responsible for the preparation of development regulations, the designation of critical coastal areas, and to encourage local land use planning in coastal counties. In critical areas, local governments would be encouraged to adopt regulations, but the state controls and requirements would still be in effect. Under the planning process, the state would develop plans for coastal counties and give the counties the choice of implementing the plans, or passing the responsibility on to the cities or the Coastal Commission.

A second act, the Land Policy Act, created the Land Policy Council, consisting of state agency heads, legislative leaders, and representatives of local government, and the Advisory Committee on Land Policy, made up of community leaders formed to advise the first group. The task of the Land Policy Council is to classify the state's land in terms of its suitability to development and to assist local governments in preparing local plans that incorporate the classification scheme. The council will also develop policies for state activities and the management of state controlled land. The third act establishes a state land conservancy corporation which is empowered to purchase land for state use without the red tape normally associated with public purchase.³⁰

Oregon. The State of Oregon is known for its picturesque landscape. Between 1960 and 1970, Oregon also experienced a population growth rate (18%) greater than the national average. The state has gone as far as to discourage growth. The state has had a long history of resource management by enacting legislation to insure the protection and public access to all ocean beaches, established wild rivers, cleaned up the Willamette River and enacted a green way system along the river through easements, established a coastal development commission, and to require cities and counties to develop and implement comprehensive plans.³¹

Oregon, in 1973, took a more comprehensive approach to resource management in the passage of its Land Conservation and Development Act. This act created a Land Conservation and Development Commission which was charged with the responsibility of developing goals and guidelines for resource management. All governmental entities, including state agencies, local governments and special districts, were required to prepare comprehensive plans that incorporate the goals and guidelines of the Commission and these

plans were required to be implemented through available legal mechanisms. The Commission has the authority to review all plans and has approval authority over local government plans.

In a second part of the act, the Commission was authorized to designate and require permits for public activities of statewide significance. The activities the legislature were particularly concerned about were public transportation facilities, sewerage systems, water supply systems, solid waste disposal sites and facilities and schools. The permit program was intended to insure that the public infrastructure would be compatible with the state's goals and guidelines. County and state agencies affected by the activity are required to review and comment upon the permit requests.³²

Wyoming. In the past, Wyoming has had a stable population with only a small numerical increase. This trend changed in the early 1970s, primarily due to the increase in mining activities. Wyoming is rich in coal and oil shale reserves. The growth trend of the state will be an increase for a number of years to come. Another factor that affects state policy is that 48% of the state is owned by the federal government so that any actions of the federal government will have profound influence upon the state.

Wyoming is an arid state in which water is a prized resource. The state has developed an elaborate system of allocating water to the numerous competing uses. Under the state constitution, the waters of the state are the property of the state. Anyone desiring to use these waters must apply to the state to appropriate water. The application can be denied if the use of water is not in the public interest. The state has established a priority list to review appropriation applications.³³

In 1975, Wyoming established a Land Use Commission appointed by the Governor from County Commissioner's recommendations. The Commission was

charged with the responsibility of developing state land use goals, policies, and guidelines. When these are published, the local governments are required to develop local land use plans that are consistent with the state goals. Cities may join with the counties and counties must develop plans that incorporate city plans. After the local government plans are adopted, the Commission will develop a statewide plan which the county governments will implement.³⁴

III. Examples of State Advisory Role:

Missouri. Missouri's location has made it a focal point for water, land, and air transportation. As might be expected, manufacturing accounts for three-fourths of the value of goods produced in the state. The state is experiencing slow growth which is below the national average, and this trend is expected to continue in the future. Nearly 70% of the state's population is urbanized and the state has two of the nation's largest metropolitan areas.

Missouri lacks a state growth policy, but the state planning office, with assistance from the functional agencies, has prepared a comprehensive set of state development policies. The purpose of this study was to identify these factors that affect the development and growth of the state. The state planning office has worked with an Environmental Advisory Group to define and identify critical areas. Twenty-five areas have been identified and placed into one of three categories: (a) sensitive areas, (b) potentially critical areas, and (c) critical areas. No state critical area program actually exists and the identification is advisory only.

Despite these state efforts, the management of land and water resources is predominantly the responsibility of the local governments. Local governments are authorized to become involved with planning and regulatory control. Counties are categorized into classes through the use of assessed valuation. Each class of counties has different requirements for adopting ordinances.

Counties may also adopt either the plan and/or zoning. The state is not authorized to review local plans, but the state often provides technical assistance to the local units. Regional planning commissions play an active role in helping local governments find solutions to their problems, however, the commissions are advisory in nature and do not have review authority.³⁵

Oklahoma. Oklahoma has a diverse economy with manufacturing being the most important activity, but mining and agriculture follow close behind. The state has experienced population growth equal to national average. Sixty-eight percent of the state's population is urbanized and nearly half of the population live in three metropolitan areas.

Oklahoma appears to be a good example of the advisory role. State action is directed toward assisting local governments in their efforts at resource management. The state is attempting to identify citizen land use goals, the outcome of which might result in changes in state enabling legislation. The state planning office is also conducting a study to assess the impact of current federal, state and local laws, and policies on land use. In all, the state is attempting to clarify its position on land use.

The state has eleven regional planning agencies that completely cover the state. The emphasis of these agencies is economic development. Funding for the regional planning bodies comes from state and local sources as well as federal planning grants. Home rule authority has been given to all municipalities over 2,500 population, however, their regulatory powers differ with the size of the cities. Counties may not engage in countywide zoning, but other rules and regulations are available for the implementation of county plans.³⁶

Iowa. Agriculture is king in Iowa, consisting of 94% of the land use. Iowa provides 7% of the nation's food supply which makes it the second lead-

ing agricultural state. Manufacturing is the second largest source of income and much of the manufacturing is related to agricultural goods. Limestone mining is widespread, but has limited impact upon the economy. The state's growth rate between 1960 and 1970 has been only 2%. This trend is expected to increase, but remain well below the national average.

Iowa does not have a comprehensive growth policy or a land use policy. One area in which the state has worked is in the development of an information system. Iowa has developed a key word computer retrieval system for state land use related laws. A land information system is also being developed. In another area, the natural Resource Council has developed a plan to protect the state's water resources. Under this plan, permits are required for the use of any water within the state and permits are issued only for beneficial purposes. The Water Resources Council is authorized to establish encroachment limits in floodplains, however, the state encourages local governments to establish standards of their own. The regulations, whether state imposed or local, would prohibit the construction of any structure in the floodplain that would adversely affect the state or local plan.

All municipalities in Iowa have home rule powers and have broad zoning powers. With the exception of floodplain zoning, the state does not have the authority to review and approve local regulations. Counties are also given the authority to enact zoning. Iowa has 16 substate planning districts of which 15 are organized, however, these regional planning agencies are advisory only.³⁷

Mississippi. Mississippi is going through a period of transition. The economy of the state is rapidly changing from its formerly agricultural base to an increasingly industrial base. Presently, manufacturing accounts for nearly 57% of the value of goods produced in the state. Petroleum and natural

gas are the state's leading minerals. The state's population is largely rural with less than 45% of the population living in urban areas. The state's population growth rate, 2% between 1960 and 1970, is one of the nation's lowest and is expected to remain low at least until 1990.

Mississippi has created a task force on growth, but no growth policy or land use planning process exists. The purpose of this task force was to find ways to coordinate planning and to establish goals for the state. The state's efforts, besides this, has predominately been in the area of land use information. The state is developing a land related, computerized information system which is based upon remote sensing techniques. In conjunction with this, the regional planning agencies are collecting supplemental inventory information.

Incorporated cities have been given broad authority for zoning and subdivision controls. Counties have authority for controls in unincorporated areas. The state requires that zoning must be in accordance with a comprehensive plan. Special purpose districts, such as drainage districts, water management districts, and flood control districts, play an active role in the state. The state has designated ten substate planning areas which are all organized. The regions play an active role in the development of the information system, but they are largely advisory in nature.³⁸

North Dakota. North Dakota is actually losing population, a trend that has continued from 1930. The state has the lowest proportion of urban population of any state in the nation and only four cities have a population greater than 25,000. Agriculture is the predominate activity in North Dakota, accounting for 80% of the goods produced in the state. Food processing is the most important manufacturing activity. The prospects for mining are extremely large since the state has the largest reserve of lignite coal in the country.

The state is making a considerable effort to diversify the state's

economy. North Dakota provides industrial development bonds, five year tax breaks on both property and corporate taxes for new industry, and has constructed three cooperative power plants. The planning efforts of the state center upon providing a common planning data base and interagency ad hoc task oriented committees that deal with individual problems. The state planning office is seriously limited in what activities it can undertake. At present the state does not have enabling legislation that authorizes the state planning office to develop a statewide land use plan. One area of great concern for the state planning office is strip mining. The office has little power to prevent environmental damage and mine operators are not required to develop or file reclamation plans. The land must be restored, or the operator may lose his license, but the details of the reclamation are left to the operator.

All municipalities are given the opportunity to gain home rule powers. All that is required is that the municipality votes upon the issue. Only four cities have thus far chosen to adopt home rule. Both cities and counties have broad zoning powers and the state requires that zoning be in accordance with a comprehensive plan. Regional planning is weak in North Dakota and the agencies are advisory only.

PART THREE

DATA REQUIREMENTS

The purpose of this study is not to develop a recommendation on the best land based information system: that would be well beyond its scope. It is important, however to touch upon those data characteristics and system constraints that will affect the data commitment of the State of Kansas if it chooses any one or combination of the three role models.

Part three of this study will concentrate on the data requirements of the three role models, and the resulting data commitments that will likely occur if the state takes any one of the three approaches. The discussion will begin with a presentation of basic steps involved in the design of a land based information system, and the data characteristics that must be considered in an information system. This discussion is important in that it focuses upon the concept that data requirements is not an isolated issue, but is very much a part of an overall information system design.

The second section in part three is clarification of the identified problems in light of the three role models. A problem that has plagued this study from the very beginning is that data requirements were being assigned in isolation of actual programs. It is the nature and constraints of the actual programs that dictate the data requirements. This section is meant to compensate, to the extent possible, for the lack of specific programs. It is felt that a redefinition of the problems likely to be addressed by each of the three role models will provide sufficient guidance to develop a minimum data set for each role model.

The final section of part three will be the presentation of the data requirements for Kansas in each problem category for each role model. This listing will appear in the appendix. Also in this section, the expected

data commitments of the three approaches will be presented since this presentation assumes that the nature and needs of each role model, along with the data requirements, dictate certain commitments on the part of the state to best handle them.

DESIGN OF A LAND INFORMATION SYSTEM

This study does not endorse the assumption that all critical area type activity requires a sophisticated, complex information system. Yet the provisions of an information system will be a major and difficult issue that each state will have to face. It is necessary, then, to examine the need for and utility of information systems.

"The primary objective of a land based information system is to acquire, store, manipulate, and display data for decision making, while minimizing cost and effort."⁴⁰ An information system is a mechanism which provides needed information through an organized, and systematic process. This process consists of arranging information in the observation and collection stages for the use of that information in some decision making activity. Inherent in this definition of an information system is the assumption that the records and information from several agencies or groups will be coordinated, that the information will be regularly updated, and that the information will be quickly retrievable, able to be displayed, and organized.⁴¹

It must be remembered that information is just another tool, and that the provision of information can never be considered an end in itself.⁴² An information system should be designed to respond to specific program objectives, as well as a full range of implementation needs. The design of a system must not be developed independent from the other functions of the state. This is often a difficult task, yet it is a basic requirement for an effective information system.⁴³

To insure that an information system will be relevant to state government, a clear understanding of the purpose and expected outcome of the system is essential. A clear definition of goals and objectives is needed. The effect of goal formulation is to focus the efforts of the system development and thus, save time and effort. The development of goals and objectives should be a result of the interaction of all interested groups, the executive, the legislature and the user agencies. In this way the goals will serve as an expression of the expected outcome of the system. The formulation of goals will also serve to clarify the legal standing of the system. It is important that the agency responsible for the development of the information system be given the authority to acquire any data deemed necessary for the expected or desired outcome of the system.⁴⁴ If any information is to be withheld from the information system, it should be clarified early.

As stated previously, the development of an information system is an interagency operation. The interagency nature of information systems cannot be overstressed. If the information system is to be effective, each public, and under certain situations private, agency must give their full cooperation to lead the agency. It is often advisable to organize an interagency task force committee charged with overseeing the development of the information system. The committee should have representation of all primary users or those agencies with substantial interest and need for the system. The advantages of a task force committee are: 1) the insurance that the system will be acceptable to the primary users, and 2) that the primary users will have a better understanding of the system and what went into the development of the system.⁴⁵

The determination of primary users is not as simple as it may seem. All agencies to some extent are involved with the collection and handling of

information. It is also common for responsibilities for land and water resources to be fragmented. If the purpose of the system is to provide land related information for parties that might need it, then the information system must also have an intergovernmental perspective. No one agency or level of government can or should be responsible to collect all the needed data. Division of responsibility can reduce the cost to any single level of government or agency and achieve the best utilization of existing data, manpower and available equipment.⁴⁶

Once this question is answered, another equally complex problem which will be long standing throughout the development of the system arises. That problem is, of course; what are the informational requirements of all the various users, and in what form do they require the data? This appears to be the basic question of all information systems, but many systems fail as a result of not adequately answering this question. This is a very difficult problem in that every agency is normally going about their data provision efforts in an independent manner, and there is a built in resistance to modify their data efforts to suit the needs of others. This problem also points out the advantages of a interagency task force committee.

The logical starting point in investigating the second question is a survey of existing data. Generally, land and water resource programs should make the maximum use of existing data before new data is considered. The advantages of using existing data are: lower costs, less time expenditure, and ready availability. However, there are problems in the compilation and use of data from a variety of sources. It is not uncommon for this data to have varying scales, inaccuracies, inconsistencies in gathering approaches, lack of objectivity, inadequate base maps, lack of common geographical referencing, access problems, or being out-of-date.⁴⁸ As is often the case,

provision of this existing data is often at the expense and disturbance of other agencies. It becomes a difficult task to gain their cooperation unless they are an active participant in the development of the system.

"To seek out existing data requires not only knowledge of basic sources, . . . but also understanding of the institutional framework within which governmental and private data generation occurs."⁴⁹ Arrangements for the acquisition of data from another agency often starts with a one time request and, if the system survives, further requests for data will follow.⁵⁰ If data from an agency will need to be provided on a continual basis, the mechanism to achieve this flow of information should be established early.

On the other hand, the generation of new sources of data has its advantages. New sources allow the lead agency to specify and control the exact data elements and collection techniques it deems necessary. Unfortunately, there is no guarantee that the provision of new data will be more useful than existing data. New data is not cost effective unless the expense of assessment and compilation of existing data exceeds that of new data provision, or unless the existing data lacks the necessary scale, resolution or accuracy.⁵¹ One inevitable consequence of the current situation is that the most widely used data is the data that is the most available.⁵²

Not only is the availability of existing information important, but a number of data characteristics or constraints are vital to consider. This study will deal with several of them. The approach taken in data collection stages will profoundly affect the eventual nature of the information system. Two basic data gathering approaches will be considered here: blanket data gathering and case-by-case data gathering.

Blanket data gathering efforts are surveys which cover the entire project

area and are aimed at providing a multi-purpose data base. It is preferred in those cases where the long-term overall resource picture is required, where economics of scale result, where data characteristics are stable, where areas are relatively uniform or where money is available.⁵³ Only a few states have made an attempt to gather detailed data on a blanket approach.

Case-by-case data gathering focuses upon a particular area and is aimed at providing information for a particular decision or problem rather than to create a systematic data base. Case-by-case approaches are preferred where spot or one time investigations are called for, where local expertise can be used, where the data characteristics are dynamic, where the areas are complex, or where money is limited.⁵⁴ Case-by-case approaches result in complex information on geographically limited areas.

The two approaches are not, however, mutually exclusive. Many resource management programs begin with a blanket approach with generalized data until sensitive areas are determined. At this point, a case-by-case approach is often utilized to gather detailed information on those areas. This combination of approaches may not prove to be the best in all situations, but there does appear to be a potential of combining the two approaches.

A major constraint on the use of information is its accuracy. "Reliability and accuracy are measures of the quality of the data as it relates to a defined problem and to the assumptions or requirements of specific data analysis." Accuracy is defined as the degree of freedom from error in an observation or measurement and reliability relates to the amount of confidence one places upon information.⁵⁵ It must be recognized that an error free or completely reliable data file is an impossibility except at extreme cost. Improvements in accuracy over 90% may be achieved only at rapidly increasing

costs.

The ability of an information system to check the accuracy of data products is most difficult. Few products indicate the accuracy levels, and field checks are extremely costly and time consuming. To check the accuracy of the U.S.G.S. 7½ minute topographic maps takes 16 man hours per square mile. There are other methods that are less costly, however, often do not result in substantial improvements in accuracy. Perhaps the best and most inexpensive check for accuracy in map products is to check the uniformity of data from one area to an adjacent area.

The cost of providing essential information is perhaps the greatest limitation on data availability.⁵⁶ Costs are a significant issue since information provision is often costly and information systems are often not considered high priority. The result is often the most data for the dollar rather than the most useful data for the dollar. The central issue in system development is the optional allocation of scarce dollars. Four steps should be used to minimize data collection costs: development of a coordinated federal, state, and local data gathering effort, the use to the extent possible of existing data, data gathering of essential items on a priority basis, and shifting a portion of the data gathering burden to other public and private agencies.⁵⁷

Because of the high cost of data provision, the information system should only include information that is relevant to achieving the goals and objectives of the system. Relevant data is usable data and is determined by assessing the applicability of information to the needs of defined problems.⁵⁸ The question of relevancy is the question of essential data vs. desirable data. It should also be pointed out that a particular data item or characteristic may be essential at one stage of a program, but have little or no

value in subsequent stages. It is important that the system development process relate to the changing needs of conservation programs.⁵⁹

Perhaps the single most important factor in determining required data scale, format, and manipulative capability is the choice of implementation techniques. Data gathering efforts must be designed to respond to the information needs of program objectives and reflect the needs of anticipated implementation tools.⁶⁰ Because of the enormous potential for legal conflicts over land related implementation tools, the information of the system must be accurate and clearly indicate the need for the proposed land related restrictions.⁶¹

Any land related restrictions require detailed information to justify the restrictions. A problem arises in that it is difficult to provide information that is detailed, accurate and with the other necessary characteristics. The courts generally accept a partial approach to data provision where there is an ongoing systematic program for improving the information base. With such a piecemeal approach, care must be taken that systematic and uniform data gathering approaches be applied to all areas, that data gathering for one area be coordinated with that for another, and that some effort be made to take into account the cumulative effects of development.⁶²

Another data characteristic that must be considered is the desirability of standardizing information. The standardization of information often is brought about by the centralization of the information functions into one agency or body. The advantages of standardization are: the realization of economics of scale, the most efficient use of expert staff and equipment, easier compilation and manipulation of data, and less administrative demand. The standardization of data must, however, overcome a number of disadvantages,

including: the variety within state and local efforts, the differences in developmental pressures and the resulting scale requirements, the lack of standardization of existing and past data, and the fact that each area in need of conservation measures have unique requirements for data characteristics.⁶³ These difficulties seriously restrict the ability and desirability to standardize all data. There does, however, appear to be some advantage in standardization through a centralized coordination of the data provision efforts.

Resolution is an essential consideration for visual data. Resolution is the observable or represented detail on a map, aerial photograph, or information product. It depends upon the minimum distance between features, the contrast between features, the data product, and the specificity of characteristics observable or represented by those features. Resolution is normally associated with visual products, but it also influences tabular data taken from visual products.

Detailed and high resolution products have been considered essential for the determination of areas in need of conservation measures, regulatory mapping, and the establishment of use standards. The lack of this data has proven to be a constraint in implementation programs. The recent federal emphasis upon low resolution satellite imagery is resulting in a widening gap between the scale and resolution needed by states and localities and that emphasized in federal data gathering efforts.⁶⁴

Scale is directly related to resolution. Scale is the relationship between a measurable distance on a graphic representation and the corresponding distance on earth, expressed as a ratio. Scale also predominately affects visual products and, as a resolution, affects information taken from visual products. Each change in scale or format introduces the possibility of errors or loss of

valuable information. The enlargement of a map scale will perhaps make some detail more apparent, but it will not increase the content or accuracy of the map. It is possible to go from the specific to the general, but not vice versa.⁶⁵ Scale is determined by information system users and applications, base map availability, and the availability of land related information.⁶⁶

Map scales are frequently categorized by their relative size or detail. Small map scales (1:125,000 to 1:500,000) are limited as a planning or management tool. They cannot be used to determine the precise nature of existing uses, the relative importance of land characteristics, or serve for regulatory administration. Intermediate scaled products (1:50,000 to 1:125,000) have not been used extensively since they are not available throughout the country. The potential for this scale seems to be good, however, research is needed to determine if they can be used for regulatory administration. Large scale products (1:16,000 to 1:50,000) have been widely used, especially the U.S.G.S. topographic map series, and are considered most valuable in conservation programs.⁶⁷ This scale of data appears to make the maximum use of available land resource characteristics data.⁶⁸

Acceptable data is often available for only certain areas.⁶⁹ Much of the needed data is either not adequate in terms of the spatial extent and completeness of coverage or in the content of the coverage. Most data series are not complete for the entire country or even in most states. "An accurate summary of the national situation would be that most data are incomplete, are available at smaller scales or lesser resolution than desired, or are functionally incompatible with related data series."⁷⁰

State resource management programs require substantial amounts of information.⁷⁰ Data volume involves both the number of physical records upon which

data is recorded, and the number of data elements upon each record. Volume is a prime concern in system design. It can overwhelm any data handling operation, just by the sheer number of data elements, and it can place extreme limitations on the operation of any information system. To illustrate, the New York State natural resource analysis covered the 50,000 square mile land area at a scale of 1:24,000. The operation involved the interpretation of 15,000 aerial photographs, the production of 1,000 base maps with an accompanying 3,000 overlays, and resulted in 2,000 data coding books and almost 500,000 data cards.⁷² The program took three years, cost \$700,000, 80% of which was federal money, and employed as many as 55 persons at one time.⁷³

A major issue in all information systems is not just the availability of information, but the time frame in providing information. Timeliness and ready availability of information are key considerations. The federal mapping efforts have been notoriously slow from the initial data gathering to publication of a final map. A national task force on federal mapping reported in 1973 that, on the average, $5\frac{1}{2}$ years are required to produce one multi-color U.S.G.S. $7\frac{1}{2}$ minute topographic map. The considerable time lag in map production suggests that state and local data efforts may be more appropriate for quickly changing information and that the federal effort should concentrate on the relatively permanent resource information.⁷⁴

Another time related characteristic is the lineage or updating requirements of the data. These requirements must be considered prior to the design of the information system and the desired output format. The updating requirements will influence the frequency of the system modification and the cost of providing information. If information will require continuous updating, the system must be prepared for this and a less permanent data output

format should be considered.⁷⁵

Geographic data normally requires a georeferencing system. "A georeferencing system is a system of points, grids, or other descriptive parameters which are used to describe systematically and accurately the geographic location of particular soils, topography, structures, or natural-cultural features in a manner which will allow retrieval, analysis and display of spatial criteria."⁷⁶ It must be considered as part of planning a mapping format. It is essential that a georeference scheme be used to refer to specific locations on maps and to insure spatial interreliability of information.⁷⁷

The data output format is the recording medium upon which data is presented. It refers to the way in which real world objects have been presented as data on some recording medium. Two basic output formats or products exist in resource conservation programs: written or printed materials and graphics. Traditionally, spatial data has been handled in map form and are considered essential for virtually all regulatory programs and many non-regulatory programs.⁷⁸ Map products still exhibit the problems of accuracy, difficulty of manipulation, and limitations on the amount of information capable of being presented, however, these problems are being overcome by technical solutions.⁷⁹ The output format of information does not present major problems in system design information. Almost any format can be changed to a more desirable format for storage or processing by transformation of the data.

Once all the data characteristics and constraints have been weighed and considered, the lead agency can begin to draft a listing of specific data requirements. If all of the factors have been considered, and the constraints understood and compensated for, then the assignment of needed data elements is

likely to be a simpler process. The data requirements should naturally flow from the consideration of the needs of the user agencies, the inventory of existing data, and the data characteristics.

Data requirements are highly dependent upon the scope, the nature, and the approach of the conservation programs under consideration.⁸⁰ The determination of data requirements is actually a reasonably straight-forward technical question once the purpose and nature of the programs, the inter-governmental relations, and the availability of information are known. Essentially, there is no definitive answers to determine what data will be required, when it will be required, and how it will be used. A fair degree of professional judgement is required in the selection of data elements.⁸¹

Once the data requirements have been determined, the components of the system must be established. The art of information system design is to strike a proper balance between needs and desires within available resources.⁸² Data characteristics are, however, major determinates in system design. Key considerations are such things as the intended use of the data, the products required and the urgency of the data. Information systems need to directly respond to the needs of the various participants at each phase of the programs. The basic problem is, thus, to handle the diverse data that exists and to accommodate new information as it is generated. A major task of system design is to see that its capabilities are developed logically and efficiently.⁸³

Three basic information system options are available: manual systems, computer aided systems and completely automated systems. It is questionable whether a truly automated system is achievable or desirable in the resource conservation area. The system has difficulty keeping up with changes in resource management requirements.⁸⁴ In general, resource program managers feel that manual manipulation is adequate for their needs when a single class of area

is concerned.⁸⁵ It is best to consider a manual system first, however computer aided systems should be utilized to the extent that they perform the need functions more effectively. A variety of options exist within each option and, depending upon circumstances, parts of each option may be developed into one system.

Computer aided systems are increasing in usage due to the complexity of resource problems. Complex comparisons of information virtually require a computer. Computer aided systems have potential in assessing state resources where large numbers of factors are involved, where there is a need for continuous updating, and where funds are available.⁸⁶ Two major drawbacks affect computer usage. First, a computer cannot recognize or deal with conditions that have not been explicitly defined. A human can ignore any inconsistencies in information, but a computer cannot. All errors must be corrected before data is put into the computer. Second, computers are costly to purchase and to operate. The preparation of data for a computer is seldom considered and frequently results in higher than expected costs. For these reasons, it is important that the advantages and disadvantages be carefully weighed before the state commits itself to a particular system.⁸⁷

It is not uncommon for an information system to evolve incrementally in order to meet different data needs at different phases of the planning process. Data requirements are both circular and cumulative: they grow and change.⁸⁸ A typical scenario is to design the initial system so as to handle data manually, but within the intention of evolving toward a computer aided system.

The last consideration of an information system design process is the operational constraints. The management function of an information system receives the least attention or the lowest priority, but is a most significant factor in the survival of the system. It is the most overlooked area of system development mainly because almost every system grows out of one

or more discrete projects. Information systems must be related to the central functions of the state. "It is mandatory that the individual charged with the decision task recognize each decision and the interdependence between certain decisions, and that he consider each decision explicitly with full knowledge of the options for that decision and the interdependencies with other decisions."⁸⁹

General operating policies are needed that include the mode of operation, interagency agreements, data confidentiality, and long-range system development plans. A data system must be dynamic and able to quickly respond to change. The development of long-term system objectives or a long-range system plan will help prevent the evolution of a system in which the level of service is unacceptable. A feedback process should also be part of this process. To obtain valid feedback, the user must not merely be provided with data for his problem. He must have the ability to perceive his problem in quantitative terms and relate the data to his problem in an appropriate manner.⁹⁰

Obtaining continual financing of the operation of a system is often a difficult task. It is rare that an information system will be viewed as an immediate necessity. A long-range fiscal plan (5 years) should be developed in the early stages of operation. The plan should include the total funds required for operation, the fiscal continuity, and a comparison of system development costs with system operation costs. The fiscal plan should also point out that early estimates of total costs will need to be frequently revised to reflect changing conditions during the operation of the system.⁹¹

The provision of hardware is a very important consideration in the implementation of an information system, especially for computer aided systems. Three commonly found situations are: intense competition between hardware

manufacturers to obtain an order, proposals to provide general purpose software such as a data management package, and the free availability of a multitude of special purpose pieces of software. In no case should a commitment be made to acquire a piece of hardware until it has been demonstrated in actual use, in concert with other pieces of hardware, and has passed a rigorous evaluation procedure or benchmark test. One should also be cautioned on software proposals. Large software packages often exist as concepts and not fact, and software often requires backup procedures. It is always advisable to check with other agencies or organizations using the equipment in question to get an evaluation of its performance.⁹²

The last area of system operation that requires consideration is the training of personnel to operate the information system. Trained personnel are a necessity. If consultants are used to develop the system, it is important that the operations personnel work very closely with the consultants. The operations team should have full and complete knowledge of the proposal system. It is further recommended that a vigorous user training program be established. The training program should not only show users how to code up a request, but to conceptualize problems in a quantitative sense so that the system will be of greater utility.⁹³

DATA REQUIREMENTS BY ROLE MODEL

As previously stated, the data requirements of a land and water resource tend to be illustrated or determined by the particular role played by a state. The basic premise of this study is that the data requirements of a state resource management program shall change with the level of involvement of the state in the resource problems of the state. As a state becomes more involved, the need for information will increase.

It has, however, been pointed out that few states play the same role with each resource problem area. This makes it difficult to analyze the data requirements of each role model by itself. The data requirements for each role model must be gained by aggregating the data requirements of each resource problem area as illustrated by the role models. The end result shall be a matrix with three role models on one axis and the twelve problem areas on the other. The cells will illustrate the data requirements of a particular problem area if a state performs a particular role.

Up to this point, the study has concentrated upon the development of the three role models, but it is now time to turn our attention to the problem side of the matrix. If the actual data elements are to be determined, the problem in each category must be redefined in light of the three role models. The process began with a determination of the type of program likely to result if the State of Kansas approached a problem category using a particular role model. To achieve this determination, the individual problems within each category were prioritized in terms of what each role model would be concerned with. The outcome of this process is a paragraph describing the concerns likely to be exhibited in each of the twelve problem categories if the state performed any of the three role models. The descriptive paragraphs are presented on the following pages.

I. Conservation of Natural Resources

State Exclusive Control: The loss and reduction of the state's natural environments would be a major concern in this role model, and every type of natural area would at least be reviewed to determine its importance. The state would conduct an inventory of natural areas and determine the need for, and the best approach to, the management of those areas thought to be of statewide significance. Areas such as hedgerows, shelterbelts, forestland, tallgrass

and sandhage prairielands, marshlands and other wetlands, would be of prime concern in this statewide inventory process.

State/Local Partnership: The loss and reduction of the state's natural environments would also be a major concern here, but not to the extent of the exclusive control model. Attention would be placed upon particular areas defined as important to the state. Areas thought to be of major importance to statewide concerns would have mandated controls while other significant areas would have discretionary controls which could be implemented by the local governments. Since the extent of a particular natural feature would have an important bearing upon its status, each natural area would be evaluated separately. This selective approach would of course affect the data gathering efforts in that only general information would be needed on a statewide basis with specific, detailed information needs for certain areas. Land areas such as prairies, marshlands, and large expanses of woodlands would be likely candidates for state mandated controls.

State Advisory Role: The loss and reduction of the state's natural environments would not be a major concern of state government. The state would allow the local governments to impose limited controls over development in certain areas and they might even offer incentives to encourage local protection of important resources. The state would only provide a large scale general inventory of natural resources, and very little detailed information would be collected by the state. Detailed studies would most often be the result of a Federal mandate. Again, prairielands and marshlands would be perceived as being valuable enough to merit at least some state level attention.

II. Agricultural Conservation

State Exclusive Control: The removal of prime agricultural land would be a major concern if the state performed this role model. The protection of

prime agriculture would be a major portion of a statewide resource protection program. If the state developed a growth policy, which would be consistent in this role model, then the decline in the number of farms would likely be a concern addressed by the growth policy. It has been claimed by some that the reduction of population in western Kansas, as a result of the decline of farms, will tax the ability of the state to provide this area with services. This would be a central issue in any growth policy that was developed. Agricultural preservation programs would likely result in the classification of prime agricultural land, the identification of current and future urban growth patterns, and the development of alternative land preservation controls. Soil erosion would be a high priority problem partially due to its water quality implications. Programs such as bank stabilization in southwest Kansas and improved cultivation practices on slopes in north-central Kansas would be developed.

State/Local Partnership: The loss of prime agricultural land would also be a major concern in this role model. An agricultural preserve program would be implemented with preserve areas being designated jointly by the state and local governments. The responsibility to initiate the designation procedures would be given to the local governments, but the state would offer incentives. The state would provide a general inventory of prime agricultural land, going into detail for certain areas impacted by urban growth, and the state would participate in any federal prime agriculture designation program. The state sponsored prime agricultural land conservation program would not necessarily be coordinated with other conservation programs. The decline of the number of farms would be a state concern and monitored by the state, but the state would not get involved in encouraging smaller farms. The state would provide money for soil erosion prevention research, but not become in-

volved in prevention programs. In particularly bad areas the state might require local controls.

State Advisory Role: The removal of prime agricultural land would be a state concern only around urban areas in this role model. The state might allow urban areas to control development in order to preserve prime agricultural land. The state would not become directly involved with preservation controls. The state would not designate prime agricultural land, but it would assist the federal government in its effort to designate prime agricultural land. The state's response to the decline in the number of farms would likely be to offer tax incentives. Soil erosion would be a major concern and the state would provide assistance to soil conservation programs.

III. Energy

State Exclusive Control: The wasteful use of the state's energy resources would be a major concern of this role model. The state would develop an energy conservation plan that would impact upon the state's development activities. Conservation measures would be made a functional element in the operation of the state government. Alternative energy sources would be reviewed for use by the state operations. Energy conservation measures would also be included in a state building code and in tax incentives. The state would also be concerned with the imbalance in the distribution of energy resources and would monitor this area closely. The state would control the placement of new power plants and power distribution lines. Environmental standards would be developed for the production of energy resources and these standards would be enforced by the state.

State/Local Partnership: The state would be very concerned about the distribution of energy resources, but view them as being beyond their ability to influence. No comprehensive energy conservation plan would be developed per se,

yet individual measures would be developed. The state would mandate conservation in areas where the state has traditionally had direct control, and encourage conservation in the private sectors. The state would provide funds for alternative energy sources and provide information to citizens on conservation practices. Coal production would be encouraged and environmental controls would be required by the state, but administered by the local governments. The state would also provide for the distribution of energy during emergencies.

State Advisory Role: In this role model, the state would allow local governments and private sector to initiate energy conservation measures. Incentives probably would be offered to local governments for conservation efforts. The state would develop an energy program for the state government and investigate the use of alternative energy sources on state buildings. The state would operate an energy public information service and monitor the production and distribution of energy resources. The state would establish broad environmental standards for the production of coal, but these standards would be administered by either the local governments, or the mining companies. During times of energy emergencies, the state would evaluate the needs and distribute energy resources accordingly.

IV. Geology

State Exclusive Control: The protection of the state's rare geological features would be a prime concern of the role model. Important geological features that have, or do not have, economic value would be included in this concern and special attention would be placed upon those geological resources in the path of urbanization. The state would also be concerned with geological hazards and would develop protection plans for the affected area. The state would also identify existing and potential subsidence areas and mandate that all construction in these areas be built with this potential danger in mind.

If the state develops a building code, these measures would be included in it.

State/Local Partnership: At this level the state would assess the importance of rare geological features, confer with local governments, and require local governments to enact controls to regulate development of those geological features that the state and the localities agree are of state significance. The local governments would be allowed to regulate development for areas not classified as of state importance. The state would inventory potential subsidence areas and advise local governments accordingly. The state would also provide technical assistance to the private sector in developing mineral resources.

State Advisory Role: The state would identify rare geological features, but would make no attempt to protect these resources. The state would advise local governments on the importance of these features and how they can be protected, but the state would not become involved in the protection process. The state would identify mineral resources and aid in their development through technical assistance. Natural hazard information would be collected and be made available to local governments. The information, however, would be more general than at the other two levels.

V. Air Quality

State Exclusive Control: Air quality would be a major concern in and around the metropolitan areas under this role model. Rural air quality would be a concern, but the state would recognize that most of the air quality problems in rural areas are agriculturally related and difficult to prevent. The state would sponsor active research into preventing wind erosion and the state would regulate the removal of agricultural shelterbelts. Point sources of air pollution would be closely monitored. The state would also be actively concerned with noise pollution, and require airport zoning to restrict development around

airports. Highways would be developed in ways to restrict noise, and noise barriers would be used in urban areas. The state would also allow local governments to impose restrictions on high noise areas.

State/Local Partnership: Air quality would only be a moderate concern at this level. The state would encourage local government to regulate discharge from point sources of air pollution. The state's priority would be placed on rural air pollution. The state would fund research into controlling wind erosion, but would probably not become directly involved in ongoing projects. The state would encourage farmers to keep their shelterbelts and perhaps provide incentives to keep them, but it would not prohibit their removal. Noise pollution would be considered a totally local matter.

State Advisory Role: The state would show its concern for air pollution by providing funds, on a limited basis, for research into wind erosion. The state would also comply with the federal government's air pollution legislation, but not exceed the requirements. Noise pollution would be a matter for the local governments.

VI. Water Use and Conservation

State Exclusive Control: At this level, the state would develop a water appropriation system which would establish limits on the use of water. Water conservation would be a major goal of the state, especially in western Kansas. In the water plan, water would be allocated among competing users on the basis of the maximum benefit to the state. In this way, water would be considered a public resource. The state would monitor the use and supply of water and adjust the allocations system accordingly. The state would conduct research into weather modification and groundwater recharge. The state would play an active role in the distribution of water resources.

State/Local Partnership: The state would be concerned with the supply of

water resources and would direct the local governments and special districts to impose constraints on overuse or wasteful use of water. The state would study the problems of water distribution and allocation and make recommendations to local governments and special districts, however, this analysis would use moderate scale information. The state would provide some funding for weather modification and groundwater recharge studies, but not participate directly in the projects. The special analysis of particular local problems would be left to the local governments or special districts.

State Advisory Role: At this level, the state would consider water shortage problems largely a local issue. The state would allow local governments to impose conservation measures, particularly in emergency situations. Special districts would also be allowed to place some restrictions on the wasteful use of groundwater. The state would provide technical assistance when requested to do so. The state would permit the local governments to become involved in groundwater recharge efforts and weather modification programs.

VII. Flood Control

State Exclusive Control: Flood prone areas would be a major concern of this model and the state would enact legislation to regulate development in flood prone areas. The construction of flood control structures would not be considered independent of other existing or proposed structures. The flood control structures would be thought of as a network rather than a single project. The state would play an active role in the federal flood programs. Flood information would be collected and analyzed by the appropriate state agency.

State/Local Partnership: At this level, the state would require local governments to control development in their flood prone areas. The state would provide technical assistance in the determination of the need for flood control structures, but on a request basis. The state would play a moderate role in

federal flood programs and encourage local governments to take a similar role. The state would maintain a flood incidence data file.

State Advisory Role: The state would allow local governments to regulate development in flood prone areas. The state would not become involved with the placement of flood control structures unless the structures would relate to another statewide concern. The state would only meet the requirements of any federal flood program. The state would maintain only general flood data.

VIII. Groundwater

State Exclusive Control: The conservation of groundwater would be a major concern of the state at this level. The state would develop a groundwater allocation system and oversee its administration. If the state developed a surface water allocation system, the groundwater system would be a major element in the overall water allocation system. The state would establish and enforce groundwater quality standards. The state would monitor the withdrawal of groundwater, the flow, depth, and other physical characteristics of groundwater, and the potential for further development and use of groundwater. The actual administration of the allocation system might be conducted by special districts (such as groundwater management districts), however, they would receive their directions from the state.

State/Local Partnership: In this role model, the state would require local governments and groundwater management districts to prevent the wasteful and overuse of groundwater resources. The state would have review authority over these protective measures, but it could not veto local actions. Groundwater quality standards would not be imposed by the state. The state would, however, monitor the groundwater characteristics and provide this information to the local governments.

State Advisory Role: The groundwater management districts would be permitted to develop certain measure to control the use of groundwater. The state would perhaps suggest guidelines for the groundwater districts to follow, but the state could not impose any requirements upon them. The state would monitor the general groundwater characteristics and provide this information to the local governments.

IX. Water Quality

State Exclusive Control: In this role model, the predominant responsibility for monitoring water quality and conducting programs to prevent water pollution would be given to the state. Discharge limits would be imposed on point sources of water pollution and erosion control measures, both wind and water, would be required on operations that might create substantial erosion. The state would provide and enforce guidelines for the use of pesticides, herbicides, fertilizers, etc.. The state would monitor water pollution from mining operations and require both reclamation plans and pollution prevention measures before mining operations would be permitted. Landfills would not be permitted in flood prone areas and the state would regulate oil and gas operations to insure the prevention of water pollution.

State/Local Partnership: At this level, the state would conduct water quality monitoring on only key areas along rivers. The purpose of this monitoring would be to provide a general assessment of the state's water quality. If more detailed information was required by a local government, it would be their responsibility. The state would implement a point source effluent permit system and mandate that non-point pollution controls be established by local governments. The state would also require local governments to impose sediment control measures. The precise form and content of these mandated controls would not be dictated by the state government.

State Advisory Role: In this role model, the state would direct its effort toward meeting the federal requirements. The state would allow local governments to impose standards to prevent or control non-point sources of pollution, however, limitations would be placed upon controls affecting agricultural land. The state would collect general information on stream quality.

X. Land Use Considerations

State Exclusive Control: Two major issues, solid waste and development around reservoirs, would be subject to state regulations. The state would have review and approval authority over the siting of regional solid waste facilities. Guidelines would be developed to aid local governments in determining the optimal locations. The state would enact a permit program to regulate development around reservoirs. Developers requesting permits would have to show that their development activities would not damage the landscape or water quality.

State/Local Partnership: At this level, the state would establish guidelines that would restrict solid waste facilities from certain areas (floodplains, high slopes, etc.) and indicate the optimal characteristics of solid waste sites. The state would not have approval power over the siting of solid waste facilities except in those specific areas in which they are prohibited. The state would require counties to regulate development around reservoirs in accordance with state guidelines, but the content of these controls would be left to the local governments.

State Advisory Role: The placement of solid waste facilities would not be a responsibility of the state government. The state might provide some technical assistance to local governments, upon request, to help determine proper sites, but this would not be a normal function of the state. The regulation of development around reservoirs would be the responsibility of the local govern-

ment, but the state would establish minimum standards for health purposes. The administration of the standards would be given to the local governments.

XI. Wildlife Preservation

State Exclusive Control: At this level, the protection of wildlife habitats would be a major concern of the state. Development in and around the habitats of endangered or threatened species would be monitored to ensure that the development is compatible with these habitats and that the areas would be restored to the extent possible. The state would encourage the development of private wildlife areas. The state would regularly monitor and maintain the population of those species deemed to be important to the state. The state would ensure the widest possible range of wildlife and wetland drainage would be considered in light of their effect upon waterfowl.

State/Local Partnership: The state would require each county to identify and protect their significant wildlife habitat areas. The state would establish guidelines, but not become involved in the management of these areas. In addition, owners would be given incentives to protect wildlife habitats on their property. The state would maintain wildlife survey information and provide this information to the local governments. Wetland drainage projects would be prohibited in areas the counties determined as vital for waterfowl protection. The state would purchase key wildlife areas for wildlife refuges, but only after consultation and approval of local governments.

State Advisory Role: At this level, the state would monitor wildlife populations, however, direct state involvement would be confined to managing the hunting, fishing, and trapping laws, and to programs aimed at protecting endangered and threatened species. The state would purchase land for the wildlife management programs, but only after consultation with the local governments.

XII. Recreation

State Exclusive Control: At this level, the state would develop a state recreation plan for the future development of the recreation potential of the state. The state would conduct an inventory of sites with recreation potential. Included in this inventory would be historical and archeological sites. The recreational inventory would divide potential areas into two categories: state recreational areas and local recreational areas. The state would regulate development in those areas of state concern and begin a process of purchasing these areas and developing their recreational potential. The state would provide funds to local governments to regulate development as an interim measure before they buy the sites. The state would conduct an inventory of significant archeological and historical features in areas of proposed reservoir development. The state would also insure that development around significant state historical or archeological sites will be compatible with the sites.

State/Local Partnership: The state would conduct an inventory of potential recreational sites aimed at determining state recreational sites. The inventory would provide local governments with information to assist them in their efforts, but the state would not identify local recreational potentials. The inventory would identify historical and archeological sites of statewide significance. The state would attempt to coordinate the recreational programs of local governments with the state's recreation programs.

State Advisory Role: The state would conduct a general inventory of potential recreation development and make this inventory available to the local governments. Detailed information would be collected only on specific sites of statewide significance. Historical and archeological sites would be included if of statewide significance. The state's role in recreation planning would be limited.

DATA REQUIREMENTS FOR ALTERNATIVE STATE APPROACHES

The ability to propose the best resource conservation approach for the State of Kansas is beyond the scope of this study. Likewise, the recommendation of any one data system would be premature and beyond the confines of this study. However, it is possible to outline in general terms the minimum data requirements of the three role models. This is possible through the development of the characteristics of the role models and the redefinition of the problems facing Kansas in light of the role models.

It is true that without the specific programs, this assignment of data requirements is a difficult and somewhat questionable task. It is felt that by redefining the problems in light of the three role models, sufficient information is provided to justify the assignment of data requirements. The data requirements represent the minimum data set to undertake and sustain the three different approaches. The data is complete for only the eleven problem categories. One should note that identical data elements may appear in two or more problem categories. Additional data may be included if it is found to be readily available and helps clarify the analysis.

The data requirements assigned to the three role models are found in Appendix II. This listing was developed from the previous section which outlined the problems that each role model seeks to address. The basic question asked for each problem was what data would be essential if the problems are to be adequately addressed. Also the scale, aggregation, source and vintage of the data has been determined. The data elements also represent an ideal situation and did not consider aspects of cost, availability, etc.. These additional factors, as discussed in the beginning of this part, will be considered in the following section. Each role model will require a different commitment to handling the identified data requirements.

STATE DATA COMMITMENT

When a state develops a listing of what data it requires to conduct a successful land and water resource conservation program, it will also need to develop a system to handle this information. The steps a state takes to developing a system and the nature of that system shall be termed the state's data commitments. The purpose of this section is to develop general scenarios as to the likely data commitments of the three role models. Each role model has different data and exhibit different needs for a system and, therefore, will result in different data commitments. Due to the scope of this study, only the data commitments of the three role models will be developed. It is recognized that the data commitments will change if a state combines approaches. The data commitments shall be presented by the three role models.

I. State Exclusive Control

One of the predominate concerns of this approach would be the availability of information. The state would undertake a survey and inventory of available sources including federal, state, local and private. Catalogs of sources would be developed and distributed to interested parties. From these catalogs it would be determined precisely which available information meets the needs of the conservation programs and what information is lacking. An attempt would be made to modify existing information or data gathering approaches in order to arrive at the data needs of the programs. If existing data is not available or cannot be modified, the state would collect new information. The program would probably not be modified to suit the constraints of the existing data.

The system used at this level of involvement would have to be a computer-aided system. The complexity of the analysis and the volume of data would dictate this type of a system. The system would need to be dynamic and capable

of visual or mapable display. The system would require the capability of isolating various elements to be compared by a number of different techniques. Each mapable category should be able to be isolated, mapped separately or in association with another category. The system would have the capability of outputting relatively large map displays. A substantial budget would be required and provided on a continuous basis. The information system would have a high priority and be in response to a recognized need.

The information for the system would be gathered through a blanket approach resulting in fairly detailed information. The purpose would be to provide as detailed a base as economically feasible, and be able to be used to substantiate land related regulations when called for. Case-by-case data gathering would be used for areas requiring a very detailed analysis, that are complex in nature, or for other areas which present special informational requirements. This information would be fully integrated into the information system, and special care would be taken to insure that its special characteristics would not erroneously affect the analysis.

The difficulty of accuracy will be another perplexing problem at this level. The demand for accuracy at this level will be substantial, yet, due to the costs, a thorough check for the accuracy of all information would be out of the question. Special attention would be placed upon the data collection phases to reduce inaccuracies as much as possible. Accuracy would be checked on the final products by systematic samples, and by fitting the products together in the appropriate scheme or order. A field check of accuracy will be conducted for court cases and on certain special areas.

The information and collection techniques would in all likelihood be standardized in an attempt to reduce inconsistencies which might later contribute to inaccuracies. Not all information will, of course, neatly fit into a stan-

dard pattern. These special cases would be dealt with separately. To facilitate standardization, a central agency would be given the task of compiling information and operating the system. A standing information development committee would oversee the operations of the system and mediate in any disputes involving information such as overlaps, noncompliance with prescribed collection standards, etc. Standardization of information would extend to uniform coverage of the state, compatibility of data elements and making information more easily understood.

The system would include that information that would be considered essential. Desired data would be included only if it is readily available, and the cost and space permitted. The cost of the system would be expected to be high, yet the state would have an active commitment to maintaining the system. There would be a continuous attempt to provide information at the lowest possible cost, but not at the expense of the system. The exclusive control approach would require information with high resolution, large scale and recent vintage. This requirement would necessitate an active ongoing data provision process. Low level aerial photography would be extensively used, and the updating process would be continuous with each part of the state being updated at least once within the vintage specified for each data item. The response time would need to be short even for complex analysis. A georeference system would also be required so that all spatial information would be able to be located precisely.

II. State/Local Partnership:

The state, at this level, would attempt to utilize the existing information to the extent possible. The state would conduct an inventory of existing state sources and rely upon federal catalog activities for federal sources. Local and private sources would be considered as part of the duties of a task force committee established to develop the system. If at all possible, the program requirements for data would be modified to take full advantage of existing information. The determination of the system and data needs would be the responsibility of the task force committee.

The committee would consist of those state agencies directly involved in the provision of information and the representative local governments and regional planning agencies. This task force would oversee the development of the information system and then disband. They would establish guidelines for the operation of the system, but not be responsible for the actual system operation.

A central agency would be given the development and operation responsibility. The task force would intervene in any disputes during the development of the system.

The system would be either a manual or a computer aided system depending upon the task force's recommendation. Cost, required response time, personnel capabilities, and space requirements would all enter into the decision. The state may wish to develop a manual system that could, over time, evolve into a computer aided system. The system would be able to display all the information identified as required and, if possible, to interrelate many of the data items. Mapping capability may be separate from the computer system, if one is in fact developed.

The state would utilize a blanket data gathering approach for generalized information. This information should provide the level of detail necessary for general statewide planning. The state would also emphasize a case-by-case approach for certain areas deemed to be important to state development and these areas would be given high priority for data collection efforts. The state would conduct the blanket data gathering efforts and encourage local collection of case-by-case information. The state would attempt to maximize the use of local expertise.

The mixture of these two approaches would likely generate problems in accuracy. The two sets of information would be considered separate and not be interchanged. Accuracy would not be a demanding problem on the blanket gathering efforts and subsequently less time would be spent on checking accuracy for this data. The special areas would require more accurate information. Since this information is to be gathered by a variety of local units, the compatibility of the information would be a major concern. The state would attempt to oversee these local efforts by providing technical assistance and periodically spot checking some of the information.

The system would also include information that would be considered essential, but the term essential would be subject to compromise. Essential information might be excluded if other complementary information would be available at less cost and effort. The cost of developing the system would be a major constraint and, therefore, extreme care would be taken to reduce costs. The most practical method might perhaps be to program in certain improvements over a number of years, thus spreading costs over a longer period of time. The system would be given a moderate priority.

The partnership role would require information with moderate scale and resolution. The vintage or updating requirements would be as long as possible, while still retaining its usefulness. The updating process would again be continuous in order to spread costs out. The system would use higher level imagery and attempt to use satellite photography provided by the federal government. The response time would be favorable and depend upon the product and the particular system developed. A georeference system would be developed and used on all map products.

III. State Advisory Role:

The state, at this level, would attempt to use exclusively the existing information available to the state. The state would conduct an inventory of state sources and take note of the readily available federal sources. Local and private sources would be ignored unless they would be readily available. The purpose of the state's system would be to advise local governments, regional planning agencies, state planning and development agencies, and the state legislature for their decision making functions.

The existing information would dictate the nature of the system. The system would in all likelihood be a manual system with an extensive library function. A central agency would house the system, but a planning coordinating committee would define the needed information. The central agency would not provide an analysis or research activity for the users of the system. Each agency would be expected to develop this capability in-house. The system would basically be a referral system of available information.

The planning coordinating committee would undertake the responsibility for determining if additional information would be required. The committee would consider any requests from agencies, local or state, and also evaluate the current activities to develop its list of additional information to consider. The central agency would also provide the committee with a listing of frequently requested information. The committee would evaluate the needs and make a recommendation to the chief executive who would require an agency to provide this information. Each agency would also have some discretion in collecting new information for its purposes without going through the committee.

A computer aided system may be used by the state for the ease of handling the information. This system would not be interactive. The computer would serve as a convenient storage medium for the information and its primary function would be to display information. Mapping capacity would probably not be

a part of the system. Mapping would be a separate operation and normally use existing maps. A limited cartographic capability might exist in one agency and would be loaned out to the rest of the state agencies.

The accuracy of the information would not present a major problem. If an agency requires more detailed or accurate information it would be their responsibility to provide it. Much of the information would likely be federal and accuracy checks would not be conducted for this material. The accuracy of state generated information would be a concern and some spot checking would occur. The information would not be standardized, but the central agency would attempt to promote compatibility of all information in the system.

The system would be more concerned with the gathering of existing information than the question of essential vs. desirable information. It would be presumed that essential information would be already collected by the state agencies. Some study would be conducted to determine if any information is being collected and is under utilized or non-essential to the agency in question and the state. If any data items fall into this category, they would be discontinued.

This level of involvement would not require detailed information and, therefore, would predominately utilize the existing federal sources. These sources usually have high resolution, large scale, and are not of recent vintage. The state would count on the federal government to make improvement on the data sources. Federal package systems, such as the LUDA system, would be heavily used and relied upon for the state's data needs. The response time would depend upon the product desired. Generally, the basic information would be available in short order, however, the time constraints on the subsequent analysis of the information would determine the total response time. A georeference scheme would be provided through the federal mapping sources.

PART FOUR

THE KANSAS APPROACH

Thus far in the study, three seemingly unrelated outcomes or products have been presented. It is the purpose of this section to show the inter-relatedness of the first three parts and their value for Kansas. Kansas is a unique state with its own special conservation problems and its own special ways of approaching problems. Kansas is in the process of reevaluating its direction in the development of the state. This study is an attempt to provide additional information as to the possible effects of different state roles or approaches in the conservation of land and water resources.

Part One of this study has taken a look at the existing state policies, problems and data elements dealing with the conservation of land and water resources. The objective of this analysis was many fold. First, it was felt desirable to produce a list of existing policies, problems and data items in broad categories of resource conservation related topics. In this way, these items would be collected together rather than in dispersed locations. Second, the analysis provided the opportunity to observe the existing policies both in terms of relationships between policies, and between policies and the problems they seek to address. This analysis was not meant to be a comprehensive review, but proved to be valuable in indicating areas that are in need of further study. Finally, the analysis proved desirable for taking a look at the data provision efforts of the state. The particular interest in this review was the determination of the adequacy of the present data provision efforts in terms of gaps of information and the duplication of information. This part was intended to analyze the data provision efforts of Kansas and to determine their relationship to the expressed policies and the identified problems.

Part Two of the study involved the development of three hypothetical role models which illustrate three different levels of state involvement in the conservation of land and water resources. The purpose of developing role models was to explain, to the extent possible, different approach options available to all states in providing resource conservation programs. The role models attempt to generalize the nature and content of programs and policy direction that are available to each state for conservation purposes. It was pointed out that each state might take a different option for any given

problem and the role models were illustrated by existing state programs in a number of states.

The purpose of Part Three was to develop a listing for each role model of the information required for Kansas to perform that particular state role and what data commitments would Kansas have to make to collect and handle the required information. This process involved identifying those data characteristics and constraints that must be considered prior to identifying required data elements. The process was also hampered by the fact that the role models were generalizations of the nature of the state roles and did not indicate actual programs. This required a discussion of how each role model relates to the identified conservation related problems in Kansas. The actual programs could not be identified, however, the problem/role model clarification did provide a general feeling for what data items would minimally be required for each particular model. This, in turn, facilitated the development of three scenarios which generally indicate what data commitments Kansas would have to make to provide the required data, assuming the state plays a pure role model.

It is the purpose of this part, Part Four, to tie the previous three parts together and indicate what roles Kansas is performing in each of the twelve broad categories. This process shall involve a comparison of the analysis and policy-problem-data element listing of Part One with the problem/role model clarification and required data list of Part Three. This analysis shall also include a general comparison of the existing data elements with those indicated as required for a particular role. At the end of Part Four there will be a presentation of recommendations which have been indicated from the analysis of all four parts.

KANSAS APPROACH TO CONSERVATION

The analysis of the Kansas approach will determine which of the three role models best explains the current efforts in conservation in each of the twelve broad categories. This, of course, is not an easy task since there is a variety within each of the categories. One activity or data element may be characteristic of one role model while another activity in the same broad category best fits into another role model. For each of these determinations of the Kansas approach, a general feeling for where Kansas is and what the role model calls for will be the determining factor. Factors that do not apply to the specifics of the role model shall be presented. The discussion

shall be presented by the broad categories.

In the Conservation of Natural Resources category, the State of Kansas has not established a critical areas type of program, nor does it control or mandate control of special areas. The state has, also, not expressed the loss or destruction of natural vegetation as a major policy concern, but it is recognized as a *major problem* for Kansas. These factors indicate that the state is not taking the exclusive control role, and that it is not fully taking the partnership role.

The existing data elements indicate the land use/land cover information is general. A public land inventory does exist, however, it is an open file and is not readily accessible. The state is collecting information on special areas, yet no state programs exist for these areas. Generally, the approach taken by Kansas for the conservation of natural resources has been an advisory role, however, some of the necessary data elements and policy concerns for a partnership role are in place.

Agriculture is the backbone to the Kansas economy, but the state has generally taken a hands off approach. In the Agricultural Conservation category it can be seen that the state is concerned with the loss of agricultural land, yet it is generally considered an urban problem. The state has recently enacted a constitutional amendment that calls for the assessment of agricultural land in terms of its use or income producing ability. A tax deferral clause has not been included so far and, therefore, the use value appraisal will likely have only a limited affect on reducing land speculation. The identification of prime agricultural land is often spoke of in Kansas, but the state has *no program* to identify these areas or monitor if the state is losing prime agricultural land. The decline of the number of farms is a concern, but again no preventative program exists. Erosion control is a strong desire and local programs do exist. Up to now, the state has not been involved in these programs.

This lack of involvement is also shown in the existing data. The state does have some of the necessary information available for a partnership role, but these sources are incomplete. The designation of prime agricultural land, the county soil surveys, slope information, farm financial data, and erosion data are all available, but either incomplete or insufficient for the needs of the partnership role. The extent of urban expansion, farm ownership data and soil stabilization project data are not indicated as available to the state.

The state exhibits an advisory role in the Agricultural Conservation category. The enactment of a deferral clause in the use value appraisal and the state financing of the acceleration of the soil surveys may change this situation.

The State of Kansas has shown an active concern for energy conservation. The state has developed an energy conservation plan and numerous conservation measures are being contemplated. The state presently does not provide financial incentives for the development of alternative energy sources, but this has been proposed and is under debate. The state lacks building code regulations and this again is under debate. The state has stayed out of the area of projecting energy demand or in identifying the size or type of power facilities that are constructed.

In terms of existing data, the state is less active than might be expected. The state seems to lack information on alternative sources, the value of energy resource production, the projected energy demand of activities, energy use and consumption patterns, and utility construction forecasts. The state generally exhibits a partnership role in the energy category, however, there appears to be the need to increase the information sources.

The geologic aspects of Kansas are generally taken for granted. The state has no policy for the preservation of rare geomorphic features whether economically important or scenically important. The state does have a disaster relief program, but this program relates to the aftermath of a disaster rather than preparing the state for potential hazards. The state makes no real attempt to identify subsidence areas and avoid development in these areas. The state is actively involved in identifying deposits of minerals with some economic potential.

The existing data is the Geology category, which tends to be in accord-

ance with the expressed policies. Slope data is largely unavailable and there is no inventory of rare geomorphic features. Urban expansion information is difficult to find as well as information on mining activities. The conservation efforts of Kansas are limited in terms of the Geology section and, therefore, exhibits an advisory approach.

The policy expressed in the Air Quality category is fairly vague and is more an expression of a goal of clean air than a policy of how to achieve clean air. There are many areas related to clean air that the state has not become involved in, such as shelterbelts, wind erosion prevention, and regulation of indirect sources of pollution. At the same time, the state does not face severe air pollution problems.

The existing data suggests a moderate level of involvement in air quality, but many data items are absent. The state seems to lack information on shelterbelts, wind erosion, specific point source emission levels, motor vehicle fuel consumption, wind control projects, noise control measures, and noise levels around most airports. All these factors point to an advisory role. The state is attempting to meet the federal requirements and in this way indicates, in certain circumstances, a partnership role.

In the Water Use Category, it is shown that the state does not, in reality, allocate water or limit its use. The state's appropriation laws are frequently charged with actually promoting the waste or overuse of water. The state also will not allow special districts or local governments to restrict the use of water. The allocation rights are stated in fixed amounts and cannot be modified when the state faces a drought. The state does not conduct weather modification research. There has been recent discussion and legislative proposals to limit the use of groundwater, but the use of surface water is largely unrestricted within the appropriation rights.

A great deal of information is being collected in the Water Use category, yet several areas are lacking. The state does not collect information on projected water use, yields for all wells, weather modification results, aquifer location, and recharge efforts. The existing data point to the development of a partnership role, however, the expressed policies do not confirm this approach. This category has been assigned a partnership role predominately due to the anticipation of the outcome of the continuing interest in the conservation of water use.

Flood control in Kansas is largely considered a local matter. The state does not regulate development in floodplains, nor does it require local governments to regulate development in floodplains. The state does not treat flood control structures as being part of a network and it does not work closely with the Army Corps of Engineers in developing structures. The state relies totally upon the federal government to control floodplains through the flood insurance program.

The data collected in the Flood Control Section is somewhat extensive. The federal government provides much of the information in this category. Absent from this category are information on the location of flood control structures, the affected increase of urban runoff, elevation data on structures and ownership data on property and buildings in floodplains. In general, the state's approach toward this category has been to take the advisory role. This category does have a few data items defined as required for the partnership role.

The depletion of groundwater in Kansas is a well documented, major problem that demands state attention. The state is in the process of assessing its appropriate role in the conservation of groundwater. Currently, however, the state does not control or limit the appropriation rights for groundwater

use and it does not let special districts or local governments establish limits. The state does give special districts the authority to impose well spacing requirements and several groundwater management districts are imposing these restrictions. The state also has been unable to effectively monitor the use of groundwater and the level of groundwater reserves. The state is attempting to change its role in conserving groundwater.

The existing data on groundwater almost approaches that identified as required to perform the state exclusive control role. This information, however, is limited in coverage and lack the data characteristics called for by that level. The approach taken by Kansas in this category is between the advisory role and the partnership role. It is expected that this will change in the next few years to exhibit a solid partnership role. This may require the increase in coverage of the existing data.

Water quality has become a concern of the State of Kansas largely because of the federal requirements and the growing recognition that the Kansas waters do have pollution problems. The state is involved in monitoring river and stream water quality. The state does not require erosion control measures or the location of solid waste facilities. Mining activities are required to reclaim the land, but no pollution prevention measures are required for active mining sites. The state has thus far steered clear of the non-point source pollution issue.

The existing data also points to a mixed approach. The state does collect information on water quality, but this does not include a biological analysis. The state does collect data on possible sources of pollution, but has left mining and solid wastes off the list. The state also does not collect information on chemical usage on agricultural land. There is no evidence that the state is projecting the future pollution loads in the state's waters.

For the most part, the state has taken an advisory approach. The state is, however, becoming more aware of this problem and may evolve into a partnership role.

Land use is not a popular topic in Kansas, and therefore, the state has only a limited experience in land use activities and their relationship to conservation. The state has not gotten involved in the siting of solid waste facilities or required the local governments to follow any sort of state guidelines on the location of solid waste facilities. Likewise, the state does not strictly enforce health standards around reservoirs, nor does it control the type and extent of development around reservoirs. Both of these areas are the concerns of policy expression.

The state is in the process of providing decision makers with the LUDA system information, but a number of important data items are not provided. The state lacks any indication of land use changes, property ownership, housing demands, and building construction rates. The Land Use category is dealt with from an advisory approach that is not likely to change in the near future.

In the Wildlife Preservation category, it is shown that the state places a moderate priority on wildlife. The state does not have a critical area type of program and does not identify prime wildlife habitat areas. The state also does not provide funds to restore destroyed or damaged habitats. Wetland drainage projects are not required or encouraged to consider possible adverse effects on wildlife. The state does not provide incentives to private property owners to encourage wildlife preservation measures.

The existing data on wildlife is very extensive. The state has a good indication of how many animals exist, by species, in Kansas. The state, however, does not identify prime wildlife habitat areas, and the number of

animals killed and by what means is also not indicated. The data on wildlife management areas is readily available. The existing data points to a partnership role, but one must conclude that, due to the policy directions, the Wildlife Preservation category is approached from an advisory role.

The state plays an active role in identifying recreational demand and potential. The state is actively promoting recreation and places an emphasis on historic preservation. The state does not regulate development in areas with potential recreational value or around recreational areas, nor does the state allow local governments to regulate development in potential, or around existing, recreational areas. The state is also not actively investigating potential archeological areas. The emphasis appears to be in the provision of active recreational activities.

The current data collection efforts are quite extensive and cover a variety of topics. The existing data does not include the effect of taxing policies on recreational land. Land use in the vicinity of recreational areas is not indicated as being available. The existing data also appears to lack an indication of demand for different categories of activities such as active, passive, water based and land based. The state appears to have placed itself in an advisory role. The state is active in the promotion of recreation, but not the development of recreation.

It can be seen from the analysis of twelve categories, that with few exceptions, Kansas is taking the advisory role approach. This approach is generally consistent with the policies expressed in state legislation. Emphasis has been placed in particular areas, energy, water use, and groundwater, in which the state has a particular interest. This emphasis appears to be motivated by economic considerations rather than a commitment to conservation. The state does recognize the need to conserve its land and water resources, but the basic question it has been unable to answer thus far is to what extent

should the state become involved? Kansas has a strong tradition of local autonomy and state controled or mandated conservation efforts are perceived as running counter to this tradition.

The next question now is, should Kansas approach the provision of required information or what commitments will the state have to make to provide information? Specific recommendations shall be offered in the final section. Kansas is basically following the appropriate course of action in providing needed data. A catalog of state data sources related to natural resources has been completed and the state is in the final stages of implementing a computer data base system. This system is predominately for display purposes, but some analytical work may potentially be performed.

The mapping functions of the state are manual and dispersed among a variety of state agencies. No standard base map exists, nor does a standard map scale exist. No statewide cooperative agreement exists between agencies for the production of maps by one agency for the use of all agencies. Each agency must contract for the service of producing the maps in-house.

The decision to gather new information is often left to the individual agencies. As yet, no mechanism exists for state agencies to have desired information collected by another agency when this information is not in their immediate area of interest. In other words, no mechanism exists allowing an agency to provide input into the data collection efforts of another agency. The state is only beginning to provide coordination of data provision efforts between agencies.

The state is currently using federal data sources for much of its information on natural resources. This involves some adjustments to make the data fit into existing state sources. This information tends to be reliable for the current state programs and is readily available in a reasonable time frame. The state is relying upon the federal government to improve its data sources.

RECOMMENDATIONS

The following recommendations are offered as the terminus of this study. They have been indicated as being desirable from all four parts of the study.

- 1) Part One of the study indicated that a number of inconsistencies in expressed policies appear to exist. These inconsistencies tend to occur when two or more uses compete for an area. An example of this are policies which encourage the expansion of agriculture which may be in conflict with policies that call for the preservation of natural areas. These policies are not necessarily in conflict, but no policies exist that resolve the difference in emphasis of many of the state's existing policies. It is, therefore, recommended that the state clarify its policies related to the conservation of land and water resources.
- 2) From this study it appears that Kansas is and has approached its problems in a piecemeal fashion. The state seems to be unsure of how each program contributes to the overall development of the state. It is recommended that the state reassess its policy directions and make a determination as to what role the state should be playing and how this role should be changing to meet anticipated changes in the problems of the state.
- 3) The state presently utilizes a computer to store information for planning functions. This computer aided system's predominate use is for the display of information and only has limited analysis capability. It is recommended that the analysis capability of this system be expanded. It is further recommended that visual display or a graphics capability be added to the system.
- 4) Part One also indicated that duplication of data collection efforts potentially exist. It is recommended that the state investigate this situation and establish a committee to encourage the improvement of information flow and to help establish compatible data bases.

- 5) One problem which is ever present is the inadequate coordination of federal data collection efforts. This is particularly true between different federal agencies. For example, soil surveys are conducted on a scale of 1:20,000 while the U.S.G.S. topographic maps are produced on a 1:24,000 scale. It is recommended that the state urge and encourage the federal government to provide better coordination of their data provision activities.
- 6) One of the chief lacking data items is the incomplete coverage of the soil surveys. This program presently receives limited funding and is scheduled to be complete for Kansas within a ten-year period. This information is vital not only from a planning perspective, but also for agriculture, construction and other land use activities. It is recommended that the state encourage the federal government to accelerate the soil survey program and explore funding options available to the state to complete this program.
- 7) The state currently relies upon the federal LUDA system for land cover and land use information. The scale of this system is 1:250,000 which is considered too small for detailed analysis. The federal government will attempt in the future to rework the system at the 1:100,000 scale. This scale will be appropriate for most of the planning activities at the state level. It is, therefore, recommended that the state continue to work with the federal government and make no effort to develop large scale land use and land cover data products.
- 8) One area in which the state is deficient, is information on state owned property. This information is of value in a number of programs. The information is available in the open files of the Secretary of State's office, however, no comprehensive description or mapable products are available. It is recommended that the state undertake a survey of existing buildings and lands determining how much property the state owns and the location of this property.
- 9) The wetlands of the state are important natural areas and provide for

wildlife and waterfowl habitats. The state currently does not have the necessary information to monitor the changes in these wetlands. It is recommended that the state investigate the possibility of identifying major wetlands and monitor any changes.

10) The designation of prime agricultural land would be a valuable asset to the state in conservation programs and in use value tax appraisal. Before land can be classified in terms of being prime, a soil survey must be conducted. It is recommended that for those counties with soil surveys, the state should designate the prime agricultural lands.

APPENDIX ONE

EXPLANATION OF TABLE

The accompanying table is a listing of the policies, the problems, and the existing data elements that relate to the conservation of the state's natural resources. The listing is organized into twelve categories and includes a listing of general data that pertain to each of the categories (General Data Elements). Care has been taken to include all relevant policies, problems, and data items that directly relate to the conservation of natural resources. It must be pointed out, however, that the preparation of this listing was conducted through a somewhat subjective process, and that no hard and fast decision criteria was developed. Each item appearing in the listing is a result of a judgmental decision based upon the confines of the study.

The policies have been determined from:

- 1) Kansas Growth Policy Study; KDED, 1974.
- 2) Kansas Legislature: Summary of Legislation; Legislative Research Department, 1975.
- 3) Kansas Legislature: Summary of Legislation; Legislative Research Department, 1976.
- 4) Kansas Legislature: Summary of Legislation; Legislative Research Department, 1977.

The policies include the statute reference or an indication of where the policy expression originated, and a notation on what agency is responsible for implementing the policy.

The identified problems have been extracted from four documents and are noted at the end of each problem statement. The roman numerals represent:

- I. The Future of Kansas Study; Division of Planning and Research, 1975.
- II. Land and Water Resource Areas and Key Facility Report; Division of Planning and Research, 1977
- III. "Land Resources in Kansas"; AIP, draft report, 1976.
- IV. "Kansas Energy Resources and Policy Report"; Midwest Research Institute, 1976.

The data elements are all extracted from the Natural Resources Data Catalog which is a publication of the Division of Planning and Research.

I. Conservation of Natural Resources

Policies:

To control the development and conservation of natural resources: forests, woodlands, public lands, soil, game reserves, waters.

Statute Reference: KSA 74-3308

Implementing Agency: Forestry, Fish and Game Commission

To secure for the people of Kansas the benefits of an enduring resource of natural scientific areas by establishing a system of natural and scientific preserves, to provide for the protection, control and management of these areas, and to establish and maintain a registry of natural and scientific areas.

Statute Reference: KSA 74-6602 to 74-6613

Implementing Agency: Park and Resources Authority, Natural and Scientific Areas Advisory Board

To establish, improve, keep, and maintain lands as public forestry, recreation grounds, fish and/or game preserves.

Statute Reference: KSA 32-214

Implementing Agency: Forestry, Fish and Game Commission

To administer the procurement of federal aid in all matters pertaining to the development of natural resources insofar as it pertains to the control and utilization of waters, prevention of erosion, and flood control.

Statute Reference: KSA 74-3308

Implementing Agency: Forestry, Fish and Game Commission

To conduct research in conservation methods and disseminate information.

Statute Reference: KSA 32-215

Implementing Agency: Forestry, Fish and Game Commission

To serve as natural resources research and development arm of state government.

Governor's speech at Ribbon Ceremony for new Geological Survey Building, February 2, 1973

Implementing Agency: Kansas Geological Survey

Problems:

- 1) Reduction of the state's natural vegetation. (II, p-11)

- 2) Removal of forest lands in all categories; hedgerows, shelterbelts, natural timber and brush areas, oak-hickory forests, ozark-forests, cross-timber forests and floodplain forests. (II, p-14)
- 3) Destruction of the tall grass or bluestem prairies. (I, 2-24)
- 4) Decline of marshlands from government sponsored drainage projects. (I, 2-24 & II, p-3)

Data Elements:

- 1) Land Use: Acres in land use: cropland, woodland and forests, range and pasture, other agricultural land, coal mining, transportation, land and water recreation, fish and wildlife, and military.

Aggregation: State, river basin, sub-basin
Statute: KSA 74-2608

- 2) Pasture Lands: Annual report on bluestem and wheat pasture lands which are grazed by acreage and rental rates.

Aggregation: State
Statute: 7 USC 2204, KSA 11-101
Agency: Board of Agriculture, Division of Statistics

- 3) Woodland Acreage: Inventory of woodland acreage by timber type, ownership class, timber volumes in board feet and cubic feed by species and size class and timber growth and cut volumes.

Aggregation: Forestry regions, county, state.
Statute: KSA 76-425, 43 Statute 653
Agency: Extension Forestry

- 4) State-owned Property: Inventory of state-owned property by assignment of property to a particular department, by deeds and by abstracts of title.

Aggregation: State
Statute: KSA 74-415
Agency: Secretary of State

- 5) State Agencies Leased and Owned Land: Inventory of lands owned and leased by state agencies; by owned, leased and total acres by agency.

Aggregation: County, State
Statute: KSA 46-1106 et. seq.
Agency: Legislative Division of Post Audit

- 6) Public Trees: Inventory of public trees by species, size, conditions, value and number of dead and dying trees.

Aggregation: City
Statute: KSA 76-425 and 64 Statute 473
Agency: Extension Forestry

- 7) **Prairie Stream Habitat:** Physical and biological habitat of prairie streams such as the Neosho and Verdigris rivers.

Aggregation: River
 Statute: KSA 32-215
 Agency: Forestry, Fish, and Game Commission

- 8) **Highway Land Characteristics:** Characteristics of land that is a part of the proposed highway route including property owner information, physical description, and grievance use of land.

Aggregation: Specific location
 Statute: KSA 75-5001 et. seq.
 Agency: KDOT

II. Agricultural Conservation

Policies:

To encourage the purchase, improvements and ownership of agricultural lands and the occupancy and cultivation thereof; provision is made for a fund to be used for the purchase and sale of lands for agricultural purposes.

Statute Reference: Article 15-11
 Implementing Agency: Board of Agriculture

To provide for the valuation of agricultural lands on the basis of actual or potential agricultural income or productivity. The difference between taxation based upon use-value and based upon market value will be recouped to the extent possible if the use of the property is changed.

Statute Reference: Article 11 and 12, Kansas State Constitution
 Implementing Agency: Department of Revenue

To secure and disseminate statistics relating to crop acreage concerns such as soil moisture depth, winter wheat abandonment or cultivation and wheat varieties.

Statute Reference: KSA 74-504 (b)
 Implementing Agency: Board of Agriculture

To cooperate with the federal government in efforts to prevent soil erosion by wind and dust storms and distribute any federal monies among the counties of the state.

Statute Reference: KSA 2-2009
 Implementing Agency: Board of Agriculture

To provide information and reports concerning soil erosion and dust storms to the legislature, the governor, and to landowners affected.

Statute Reference: KSA 2-2005
 Implementing Agency: Board of Agriculture

Problems:

- 1) Removal of prime agricultural lands, (II, p-104)
- 2) Accelerated growth in urban areas. (III, ps. 1&2)
- 3) Increase in farm size and decline in the number of farms. (II p-11)
- 4) Large amount of soil loss from wind and water erosion. (II, p-104)
- 5) High erosion potential of Northeastern, South central and extreme North central Kansas. (I, 2-8)
- 6) Severe sheet and gully erosion on cultivated slopes of North central Kansas. (I, 2-8)
- 7) Steep banks along riverbanks in high plains of southwest Kansas. (I, 2-4 & 2-8)

Data Elements:

- 1) Agricultural Land Use: Acres of land dedicated to agricultural use, irrigated cropland, bottom and upland, native and tame grass-land pasture, wasteland, yard plots and their assessed valuation.
 Aggregation: County, state, township in files of Department of Revenue.
 Statute: KSA 79-1806
 Agency: Department of Revenue, Property Evaluation Division.
- 2) Prime Farmlands: Map of prime farmlands in Shawnee, Republic and Harper counties only. A 1976 pilot project.
 Aggregation: County
 Statute: PL 92-419
 Agency: State Conservation Commission
- 3) Crop Production Land: Acres of land suitable for crop production.
 Aggregation: State
 Statute: PL 92-419
 Agency: State Conservation Commission
- 4) Soils Data: Inventory of soils (types and depths) with maps and interpretation as to specific use (septic tanks, landfills, highways, etc.). As of July, 1976, 35 county surveys published, 22 surveys completed but unpublished, 20 county surveys in process, 28 incomplete.
 Aggregation: County, generalized view of state.
 Statute: 49 Statute 163, PL 89-560
 Agency: State Conservation Commission
- 5) Planted and Harvested Crop Acreage: Crop acreage planted and harvested, average yield per acre, total production and value: wheat, corn, oats, barley, rye, sorghum, soybeans, sugar beets, popcorn, hay, alfalfa seed, red clover seed, lespedeza seed, apples, peaches, and dry beans.
 Aggregation: County and State
 Statute: 7 USC 2204, KSA 11-101 et. seq.
 Agency: Board of Agriculture, Division of Statistics

- 6) Dry and Irrigated Cropland: Acres of dry and irrigated cropland, pasture or range land in need of conservation treatment (vegetative cover, brush control, terracing, diversions, crop rotation, etc.) amounts of each type of land by acres.

Aggregation: Land capability class, county.

Statute: 49 Statute 163

Agency: State Conservation Commission

- 7) Farm Size: Number of farms, average size and total acres in farmland.

Aggregation: State.

Statute: 7 USC 2204, KSA 11-101 et. seq.

Agency: Board of Agriculture, Division of Statistics

III. Energy

Policies:

To establish a central energy office that will oversee the energy matters of the State of Kansas. The office shall adopt rules and regulations establishing a system of priorities for the allocation of energy resources and the curtailment of consumption during energy emergencies.

Statute Reference: KSA 74-6801 et. seq.

Implementing Agency: Kansas Energy Office

To initiate studies and generate recommendations concerning needed changes in state law concerning nuclear energy, particularly as they might relate to the hazards to natural resources including wildlife.

Statute Reference: KSA 48-1604

Implementing Agency: Forestry, Fish and Game Commission

To regulate and prevent the waste of crude oil petroleum or natural gas.

Statute Reference: KSA 55-601, 55-602, 55-701, 55-702

Implementing Agency: State Corporation Commission

To promote the conservation of natural gas, the State Corporation Commission is authorized to approve underground storage, and protect associated correlative rights for its retrieval.

Statute Reference: KSA 55-1202, 55-1302

Implementing Agency: State Corporation Commission

To establish an interstate compact to conserve oil and gas in the State.

Statute Reference: KSA 55-801; 55-804; 55-857

Implementing Agency: State Corporation Commission

To conserve geological information and file samples and logs of oil and gas wells for study and evaluation related to future development of the State.

Corporation Commission Rule 82-2-125

Implementing Agency: Kansas Geological Survey

To encourage the development of solar energy systems through income tax credits and accelerated amortization for business property which install solar energy systems.

Statute Reference: H.B. 2969 1977 Legislative Session
Implementing Agency: Department of Revenue

To encourage the development of solar energy systems by extending a five year 35% rebate from all ad valorem property taxes paid for buildings or additions which are equiped with solar energy systems.

Statute Reference: H.B. 2618 1977 Legislative Session
Implementing Agency: Department of Revenue

Problems:

- 1) Shortage and imbalance in the supply and distribution of energy. (II, p-1)
- 2) Future depletion of oil and natural gas. (I, 3-3 & 3-13)
- 3) Oil imports presently needed for Kansas oil refineries. (I,3-7)
- 4) Spot shortages of natural gas in agriculture for harvesting and drying. (II, p-4)
- 5) Natural gas shortages for industries and institutions during cold weather. (II, p-4)
- 6) Increased possibility of radiation damage due to increase in use of nuclear power plants. (I, 11-10)
- 7) Limited data available on energy supply, distribution, and consumption characteristics. (II, p-2)

Data Elements:

- 1) Oil and Gas Related Wells: Inventory of oil and gas related wells: location, depth and thickness of subsurface strata.
Aggregation: Individual well.
Statute: KSA 76-322 et.seq.
Agency: Kansas Geological Survey
- 2) Oil and Gas Production: Quantity of oil and gas production.
Aggregation: Lease, county.
Statute: KSA 76-322 et. seq.
Agency: Kansas Geological Survey
- 3) Oil Well Production: Monthly inventory of oil well production: field pool, number of wells, well operator, acreage per well, location, daily production allowed and capability, monthly production allowed and actual, net production shortage or average and production allowed in subsequent month.
Aggregation: Individual well, pool.
Statute: KSA 74-601 et. seq.
Agency: Conservation Division, Corporation Commission

- 4) Gas Well Production: Monthly inventory of gas well production, lease name, well number, location, acreage per well, tested daily production capability, monthly production allowed and actual, net production shortage or average and production allowed in the subsequent month.
 Aggregation: Individual well summarized by purchasing Company
 Statute: KSA 74-601 et. seq.
 Agency: Conservation Division, Corporation Commission
- 5) Oil and Gas Pools: Monthly inventory of oil and gas pools: land-owners, location, acres per well, oil-gas ratio, daily production capability for oil, actual and allowed monthly production, net production average or shortage and production allowed in the subsequent month.
 Aggregation: Individual well, purchaser, pool.
 Statute: KSA 74-601 et. seq.
 Agency: Conservation Division, Corporation Commission
- 6) Oil and Gas Reservoirs: Oil and gas reservoirs: permeability, porosity and chemical composition of the rock; pressure, temperature and type of fluids.
 Aggregation: Oil or gas field.
 Statute: KSA 76-322 et. seq.
 Agency: Kansas Geological Survey
- 7) Oil Spills: Inventory of reported oil spills: Location, date, cause of spill, type of material spilled and clean-up procedure.
 Aggregation: Open files at Health and Environment.
 State: KSA 65-107, 55-121, PL 92-500 and Health and Environment Regulations 28-16-27
 Agency: Department of Health and Environment
- 8) Underground Fuel Storage: Inventory of underground fuel storage facilities: location, type of fuel, storage records and zone of cavity development.
 Aggregation: Company, type of storage, state.
 Statute: KSA 65-164, 65-165, 65-171d
 Agency: Department of Health and Environment
- 9) Coal Reserves: Coal reserves estimated by quantity per acre foot, quality by BTU's, type and generalized location.
 Aggregation: Formation, county, state.
 Statute: KSA 76-322 et. seq.
 Agency: Kansas Geological Survey
- 10) Coal Mining Permits: Coal mining permits including applications of specific companies, maps of proposed sites and bonds. Also have revegetation plan files and annual reports of mining operators.
 Aggregation: Individual company, specific mining site.
 Statute: KSA 40-401 et. seq.
 Agency: Mined Land Conservation and Reclamation Board

- 11) Electrical Plants and Transmission Lines: State map showing generalized location of electric power plants and major electric transmission lines.

Aggregation: Generalized location.

Statute: KSA 66-101 et. seq.

Agency: Utilities Division, Corporation Commission

IV. Geology

Policies:

To make, as far as possible, a complete geological survey of the State of Kansas, giving special attention to any and all natural products of economic importance, in order to determine the character, location and amount of such products and to prepare reports on the same.

Statute Reference: KSA 76-322

Implementing Agency: Kansas Geological Survey

To encourage and conduct investigations, research experiments and demonstrations, and to collect and disseminate information relating to mining and reclamation of lands and waters affected by surface types of mining.

Statute Reference: KSA 49-405

Implementing Agency: Mined Land Conservation and Reclamation Board

Problems:

- 1) Loss of rare or significant geomorphic features. (II, p-59)
- 2) Moderate earthquake risk zone in Flint Hills - north-south belt with a width between Topeka and Wichita. (II, 2-2 & II, p-81)
- 3) Tornado prone areas highest in central and north central portions of the state. (I, 2-20)
- 4) Unstable slopes cause land slides and cracks in foundations, damage roads and sidewalks, and cause retaining walls to fail. (II, p-82)
- 5) Subsidence areas and collapse of abandoned mines that become flooded. (II, p-81)
- 6) Settlement of strip mined areas have, in some cases, caused damage to building foundations. (II, p-87)
- 7) Quality limestone areas are being lost to urban expansion. (II, p-111)

Data Elements:

- 1) Geological Resources Data: Geologic formations, mineral resources, and water supply structure data applicable to urban corridor planning. ARES maps available.

Aggregation: Topeka-Kansas City Corridor.

Statute: KSA 76-322 et. seq.

Agency: Kansas Geological Survey

- 2) Surface Geology: Surface geology on Kansas lands: rock or land formation characteristics, and fault locations.

Aggregation: County.

Statute: KSA 76-322 et. seq.

Agency: Kansas Geological Survey

- 3) Subsurface Geological Formations: Maps showing composition, thickness and structural attitude of subsurface geologic formations. ARES maps available.

Aggregation: Specific locations.

Statute: KSA 76-322 et. seq.

Agency: Kansas Geological Survey

- 4) Seismic Activity: Seismic activity in Humboldt Fault Zone in Kansas.

Aggregation: Specific location.

Statute: KSA 76-322 et. seq.

Agency: Kansas Geological Survey

- 5) Limestone Deposits: Chemical composition of limestone deposits.

Aggregation: Individual location.

Statute: KSA 76-322 et. seq.

Agency: Kansas Geological Survey

- 6) Clay Deposits: Clay deposits: quantity, ceramic properties, chemical composition, color, firing, temperature, hardness, glazing and oxidation levels.

Aggregation: Individual location.

Statute: KSA 76-322 et. seq.

Agency: Kansas Geological Survey

V. Air Quality and Noise Pollution

Policies:

To achieve and maintain levels of air quality which will protect human health and safety, and prevent injury to plant and animal life and property.

Statute Reference: KSA 65-3001, 65-3006, 65-3005

Implementing Agency: Department of Health, Division of Environmental Health

Problems:

- 1) High levels of particulate matter in air throughout Kansas. A result of wind erosion. (I, 5-19)
- 2) Sulfurdioxide levels will be high in Kansas City by 2000. (I, 5-19)
- 3) Carbon-monoxide levels will be high in Wichita due to proposed highway construction. (II, p-93)
- 4) Need for controls of noise pollution around most airports and transportation corridors. (II, p-98)

Data Elements:

- 1) Air Pollution Data: Air pollution data from 60 statewide sampling units pertaining to particulates (dusk, smoke, etc.), sulfur dioxide, nitrogen dioxide, carbon monoxide and photo-chemical oxidants.
 Aggregation: Large urban areas and 42 cities chosen by Health and Environment
 Statute: 42 USC 1857 et. seq., KSA 65-3001 et. seq., and 40 CFR 51
 Agency: Department of Health and Environment
- 2) Particulate Pollution Sources: Estimates of particulate levels emitted by selected pollution sources: grain elevators, manufacturing firms and processing industries.
 Aggregation: Specific location
 Statute: 42 USC 1857 et. seq., KSA 65-3001 et. seq., 40 CFR 51
 Agency: Department of Health and Environment
- 3) Air Pollution Emissions Estimates: Estimates of air pollution emissions from "area sources" such as small industrial, commercial, residential fuel use, transportation, refuse disposal and wind erosion.
 Aggregation: By county.
 Statute: 42 USC 1857 et. seq., KSA 65-3001 et. seq., 40 CFR 51
 Agency: Department of Health and Environment
- 4) Noise Levels on Projected Highways: Noise levels in communities and rural areas through which proposed highway projects will run.
 Aggregation: Specific location.
 Statute: 23 USC 109 (1) h
 Agency: KDOT

VI. Water Use and Conservation

Policies:

To establish the priorities for water use and water appropriation.

Statute Reference: KSA 82a-707

Implementing Agency: Water Resources Board

To develop a well balanced, coordinated and comprehensive state water resources policy and plan for the direction of public and private water activities.

Statute Reference: KSA 82a-901

Implementing Agency: Water Resources Board

To assist in the formulation of a state water plan by the Water Resources Board.

Statute Reference: KSA 82a-903

Implementing Agency: Kansas Geological Survey

To provide state assistance for development of water conservation storage and flood control projects, and encourage, promote and secure maximum beneficial use of water resources.

Statute Reference: KSA 82a-901, 82a-903, 82a-904

Implementing Agency: Water Resources Board

To establish watershed districts with the power to construct, operate and maintain works of improvements for the conservation, development, utilization and disposal of water.

Statute Reference: KSA 24-1201(A)

Implementing Agency: Water Resources Board

To allow county commissions to establish or participate in weather modification programs and to pay the cost of such programs from the county general fund, from taxes levied for the purpose and from any other available funds.

Statute Reference: KSA 12-2904

Implementing Agency: County Commissions

Problems:

- 1) Surface water supply will not be a major problem for cities and industry until 2020. (I, 4-48)
- 2) A major problem is the distribution of water and the competing uses of water. (I, 4-48)
- 3) Reduction of surface flows from the depletion of groundwater. (II, p-113)
- 4) Large fluctuations of precipitation and insufficient rainfall. (I, 2-24)

Data Elements:

- 1) Surface and Groundwater Use: Surface and groundwater use in acre feet for: irrigation, livestock, mining, thermal-electric power, manufacturing, urban and rural domestic, commercial and reservoir and stock pond evaporation.
 Aggregation: State, river basin, sub-basin.
 Statute: KSA 74-2608
 Agency: Water Resources Board
- 2) Public Water Supplies: An inventory of public water supplies by location, source (well, river, etc.), storage capacity, type of treatment and water quality.
 Aggregation: Individual public water supply, also by state.
 Statute: KSA 65-156, 65-157
 Agency: Department of Health and Environment
- 3) Completed Dams (before 9/1/74): Inventory of dams completed prior to September 1, 1974 that are over 25 feet high or 50 acre-feet in capacity, earth-fill volume and owner information (when available).
 Aggregation: Site
 Statute: PL 92-367
 Agency: Board of Agriculture, Division of Water Resources

- 4) Water Related Data Sources: Inventory of water related data sources prior to 1968: state and federal publications, research reports and correlative data relating to the use, treatment or conditions of water resources.
Aggregation: NA
Statute: KSA 74-2605 et. seq.
Agency: Water Resources Board
- 5) Stream and River Data: Stream and river elevation levels, sediment concentration by date, location, percentage and type of sediment and flood peaks.
Aggregation: Selected locations
Statute: KSA 76-322 et. seq.
Agency: Kansas Geological Survey
- 6) Neosho River Data: Neosho river water chemistry, plankton quantity and species, stream-flow and temperature change data prior to Wolf Creek Nuclear Power Plant.
Aggregation: River at location of proposed plant.
Statute: KSA 32-215
Agency: Forestry, Fish and Game Commission
- 7) Arkansas and Missouri River Basins: Comprehensive water and related land resource data in graphic form: maps, charts, tables and graphs.
Aggregation: Basin and sub-basin and some data by county.
Statute: KSA 82-901 et. seq., PL 83-566
Agency: State Conservation Commission
- 8) Ponds: Map showing number of ponds by county.
Aggregation: State
Statute: KSA 74-4528 to 4530
Agency: Park and Resources Authority
- 9) Watershed District Acreage: Watershed district acreage by kind and extent of conservation problems.
Aggregation: Watershed district
Statute: 49 Statute 163
Agency: State Conservation Commission
- 10) Watershed District Formation: Depository of applications for watershed district formation. Each application contains approximate location of project, surveyed location (exact), analysis of district needs and proposals "General Plan Report," and detailed construction blueprint plans of all proposed projects.
Aggregation: County.
Statute: KSA 24-1201 et. seq.
Agency: Board of Agriculture, Division of Water Resources
- 11) Water Rights: Extent and priority of surface water rights upstream and downstream from federal reservoirs as determined by Water Resources Board.
Aggregation: Specific location.
Statute: KSA 82a-1301 et. seq.
Agency: Board of Agriculture, Division of Water Resources

- 12) Water Rights Diversion Records: Records of water rights legal descriptions of water wells and streambank pumping installations: location, land irrigated, annual water use, and maximum authorized rate of diversion.

Aggregation: Specific location.

Statute: KSA 82a-701-25

Agency: Board of Agriculture, Division of Water Resources

- 13) Rainfall Concentrations: Rainfall concentrations and extent in 14 western counties.

Aggregation: County, area totals.

Statute: KSA 74-2608

Agency: Water Resources Board

VII. Flood Control

Policies:

To provide for the construction of levees on, along or near any stream which is subject to floods, freshets, or overflows.

Statute Reference: KSA 24-126

Implementing Agency: Board of Agriculture

To provide authorization to cities for the construction, within or without city limits, of drains, channel changes, levees, and embankments, and other improvements to protect the city and public and private property from floods and damages by overflow of natural and artificial watercourses.

Statute Reference: KSA 12-635

Implementing Agency: City Commissions

To provide cities with a mechanism for paying for improvements and damages sustained in regard to the overflow of natural watercourses.

Statute Reference: KSA 12-644

Implementing Agency: City Commissions

To authorize cities to construct and maintain dams across streams or rivers and to pay the cost by issuance of bonds.

Statute Reference: KSA 12-1616a to 12-1616c

Implementing Agency: City Governments

To provide authorization to any county or city for the establishment of floodplain zones and restriction of the use of land adjacent to watercourses.

Statute Reference: KSA 12-734; 12-735

Implementing Agency: City and County Governments

To provide for the organization and incorporation of drainage districts with territory in two (2) or more counties.

Statute Reference: KSA 24-657

Implementing Agency: Board of Agriculture

To provide county commissions with power to create drainage districts which will oversee flood control problems in the county.

Statute Reference: KSA 24-401

Implementing Agency: County Commissions

To provide authorization to counties to clean and maintain the banks and channels of the streams and watercourses within definitely established bank lines.

Statute Reference: KSA 82a-307

Implementing Agency: Board of Agriculture

Problems:

- 1) Increased flood potential in eastern Kansas due to greater rainfall. (I, 2-10)
- 2) Lack of flood protection projects on stream tributaries. (I,2-20)
- 3) Encroachment of urban uses into floodplains. (I, 2-20)

Data Elements:

- 1) Flood Insurance Report Maps: Maps showing 100 and 500 year floodplains and 100 year floodway. Highwater profiles for 10, 50, 100, and 500 year floods.

Aggregation: City and county.

Statute: Order of Governor

Agency: Board of Agriculture, Division of Water Resources

- 2) Flood Hazard Boundary Maps: Maps showing estimated 100 year flood inundation limits.

Aggregation: City and county.

Statute: Order of Governor

Agency: Board of Agriculture, Division of Water Resources

- 3) Flood Damage Reports: Flood damage reports by rainfall amounts, flood extent and severity, high-water marks and brief descriptive narrative on each storm and flood.

Aggregation: By storm location.

Statute: 49 Statute 163, PL 93-566

Agency: State Conservation Commission

- 4) Flood Hazards and Damage: Survey of flood hazards, flood damage and possible control measures in a limited watershed area of Butler and Cowley counties.

Aggregation: Two counties and sub-watersheds.

Statute: PL 93-566

Agency: State Conservation Commission

- 5) River Channel Bank Lines: Official "bank lines" along river channels in limited counties.

Aggregation: County.

Statute: KSA 82a-307-11

Agency: Board of Agriculture, Division of Water Resources

VIII. Groundwater

Policies:

To provide for the exploration and protection of groundwater, to protect groundwater resources from wastes and potential pollution and to provide data on potential water supplies.

Statute Reference: KSA 82a-1202

Implementing Agency: Department of Health & Environment

To recognize the need for creation of groundwater management districts for the proper management and conservation of groundwater resources. States "It is the policy of this act to preserve basic water use doctrine and to establish the right of local water users to determine their destiny with respect to the use of groundwater insofar as it does not conflict with basic laws and policies of the State of Kansas."

Statute Reference: KSA 82a-1020

Implementing Agency: Board of Agriculture

To regulate and enforce the plugging of oil or gas wells so as to prevent fresh groundwater pollution (wells drilled by rotary and cable tools).

Statute Reference: KSA 55-136, 55-127, 55-139

Implementing Agency: State Corporation Commission

To provide for the withdrawal and transportation of Kansas groundwater to adjoining states as long as those states enact reciprocal rights to Kansas.

Statute Reference: KSA 82a-1201 et. seq.

Implementing Agency: Adjoining states

To promote the conservation of groundwater by requiring a permit prior to the appropriation of groundwater.

Statute Reference: S.B. 4 1977 Legislative Session

Implementing Agency: Board of Agriculture, Division of Water Resources

Problems:

- 1) The mining and rapid depletion of groundwater in Western Kansas. (I, 2-25 & 4-9)
- 2) Increase in irrigation acreage. (III, p-10)
- 3) General poor quality of groundwater in the State with the exception of the areas along alluvial valleys and in the Ogallala and Equus aquifers. (I, 4-21)
- 4) Nitrates from surface pollution reaching shallow groundwater storage reservoirs. (I, 4-39)

Data Elements:

- 1) Groundwater Levels: Groundwater levels in aquifers.

Aggregation: Individual aquifer.

Statute: KSA 76-322 et. seq.

Agency: Kansas Geological Survey

- 2) Groundwater Quantity: Estimates of the quantity of groundwater available by area. ARES maps available for groundwater district No. 1 only.
 Aggregation: Area, groundwater district.
 Statute: KSA 76-322 et. seq.
 Agency: Kansas Geological Survey
- 3) Groundwater Levels: Groundwater levels at selected irrigation and observation wells throughout the state with emphasis on western counties.
 Aggregation: Site.
 Statute: KSA 24-1201 et. seq.
 Agency: Board of Agriculture, Division of Water Resources
- 4) Groundwater Levels from Wells: Groundwater levels from 200 selected wells in the lower Arkansas River Basin in McPherson, Harvey, and Sedgwick Counties.
 Aggregation: Specific location.
 Statute: KSA 74-2608
 Agency: Water Resources Board
- 5) Water Quality of Groundwater Aquifers: Water quality in groundwater aquifers by chemical analysis only. Testing minerals, toxic materials, bacterial groups, nutrients, and organic and inorganic pollutants.
 Aggregation: Individual aquifer.
 Statute: KSA 65-164; 65-165; 65-170; PL 92-500, 40 CFR 35 (A)
 Agency: Department of Health and Environment
- 6) Groundwater Quality: Groundwater quality: chemical composition and pollutants.
 Aggregation: Selected counties in Western Kansas.
 Statute: KSA 76-322 et. seq.
 Agency: Kansas Geological Survey
- 7) Well Water Quality: Water quality in domestic, industrial and irrigation wells by chemical analysis of samples collected as part of agency investigations.
 Aggregation: Specified location.
 Statute: KSA 65-171d, PL 92-500
 Agency: Department of Health and Environment

IX. Water Pollution and Quality

Policies:

To issue revenue bonds and make grants from the proceeds to local governments for the construction or expansion of water pollution control facilities.

Statute Reference: KSA 12-3710; 12-3711; 12-3718; 12-3720
 Implementing Agency: Department of Health and Environment

To regulate and control sewage discharge in state waters.

Statute Reference: KSA 65-164 through 65-171

Implementing Agency: Department of Health & Environment

To assist in the construction of public facilities to abate and prevent the pollution of water.

Statute Reference: KSA 65-3301

Implementing Agency: Department of Health & Environment

To regulate and control, by reference to federal water quality and affluent standards of 1972, the discharge of sewage into state waters.

Statute Reference: KSA 65-165; 65-171d (amended)

Implementing Agency: Department of Health & Environment

To regulate and control discharge of marine sewage and provide adequate on-shore sewage treatment and disposal.

Statute Reference: KSA 82a-826

Implementing Agency: Department of Health & Environment

To prevent water pollution caused by gas and oil drilling and abandoned wells.

Statute Reference: KSA 55-136; 55-137; 55-139

Implementing Agency: Department of Health & Environment

To regulate and review the disposal of oil-field or gas-field brines and mineralized waters.

Statute Reference: KSA 55-1003

Implementing Agency: State Corporation Commission

To protect all usable water with respect to casing of wells and disposal of oil-field brines.

Statute Reference: KSA 55-128

Implementing Agency: State Corporation Commission

Problems:

- 1) Land runoff is the greatest source of water pollution. (II, 11-84)
- 2) Poor natural quality of some Kansas surface waters due to the leaching of minerals from rocks. Naturally occurring high mineral content and concentration. (I, 4-21 & 4-27)
- 3) Pesticides, insecticides, and herbicides used in agriculture run off the land into the streams. (I, 4-39)
- 4) Agricultural wastes which affect streams include chemicals, animal wastes, irrigation tails, and silt. (I, 4-47)
- 5) Large concentration of dissolved solids and high fecal coliform count in Kansas streams. Need for sediment controls. (I, 11-84)
- 6) Cities and industries contribute to stream degradation by increasing temperatures, discharging organics and heavy metals, and increasing turbidity and acidity. (I, 4-47)

- 7) Wastes from mining activities include salt brine disposals from oil operations and increased acidity from mineral extraction. (I, 2-27)
- 8) Inorganic wastes that are the most serious include brines, sulfates, nitrates, iron and manganese all from human activities. (I, 4-47)
- 9) Salt contamination of ground and surface waters occurring from both natural and man related sources. (II, p-112)
- 10) Solid waste disposal in floodplains and areas with low water table. (I, 2-27)
- 11) Problems defining surface water quality standards and projecting into the future. (I,ii-88)

Data Elements:

- 1) Chemical Quality of Water: Chemical and resistivity measurements of ground and surface waters.
 Aggregation: Point source.
 Statute: KSA 76-322 et. seq.
 Agency: Kansas Geological Survey
- 2) Water Quality of Lakes and Reservoirs: Water quality of lakes and reservoirs.
 Aggregation: Individual water body.
 Statute: KSA 65-164, 65-165, 65-170, PL 92-500, 40 CFR 35 (A)
 Agency: Department of Health and Environment
- 3) Water Quality in Rivers: Water quality in mainstream rivers and major tributaries.
 Aggregation: Individual stream.
 Statute: KSA 65-164, 65-165, 65-170, PL 92-500, 40 CFR 35 (A)
 Agency: Department of Health and Environment
- 4) Sedimentation Surveys: Sediment yields in small watershed areas based on reservoir sedimentation surveys. Also effect of sediment distribution and benefits of conservation treatment.
 Aggregation: State
 Statute: PL 83-566
 Agency: State Conservation Commission
- 5) Wastewater Treatment Facilities: Inventory of wastewater treatment facilities by location, type of treatment, size of plant, type of plant, construction status and permit fees paid.
 Aggregation: Individual facility
 Statute: KSA 65-170g, 65-164, 65-165, 65-166a
 Agency: Department of Health and Environment
- 6) Industrial Waste Facilities: Inventory of industrial waste treatment facilities at selected locations by type and quantity of waste, method of disposal of solid waste and liquid waste.
 Aggregation: By firm.
 Statute: KSA 65-3406
 Agency: Department of Health and Environment

- 7) Surface Pond Brine and Treatment Facilities: Inventory of surface pond facilities used for disposal and treatment of oil field brine by location, surface and shallow sub-surface geology of immediate area, and chloride concentrations.

Aggregation: Location.

Statute: KSA 65-171d

Agency: Department of Health and Environment

- 8) Wastewater Disposal Wells: Inventory of industrial waste disposal wells by chemical analysis of injected fluid, formation fluid levels, volume of fluid injected, well performance and any associated collection system.

Aggregation: Specific location.

Statute: KSA 55-1003, PL 92-500

Agency: Department of Health and Environment

- 9) Feedlot Waste Disposal: Feedlots by name, location, waste treatment, watercourse receiving surface drainage, acres owned or leased for disposal of wastes, liquid waste application equipment, sketch of facilities including nonagricultural improvements within a mile of the operation.

Aggregation: Individual location.

Statute: KSA 47-1505, 47-1511

Agency: Department of Health and Environment

- 10) Oil Field Injection Wells: Inventory of oil field injection wells: location, casing and well construction, operating wellhead injection pressure, surface-pipe and possible reconstruction.

Aggregation: Location.

Statute: KSA 55-1003, 55-1006

Agency: Department of Health and Environment

X. Land Use Considerations

Policies:

To regulate and control development of areas surrounding certain impoundments of water (reservoirs) to prevent pollution and assure sound and economic development and maintenance of sanitary conditions.

Statute Reference: KSA 65-184

Implementing Agency: Department of Health & Environment

To regulate outdoor advertising billboards, signs and devices in areas adjacent to interstate highways and primary highways.

Statute Reference: KSA 68-2231

Implementing Agency: KDOT

To regulate and restrict the operation and maintenance of junkyards in areas adjacent to highways, roads, and streets within the State.

Statute Reference: KSA 68-2202

Implementing Agency: KDOT

To enable cities in Kansas to acquire a site or sites for refuse or solid waste disposal.

Statute Reference: KSA 12-2123

Implementing Agency: Cities

To allow county commissions to acquire or lease land to be used for refuse disposal to maintain sanitary conditions within the county.

Statute Reference: KSA 19-2658

Implementing Agency: County Commissions

To establish and maintain a cooperative state and local program of planning, technical and financial assistance for comprehensive solid waste management and regulate the operation of solid waste processing and disposal systems within the State.

Statute Reference: KSA 65-3401

Implementing Agency: Department of Health and Environment

Data Elements:

- 1) Land Use Maps: Base maps with overlays for land use/land cover, counties, census county subdivision, drainage basins and federal lands. Land use/land cover statistical data available by county and drainage basin (Scale, all maps - 1:250,000; land use/land cover also available at 1:126,720).

Aggregation: City, county, region and watershed.

Statute: KSA 74-5005

Agency: KDED

- 2) Land and Structure Acquisitions: Inventory of land and structures acquired by state for highway construction classified by type of land and structure, method of acquisition, type of acquisition, extent of acquisition, and money spent in acquisition.

Aggregation: Specific location.

Statute: KSA 75-5001 et. seq.

Agency: KDOT

- 3) Junkyards by Public Roads: Inventory of junkyards within 1,000 feet of a public road by ownership record, length of existence and location.

Aggregation: Specific location, state.

Statute: KSA 68-2201 et. seq., 23 USC 136

Agency: KDOT

- 4) Outdoor Commercial Billboards: Inventory of commercial outdoor advertising billboards along Interstate and Federal Aid primary highways by location, status, ownership and date of erection.

Aggregation: Specific location, state.

Statute: KSA 68-2231 et. seq.

Agency: KDOT

- 5) Solid Waste Management: Inventory of municipal and county solid waste management programs and facilities compiled by storage, collection, disposal practices and sources of waste.

Aggregation: Location city, county, state.

Statute: KSA 65-3406

Agency: Department of Health and Environment

- 6) Solid Waste Disposal Sites: Geologic evaluation of selected solid waste disposal sites: location, bedrock formations, formation descriptions from test holes, groundwater table depths and sediment grain size analysis.

Aggregation: Specific location.

Statute: KSA 65-3407

Agency: Department of Health and Environment

- 7) Licensed Feedlots - Selected Characteristics: Licensed feed lot location, manure disposal, fly and rodent control, name of available veterinarian, maximum number on feed during previous year (by species), lot drainage and apron construction.

Aggregation: Individual lot.

Statute: KSA 47-1500 as amended

Agency: Board of Agriculture, Division of Statistics

XI Wildlife Preservation

Policies:

To administrate the operation of the state biological survey which shall publish findings regarding the preservation or use of native animals and plant resources.

State Reference: KSA 76-338

Implementing Agency: Board of Regents

To protect and conserve resident non-game, threatened or endangered species of fish and wildlife in Kansas. Rules and regulations along with such measures as are necessary to conserve the species of fish and wildlife designated as threatened or endangered shall be adopted by the State.

Statute Reference: KSA 32-501 et. seq.

Implementing Agency: Forestry, Fish and Game Commission

To protect migratory waterfowl in Kansas.

Statute Reference: KSA 32-156a

Implementing Agency: Forestry, Fish and Game Commission

To protect the introduction of foreign wildlife species into Kansas except for experimental, scientific or display purposes.

Statute Reference: KSA 32-152

Implementing Agency: Forestry, Fish and Game Commission

To provide for the restoration of wildlife habitats disturbed by construction, improvements, or other operations of watershed districts.

Statute Reference: KSA 24-1209

Implementing Agency: Watershed Districts

To protect the public from adverse health and welfare aspects of pesticides, rodents, and insects of health significance.

Statute Reference: KSA 2-2438

Implementing Agency: Board of Agriculture

Problems:

- 1) More land is needed for wildlife management. (I, 6-2)
- 2) The need to develop wildlife management programs on private property. (I, 6-8)
- 3) Loss of diverse and quality terrestrial wildlife habitat particularly in the sand prairies, floodplains and marshlands and upland, oak-hickory forests. (II, p-10)
- 4) Agricultural competition with wildlife habitats and the destruction of diverse wildlife habitats. (II, p-11)
- 5) Decrease in upland game mammals from the demand for agricultural land. (I, 6-8 to 22)
- 6) Need to increase the deer populations up to 45,000 and maintain at that level. (I, 6-11 to 14)
- 7) Intensive irrigation and intensive agriculture in the sandsage prairie chicken habitat as well as a number of other wildlife species. (I, 6-30)
- 8) Reduction of floodplain vegetation results in a loss of a variety of game and non-game species. (II, p-13)
- 9) Destruction of prairie dog villages cause a reduction of the black footed ferret, the burrowing owl and other birds. (II, p-21)
- 10) General loss of endangered, threatened and species of an undetermined status. (II, p-24 to 28)
- 11) An increase in the wetland furbearers can result in large losses of beaver, muskrat and mink. The beaver population is especially sensitive to increased hunting and may be eliminated by hunting. (I, 6-26)
- 12) Reservoir development and stream channelization results in the depletion of the mink habitats and the drainage of marshlands seriously decreased the muskrat habitat. (I, 6-26)
- 13) Reduction of habitat of migratory birds. The drainage of potholes and other wetland areas will cause significant reductions in the duck populations. (I, 6-42 & II, p-34)
- 14) Sediment and pollution in rivers and streams reduces the aquatic wildlife. (I, 6-53)

Data Elements:

- 1) Native Plants and Animals: Inventory of native plants and animals: distribution, abundance, status (endangered, extinct, etc.), reproduction capabilities.

Aggregation: County.

Statute: KSA 76-388

Agency: Kansas Biological Survey

- 2) Windshield Survey of Animals: Windshield survey of quail, pheasant, prairie chicken, rabbit, squirrel, and coyote taken by rural mail carriers four times a year.

Aggregation: County, Kansas Forestry, Fish and Game Regions.

Statute: KSA 32-215

Agency: Forestry, Fish and Game Commission

- 3) Destroyed Wildlife Habitat: Aerial photo analysis of wooded draws and hedgerows destroyed in a representative four-county area between 1962 and 1974.

Aggregation: Marshall, Nemaha, Labette, Woodson counties.

Statute: KSA 32-215

Agency: Forestry, Fish and Game Commission

- 4) Trends of Game and Waterfowl: Small game and waterfowl harvest trends: kill-survey of each species such as the quail, rabbit, duck or squirrel.

Aggregation: County and state.

Statute: KSA 32-215

Agency: Forestry, Fish and Game Commission

- 5) Deer Population: Survey of deer population: non-hunting kills from road accidents, poaching. Hunter harvest report: kill location, sex and age, condition, sex and age survey and pre and post season count.

Aggregation: County, Forestry, Fish and Game regions, deer management regions.

Statute: KSA 32-215; 74-3308

Agency: Forestry, Fish and Game Commission

- 6) Antelope Population: Survey of antelope population pre and post season counts and harvest reports: kill location, sex and age, and condition.

Aggregation: Management units and county management units.

Statute: KSA 32-215, 74-3308

Agency: Forestry, Fish and Game Commission

- 7) Wild Turkey Population: Survey of wild turkey population: harvest report samples, kill locations, sex, conditions and brood counts during summer breeding season, and winter flock counts including sex ratio.

Aggregation: County, Kansas Forestry, Fish and Game units, and its turkey management units.

Statute: KSA 32-215, 74-3308

Agency: Forestry, Fish and Game Commission

- 8) Small Mammal Maps: Distribution and density maps of small mammals in Kansas such as the racoon, bobcat and skunk.

Aggregation: State

Statute: KSA 32-215, 74-3308

Agency: Forestry, Fish and Game Commission

- 9) **Prairie Chickens Habitat:** Location of habitat favorable to greater prairie chickens in Chase County including grass compositions and weather conditions.
 Aggregation: Limited area of Chase County only.
 Statute: KSA 32-215
 Agency: Forestry, Fish and Game Commission
- 10) **Black-footed Ferret:** Documentation of the black-footed ferret: reported sighting, locations, witness name and possible habitat locations such as prairie-dog towns.
 Aggregation: Western half of Kansas by location.
 Statute: KSA 32-215, PL 93-205, HB 2007
 Agency: Forestry, Fish and Game Commission
- 11) **Beaver Habitats:** Beaver population indicators on major rivers or "float routes," by number of lodges, dams and cutting areas in cleared forest by river.
 Aggregation: Major rivers
 Statute: KSA 32-215
 Agency: Forestry, Fish and Game Commission
- 12) **Waterfowl Inventory:** Bi-weekly inventory of the number and species of waterfowl on all reservoirs, game management areas and federal preserves.
 Aggregation: Reservoir, management areas, preserve, state.
 Statute: KSA 32-215
 Agency: Forestry, Fish and Game Commission
- 13) **Wood Duck Population:** Survey of wood duck population by breeding and population index, banding information by kill location, condition and banding location.
 Aggregation: Selected rivers and selected areas.
 Statute: KSA 32-215
 Agency: Forestry, Fish and Game Commission
- 14) **River Habitat:** Quality of riverine habitat and fish species distribution on rivers. Criteria is width, depth, volume, temperature, nutrient levels for riverine habitat, percentage of fish per species, and pounds of fish per species per acre. Bank incline, river bottom material, tree canopy quality, river flow, insect quantity, larvae, crayfish and mussels are also measured.
 Aggregation: River, County, State
 Statute: KSA 32-215
 Agency: Forestry, Fish and Game Commission
- 15) **Fish Farmers:** Inventory of fish farmers including name, address, acres of water, species and size of fish, number of years in business and processing used by fish farmers.
 Aggregation: Location and state
 Statute: 49 Statute 163
 Agency: State Conservation Commission

- 16) Stock Pond Fish: Quantity and pounds per acre by species and category of fish in farm and ranch ponds.
Aggregation: Selected locations.
Statute: KSA 32-215
Agency: Forestry, Fish and Game Commission
- 17) Fish Kill Causes: Number, extent and causes of fish kills.
Aggregation: Location, state
Statute: KSA 32-215
Agency: Forestry, Fish and Game Commission
- 18) Fish Species on Government Waters: Age, rate of growth, variety and abundance of fish species at federal reservoirs, state fishing lakes and other public lakes.
Aggregation: Individual water body, state
Statute: KSA 32-15
Agency: Forestry, Fish and Game Commission
- 19) Fishing at Federal Reservoirs: Fishermen use of and fish harvested from federal reservoirs and state fishing lakes.
Aggregation: Reservoir, lake, and state
Statute: KSA 32-215
Agency: Forestry, Fish and Game Commission
- 20) Sportfish Growth Patterns: Sportfish growth patterns and percentage distribution by species relative to water nutrient availability in small lakes.
Aggregation: Selected lakes.
Statute: KSA 32-215
Agency: Forestry, Fish and Game Commission
- 21) Striped Bass in Reservoirs: Striped bass in reservoirs by number, growth rate, diet, percentage distribution of all species, prime rearing conditions, water temperature, water chemistry, and food sources.
Aggregation: Selected reservoirs
Statute: KSA 32-215
Agency: Forestry, Fish and Game Commission
- 22) Black Bass in State Lakes: Black bass in state fishing lakes by number, growth rate, diet, and percentage distribution of all other species.
Aggregation: Selected state fishing lakes
Statute: KSA 32-215
Agency: Forestry, Fish and Game Commission
- 23) Paddlefish: Paddlefish in stream systems: number, growth rate, diet, percentage distribution of all other species.
Aggregation: Selected stream systems.
Statute: KSA 32-215
Agency: Forestry, Fish and Game Commission

- 24) Caged Channel Catfish: Growth and survival rates of caged channel catfish reared in acid strip mine lakes relative to varied diets.

Aggregation: Selected strip mine lakes

Statute: KSA 32-215

Agency: Forestry, Fish and Game Commission

- 25) Northern Pike and Sunfish: Percentage distribution by number and weight of northern pike and sunfishes in selected impoundments.

Aggregation: Selected lakes and reservoirs

Statute: KSA 32-215

Agency: Forestry, Fish and Game Commission

- 26) Channel Catfish Diet: Growth, survival rates and behaviour of various channel catfish strains relative to varying population density and diet.

Aggregation: Selected testing ponds.

Statute: KSA 32-215

Agency: Forestry, Fish and Game

- 27) "Rough" Fish: Number and pounds per acre of "rough" fish (carp, buffalo, drum, etc.) available for commercial harvesting and the effects on sport fish population.

Aggregation: Selected reservoirs

Statute: KSA 32-215

Agency: Forestry, Fish and Game Commission

XII Recreation

Policies:

To develop a state plan to include location, character, and extent of state parks and recreational areas, lakes, streams, impounded water, together with methods for better usage of lands, structures, facilities, buildings and other public works within the scope of the plan.

Statute Reference: KSA 74-4507

Implementing Agency: Park and Resources Authority

To develop a comprehensive Outdoor Recreation Plan for Kansas.

Statute Reference: KSA 74-4529

Implementing Agency: Park and Resources Authority

To apply for assistance as may be available to the State under the Land and Water Act, to develop, operate, and maintain outdoor recreation areas and facilities, to enter into contracts with federal and local governmental units; to maintain financial records; and to coordinate the activities and interests of all state and local subdivisions in the planning, development, and maintenance of outdoor recreation resources and facilities.

Statute Reference: KSA 74-4534

Implementing Agency: Park and Resources Authority

To select a site for and lease or acquire, construct, equip and operate a vacation-resort adjacent to an existing or proposed federal reservoir.

Statute Reference: KSA 74-4538

Implementing Agency: Park and Resources Authority

To make recommendations to the legislature on location of state parks; determine location, design, etc., of park facilities and improvements on lands under the Authority's jurisdiction; issue revenue bonds; acquire, hold and dispose of land as authorized by legislature; hold and dispose of personal property; enter into contracts.

Statute Reference: KSA 74-4509

Implementing Agency: Park and Resources Authority

To acquire lands as authorized by the legislature by means of purchase, lease, condemnation, donation, bequests, or gifts; accept federal grants for park development; have exclusive administrative control and police supervision over lands, parks, and park facilities under its jurisdiction.

Statute Reference: KSA 74-4510

Implementing Agency: Park and Resources Authority

To establish a procedure by which counties may create and maintain public parks, museums and recreation grounds and contract for community service and social programs, including programs for the aging.

Statute Reference: KSA 19-2801

Implementing Agency: County Governments

Problems:

- 1) Insufficient amount of recreation space in Kansas. (I, 8-8)
- 2) Destruction of archeological sites by urban expansion, water projects, modern land conservation practices and modern land use activities. (I, 15-8)
- 3) Destruction of archeological sites by reservoirs. (I, 15-6)
- 4) Flood inundation and erosion of archeological sites. (II, p-51)
- 5) Key historic preservation programs are storage space for displays, land use practices, taxing policies, state and federal law and state funding. (I, 15-4)

Data Elements:

- 1) Outdoor Recreation Areas: Inventory of outdoor recreation areas administred by cities, county, location, land acres, water acres, and developed acres.

Aggregation: County, Kansas Park & Resources Authority Regions

Statute: KSA 74-4528 to 74-4530

Agency: Park and Resources Authority

- 2) Outdoor Recreation Acreage: Outdoor recreation acreages by administration: jurisdiction, land, water and developed areas.
 Aggregation: Regions of Park and Resources
 Statute: KSA 74-4528 to 74-4530
 Agency: Park and Resources Authority
- 3) Outdoor Recreation Projects: Estimated acquisition and development costs of outdoor recreation projects: county, city and school district.
 Aggregation: City, County, Kansas Park and Resources Authority Regions
 Statute: KSA 74-4528 to 74-4530
 Agency: Park and Resources Authority
- 4) State Park Site Plans: State park site plan showing location of improvements and landscape data.
 Aggregation: By park
 Statute: KSA 74-4500 et. seq.
 Agency: Park and Resources Authority
- 5) Recreation Areas and Sites: State map of Kansas Park and Resources Authority recreation areas, fishing and game management areas, safety rest areas and state institution recreation areas.
 Aggregation: General location
 Statute: KSA 74-4528-30
 Agency: Park and Resources Authority
- 6) State Outdoor Recreation Areas: Inventory of outdoor recreation areas administered by state agencies by name, county location, land, water and developed acres.
 Aggregation: County, Kansas Park and Resources Authority Regions.
 Statute: KSA 74-4528 to 74-4530
 Agency: Park and Resources Authority
- 7) Federal Outdoor-Recreation Areas: Inventory of outdoor recreation areas administered by federal agencies: name, county, location, land acres, water acres and developed acres.
 Aggregation: Park and Resources regions
 Statute: KSA 74-4528 to 74-4530
 Agency: Park and Resources Authority
- 8) County Outdoor-Recreation Areas: Inventory of outdoor recreation areas administered by counties by name of area, location by county, land, water and developed acres.
 Aggregation: County, Kansas Park and Resources Authority regions.
 Statute: KSA 74-4528 to 74-4530
 Agency: Park and Resources Authority
- 9) Single Activity Recreation Area: Inventory of historical sites and special recreation areas designed for a single activity such as a golf course and administered by the county.
 Aggregation: County
 Statute: KSA 74-4528 to 74-4530
 Agency: Park and Resources Authority

- 10) Scenic Highway Routes: Map of scenic highway routes.
 Aggregation: State
 Statute: KSA 74-4528 to 74-4530
 Agency: Park and Resources
- 11) Scenic Resources: Map of scenic routes, historic trails, scenic sites, historical sites and major scenic resource areas such as grasslands, river valleys and reservoirs.
 Aggregation: State
 Statute: KSA 74-4528
 Agency: Park and Resources Authority
- 12) Recreation Potential: Each section of land is rated on its potential for recreation development on the basis of the following factors: easy access, vegetative variety, topographic features, industrial, commercial or residential development, road, utility or railroad encroachment and agricultural use.
 Aggregation: Section
 Statute: KSA 74-4528 to 74-4530
 Agency: Park and Resources Authority
- 13) Potential for Recreational Development: Narrative evaluation of potential for the following recreational developments: vacation homes, recreational sites, sports land and correlative rating of each recreational type by soil analysis, climate norms, population trends and other related factors.
 Aggregation: Selected counties.
 Statute: 49 Statute 163
 Agency: State Conservation Commission
- 14) Recreation Potential, Streams: Inventory of recreation-facility potential on streams in northeast Kansas based on scenic, camping and picnicing value.
 Aggregation: Selected stream
 Statute: KSA 74-4528 to 74-4530
 Agency: Park and Resources Authority
- 15) Projected Recreation Demands: Projected recreation facility demands at selected future dates compared to 1972 supplies to compute future facility needs such as sprots facilities in town, parks and swimming areas. Projection dates of 1980, 1990 and 2000.
 Aggregation: County, Kansas Park and Resources Authority Regions
 Statute: KSA 74-4528 to 74-4530
 Agency: Park and Resources Authority
- 16) Private Recreation Enterprises: Inventory of private and semi-private recreation enterprises: (1) type of facility and (2) accommodation figures.
 Aggregation: County and State
 Statute: Requested by the National Association of Conservation Districts
 Agency: State Conservation Commission

- 17) Private Recreation Areas: State map of private recreation areas.
 Aggregation: Generalized location
 Statute: KSA 74-4528 to 74-4530
 Agency: Park and Resources Authority
- 18) Private Recreation Areas: Inventory of private recreation areas by land, water and developed areas.
 Aggregation: County, Kansas Park and Resources Authority Regions
 Statute: KSA 74-4528 to 74-4530
 Agency: Park and Resources Authority
- 19) Historical Resources: Inventory of archeological, architectural, cultural and historic resources in about 5,500 locations.
 Aggregation: City
 Statute: PL 89-665
 Agency: State Historical Society
- 20) Archeological Sites on Highway Projects: Inventory and evaluation of archeological sites on highway projects.
 Aggregation: Individual site
 Statute: 23 USC 138, 16 USC 433, FHWA
 Agency: KDOT

General Data Elements:

- 1) State Base Maps with Overlays: Base map with overlays depicting counties, towns, drainage, transportation routes, conservation districts, soil conservation service offices, watershed projects, resource conservation and development projects, resource conservation and development projects and Regional Planning Commissions.
 Aggregation: State
 Statute: 49 Statute 163
 Agency: State Conservation Commission
- 2) Multi-county Base Maps with Overlays: Political subdivisions, drainage, soils maps, base map with overlays depicting political subdivisions, drainage, transportation routes, soils and geology/land use.
 Aggregation: Regions as defined by Regional Planning Commission and Resource, Conservation and Development Areas
 Statute: 49 Statute 163
 Agency: State Conservation Commission
- 3) Cities Boundaries and Ordinances: Work-maps showing boundaries of all incorporated cities and copies of ordinances relating to changes.
 Aggregation: City
 Statute: KSA 68-406
 Agency: KDOT

- 4) County Basemaps with Overlays: Transportation routes, drainage, town maps, base map with overlays depicting transportation routes, drainage and towns.
Aggregation: County (20 counties only)
Statute: 49 Statute 163
Agency: State Conservation Commission
- 5) County Maps, Improvements: Maps showing roads, drainage, farm houses, churches and schools.
Aggregation: County
Statute: PL 93-643
Agency: KDOT
- 6) Site Elevations: Elevations at control points (bench marks)
Aggregation: State
Statute: KSA 76-322 et. seq.
Agency: Kansas Geological Survey
- 7) Aerial Photographs: Aerial photographs
Aggregation: Route
Statute: KSA 75-5001
Agency: KDOT
- 8) Aerial Photographs: Aerial photographs of entire state with a scale of 1:20,000.
Aggregation: County
Statute: KSA 76-322 et. seq.
Agency: Kansas Geological Survey
- 9) Topographic Maps: Topographic maps (7½ minutes, 15 minute, 30 minute).
Aggregation: Any
Statute: KSA 76-322 et. seq.
Agency: Kansas Geological Survey

APPENDIX TWO

EXPLANATION OF TABLE

The accompanying table outlines the data requirements determined to be necessary by this study. The listing represents the minimum data requirements needed for the state to perform a given level of involvement or role. Each problem category was approached separately so that the data listed in the three role models of that category are complete in and of themselves. This has resulted in the duplication of data items from one problem category to another due to the interrelatedness of many problems. The purpose of this approach was to allow the state's role or approach change from one problem category to another. For instance, the state might determine that an advisory role is the most appropriate in dealing with energy problems, but an exclusive control approach is required for water use problems.

The outline breaks down the information into finer detail whenever it was felt appropriate or possible. Less confidence is placed on this breakdown than on the actual data element. At the beginning of each role model, the reader should note the listing of data characteristics. These characteristics apply to each data element listed under that role model. Exceptions to these characteristics are noted after the identification of the output product. The characteristics are defined as follows:

Map scale: The ratio indicates relationship of the map to the earth.

Table aggregation: The groupings (political and physical districts) in which data will be indicated.

Source: Where the information is coming from - who is providing the information.

Vintage: The time period between updating information - the time interval between data collection.

Product: The output format of the information - how the information is presented.

I. Conservation of Natural Resources

State Exclusive Control

Data Characteristics: Map Scale: 1:24,000
 Table Aggregation: Township, City, County,
 Region & State
 Source: State
 Vintage or Updating: 3 years

- A. Inventory of Land Cover: hedgerows and shelterbelts, brush areas, oak-hickory forests, ozark forest, cross timber forest, tall grass prairie, sandsage-bluestem prairie, mixed grass prairie, short grass plains, row cropland, cover cropland, orchard, marshland, wetland, and barren land.

Product: map and table

- B. Inventory of Existing Land Use: agriculture (cultivation, irrigated land, rangeland, and pasture), livestock feeding areas, residential, commercial, industrial, recreational, water public use lands, transportation, and extraction.

Product: map and table

- C. Ownership of Property: amount of private and public (local, state and federal).

Product: map and table

Aggregation: parcel of minimum size, county, region, and state
 Source: local, state and federal - compiled by state.

- D. Government Sponsored Drainage Projects: location, type of project, cost and amount of wetlands drained.

Product: narrative/table

Vintage: no updating required - one time occurrence

State/Local Partnership

Data Characteristics: Map Scale: 1:125,000
 Table Aggregation: City, County, Region & State
 Source: State with Federal Assistance
 Vintage: 5 years

- A. Inventory of Land Cover: woodlands and forest, wetlands and marshland, prairie, cropland and barren land.

Product: map and table

- B. Inventory of Existing Land Uses: agriculture, rangeland, residential, commercial, industrial, transportation, recreational, water, irrigated land and public use lands.

Product: map and table

- C. Inventory of State Woodlands: hedgerows and shelterbelts, brush areas, oak-hickory forest, ozark forest, and cross timber forest.

Product: map and table
Scale: 1:50,000
Vintage: 10 years.

- D. Inventory of Prairie Lands: sandsage-bluestem, tall grass, mixed prairie and short grass plains.

Product: map and table
Scale: 1:50,000

- E. Inventory of Wetlands and Marshlands.

Product: map and table
Scale: 1:50,000

- F. Public Property Inventory: amount of local, state and federal land.

Product: map and table
Source: local, state and federal

State Advisory Role

Data Characteristics: Map Scale: 1:250,000
Table Aggregation: County and State
Source: Federal
Vintage: 10-15 years

- A. Land Use and Land Cover: urban and built-up, agriculture, rough-land, forestland, water, wetlands, and barren land.

Product: map and table
Vintage: 5-10 years

- B. Woodland Inventory: brush areas, oak-hickory forest, ozark forest, and cross timber forest.

Product: map and table

II. Agricultural Conservation

State Exclusive Control

Data Characteristics: Map Scale: 1:24,000
Table Aggregation: Township, City, County, Region,
& State
Source: State
Vintage: Annual

- A. Designation of Prime Agricultural Land: location, amount and distribution.

Product: map and table
Source: state and federal
Vintage: 10-15 years

- B. Soil Data: soil units, distribution, characteristics and properties.

Product: map and table
Source: state and federal assistance
Vintage: 20-25 years

- C. Extent and Rate of Urban Expansion on Agricultural Land.

Product: table
Vintage: 3 years

- D. Amount of Irrigated Lands: by crops, value of harvest, and total acreage.

Product: table

- E. Amount of Crop Production: by crop, value of harvest, and total acreage.

Product: table

- F. Employment in Agriculture: by type of location (county).

Product: table

- G. Slope Information: 4-5 intervals of percent slope.

Product: map
Source: federal data with state compilation
Vintage: 20-25 years

- H. Amount of Land in Agricultural Use: by agricultural activity.

Product: table

- I. Farm Financial Data: loans, mortgages, value of farm holdings, and farm operating expenditures.

Product: table

- J. Ownership of Farmland: family or corporate, by name of owner and amount of land, and total number of farms.

Product: map and table (family vs. corporate)
Vintage: 3 years

- K. Erosion Data: erosion potential, rates and amount of erosion.

Product: table
Vintage: 3 years

- L. Riverbank Stabilization Projects: cost, location, amount of bank stabilized, and type of project.

Product: narrative/table

Aggregation: by location, township, city, county, region and state

Vintage: no update required - one time occurrence

State/Local Partnership

Data Characteristics: Map Scale: 1:125,000

Table Aggregation: City, County, Region & State

Source: State with Federal Assistance

Vintage: See Each Data Item

- A. Designation of Prime Agricultural Land: location, amount and distribution.

Product: map and table

Vintage: 10-15 years

- B. Soil Data: soil units, distribution, characteristics and properties.

Product: map and table

Scale: 1:20,000 and 1:190,080

Vintage: 20-25 years

- C. Slope Data: 3-4 intervals of percent slope.

Product: map

Vintage: 20-25 years

- D. Erosion Data: erosion potential, rates and amount of erosion.

Product: table

Vintage: 5 years

- E. Amount of land in agricultural use by agricultural activity.

Product: table

Vintage: annual

- F. Amount of Crop Production: by crop, value of harvest and total acreage.

Product: table

Vintage: annual

- G. Employment in agricultural: by type and location (county).

Product: table

Vintage: annual

- H. Amount of Farmland and Number of Farms:

Product: table

Vintage: annual

- I. Riverbank Stabilization Projects: cost, location, amount of bank stabilized, and types of project.

Project: narrative/table

Aggregation: by location, county, region and state

Vintage: no updating required - one time occurrence

State Advisory Role

Data Characteristics: Map Scale: 1:250,000

Table Aggregation: County and State

Source: Federal and State

Vintage: See Each Data Item

- A. Inventory of Prime Agricultural Land: location, amount and distribution.

Product: map and table

Vintage: 10-15 years

- B. Soil Data: soil associations, distribution, characteristics and properties.

Product: map and table

Scale: 1:190,080

Vintage: 20-25 years

- C. Erosion Data: erosion potential, rates and amount of erosion.

Product: table

Vintage: 10 years

- D. Amount of Farmland and Number of Farms

Product: table

Vintage: annual

- E. Amount of Crop Production: by crop, value of harvest and total acreage.

Product: table

Vintage: annual

- F. Employment in Agriculture: by type and location (county).

Product: table

Vintage: annual

- G. Riverbank Stabilization Projects: cost, location, amount of bank stabilized, and type of project.

Product: narrative/table

Source: state

Vintage: update not required - one time occurrence

III. Energy

State Exclusive Control

Data Characteristics: Map Scale: 1:24,000
 Table Aggregation: City, County, Region and State
 Source: State
 Vintage: Annual

- A. Distribution and Location of Energy Resources: coal, oil and natural gas.

Product: map
 Vintage: 20-25 years

- B. Production and Value of Production of Energy Resources: amount, rate, and value of coal, oil and natural gas production.

Product: table
 Aggregation: by field or location, county, region and state

- C. Reserves of Energy Resources: amount of reserves of coal, oil and natural gas.

Product: table
 Aggregation: by field or location, county, region and state
 Vintage: 10 years

- D. Projected Energy Demands: by energy resource and by activity.

Product: table
 Aggregation: county, region and state

- E. Current Energy Usage: by activity.

Product: table
 Aggregation: county, region and state

- F. Energy Consumption Patterns: by area or location.

Product: table
 Aggregation: by use and area

- G. Power Needs Projection and Utility Construction Needs: by utility, electric, gas and oil, and area or location.

Product: table
 Vintage: 3 years

- H. Energy Transmission Data: location of length of lines and amount of energy use, capability of systems.

Product: table and map
 Aggregation: by lines, region and state
 Vintage: 3 years

I. Radiation Data: measurements of radiation levels.

Product: table

J. Information on Alternative Energy Sources: number of systems, generalized location (city), type of system and description of types of systems and potential use.

Product: narrative/table

K. Motor Vehicle Fuel Consumption and Use: by mode and area.

Product: table

L. Building Code Standards: description of building requirements by location (city).

Product: narrative/table

Vintage: 3 years

State/Local Partnership

Data Characteristics: Map Scale: 1:125,000
 Table Aggregation: County, Region and State
 Source: State with Federal Assistance
 Vintage: 5 years

A. Location and Amount of Energy Resources: coal, oil and natural gas.

Product: map and table

B. Production of Energy Resources: amount, rate and value of coal, oil and natural gas production.

Product: table

Vintage: annual

C. Energy Consumption Patterns: consumption by activity.

Product: table

Source: state

Vintage: annual

D. Projected Energy Demands: by energy resource and by activity.

Product: table

E. Estimated Reserves of Energy Resources: coal, oil and natural gas.

Product: table

F. Electrical Transmission Data: location of lines, length of lines, and amount of energy use.

Product: map and table

Source: state

- G. Information of Alternative Energy Sources: types of systems, potential use and benefits of each type of system.

Product: narrative

State Advisory Role

Data Characteristics: Map Scale: 1:250,000
 Table Aggregation: County and State
 Source: State with Federal Assistance
 Vintage: 10 years

- A. Location and Amount of Energy Resources: coal, oil and natural gas.

Product: map and table

- B. Estimated Reserves of Energy Resources: coal, oil and natural gas.

Product: table

- C. Production of Energy Resources: amount and rate of coal, oil and natural gas production.

Product: table
 Vintage: annual

- D. Energy Consumption Patterns: consumption by activity

Product: table
 Vintage: annual

IV. Geology

State Exclusive Control

Data Characteristics: Map Scale: 1:24,000
 Table Aggregation: Township, County, Region and State
 Source: State
 Vintage: See Each Data Item

- A. Inventory and Designation of Rare Geomorphic Features: location, type, extent.

Product: map
 Vintage: reviewed every 5-10 years

- B. Inventory of Mineral Deposits: areas by type of mineral

Product: map and table
 Vintage: 10 years

- C. Mining Activities: volume and rate of production by type of mineral.

Product: table
Vintage: annual

- D. Natural Hazard Areas: subsidence areas, landslide, tornado, seismic activity (fault lines), high wind and flood prone areas.

Product: map and table
Vintage: as directed by hazard

- E. Slope Information: 4-5 intervals of percent slope.

Product: map
Source: federal data compiled by state
Vintage: 20-25 years

- F. Extent and Rate of Urban Expansion.

Product: map
Vintage: 3 years

- G. Location and Mining Areas: by type of mining operation and type of mineral.

Product: map
Vintage: 3 years

- H. Distribution of Oil Brines: by location.

Product: map
Vintage: 3 years

State/Local Partnership

Data Characteristics: Map Scale: 1:125,000
Data Aggregation: County, Region and State
Source: State with Federal Assistance
Vintage: See Each Data Item

- A. Inventory or Rare Geomorphic Features: location, type and extent

Product: map
Vintage: 10 years

- B. Inventory of Mineral Deposit Areas: by type of mineral.

Product: map and table
Vintage: 15 years

- C. Mining Activities: Volume and rate of production by type of mineral.

Product: table
Vintage: annual

- D. Location of Mining Areas: by type of mining operation and type of mineral.

Product: map
Vintage: 5 years

- E. Natural Hazard Data: location of hazard prone areas by type of hazard.

Product: map
Vintage: 5 years (compiled on annual records)

- F. Identification of Subsidence Areas:

Product: map
Vintage: 5 years (compiled from annual records)

State Advisory Role

Data Characteristics: Map Scale: 1:250,000
Table Aggregation: County and State
Source: Federal
Vintage: See Each Data Item

- A. Inventory of Rare Geomorphic Features: location, type and extent.

Product: map
Vintage: 20-25 years

- B. Inventory of Mineral Deposit Areas: by type of commercial mineral.

Product: map and table
Vintage: 20-25 years

- C. Mining Activities: volume and rate of production by type of mineral.

Product: table
Vintage: annual

- D. Natural Hazard Data: general location of each type of natural hazard.

Product: map
Vintage: 10 years

V. Air Quality

State Exclusive Control

Data Characteristics: Map Scale: 1:24,000
Table Aggregation: City, County, Region and State
Source: State
Vintage: 3 years

- A. Location of Shelterbelts and Hedgerows.
Product: map and table
- B. Wind Erosion Data: estimated amount of erosion, and deposition areas.
Product: table
- C. Level of Particulate Matter in the Air: concentration, percent of each matter, and areal extent.
Product: table
Vintage: annual
- D. Emission Levels of Point Sources: by product and concentration.
Product: table
Aggregation: location, county and state
Vintage: month and annual
- E. Motor Vehicle Fuel Consumption: by mode of travel.
Product: table
Vintage: annual
- F. Motor Vehicle Registration and Miles Traveled: by mode of travel.
Product: table
Vintage: annual
- G. Intercity Travel Patterns: miles traveled by mode of travel.
Product: table
Aggregation: metro areas and state
- H. Noise Control Measures: by population of areas served, location, and type of measure.
Product: table
- I. Noise Level of Airports and Major Transportation Corridors:
Product: table
Aggregation: airports, county, and state
- J. Wind Control Projects: type of project, location, and effect.
Product: narrative
Aggregation: by individual project
Vintage: no updating required - one time occurrence

K. Weather Data: wind patterns, velocity, and direction.

Product: map and table

Scale: 1:125,000

Aggregation: measurement station, region and state

Vintage: monthly, seasonal and annual

State/Local Partnership

Data Characteristics: Map Scale: 1:125,000

Table Aggregation: County, Region and State

Source: State with Federal Assistance

Vintage: 5 years

A. Wind Erosion Data: amount of erosion.

Product: table

Vintage: 3 years

B. Level of Particulate Matter in the Air: concentration, percent of each matter, and areal extent.

Product: table

Vintage: annual

C. Emission Levels of Point Sources: by product and concentration.

Product: table

Aggregation: location, state

Vintage: annual

D. Weather Data: wind patterns, velocity, and direction.

Product: table

Aggregation: measurement station and state

Vintage: monthly and annual

E. Motor Vehicle Fuel Consumption: by mode of travel.

Product: table

Vintage: annual

F. Airport Noise Levels:

Product: table

Aggregation: airports and state

State Advisory Role

Data Characteristics: Map Scale: 1:250,000

Table Aggregation: County and State

Source: Federal with State Assistance

Vintage: See Each Data Item

A. Wind Erosion Data: amount of erosion.

Product: table
Vintage: 5 years

B. Level of Particulate Matter in the Air: concentration, percent of each matter and areal extent.

Product: table
Vintage: 3 years

C. Emission Levels of Point Sources: by product and concentration.

Product: table
Vintage: annual

D. Weather Data: wind patterns, velocity, and direction.

Product: table
Vintage: seasonal and manual

VI. Water Use and Conservation

State Exclusive Control

Data Characteristics: Map Scale: 1:24,000
Table Aggregation: Township, City, County,
Region & State
Source: State
Vintage: Annual

A. Location and Use of Municipal Water Supplies: types of wells or water bodies, volume of water use, type of system and system characteristics.

Product: table
Vintage: 5 years for system characteristics

B. Seasonal Average Flows of Rivers and Streams: volume and speed.

Product: table
Aggregation: river unit, county and state
Vintage: seasonal and annual

C. Weather Data: rainfall, evaporation rate, seasonal changes.

Product: table
Aggregation: measurement locations
Vintage: monthly, seasonal, and annual

D. Domestic Yields from Wells: number of wells, cubic feet used and type of wells.

Product: table
Aggregation: type of well, county, region and state

E. Weather Modification Results:

Product: narrative/table
Aggregation: Project and State

F. Location of Aquifers: location, size, volume of groundwater, recharge areas, and flow of groundwater.

Product: map and table
Aggregation: aquifer, county, region and state
Vintage: location - 10 years, flow and volume - 3 years

G. Groundwater Recharge Efforts and Prospectives.

Product: narrative/table
Aggregation: aquifer, county, region and state
Vintage: continuous date

H. Water Demand: by activity and user present and projected demand.

Product: table
Aggregation: activity, users, county, region and state

I. Present Water Use: volume and rate of water use for users and activities - cities, industry, irrigation, mining, livestock watering, utilities and transportation.

Product: table

J. Growth Rate of Water Users and Activities: projected growth and increase or decrease in water consumption.

Product: table

K. Water Volume of bodies of Water: flow rate, storage capacity and level, changes in water level.

Product: table

L. Water Rights: description of existing water rights.

Product: narrative/table
Aggregation: rights holder, county and state
Vintage: 3 years

State/Local Partnership

Data Characteristics: Map Scale: 1:125,000
Table Aggregation: County, Region and State
Source: State
Vintage: See Each Data Item

- A. Water Consumption: volume and rate of water use by activity and user.

Product: table

Aggregation: activity or user, county, region and state

Vintage: annual

- B. Present and Future Water Demand: by activity and user.

Product: table

Aggregation: activity or user, county, region and state

Vintage: 5 years

- C. Seasonal Average Flows of Rivers and Streams: volume and speed.

Product: table

Aggregation: river unit, county and state

Vintage: seasonal and annual

- D. Water Level and Volume Change: major stream, river and impoundments.

Product: table

Aggregation: water unit, county, region and state

Vintage: annual

- E. Growth Rate of Water Users and Activities: projected growth, and increase or decrease in water consumption.

Product: table

Aggregation: user or activity, county, region and state

Vintage: 5 years

- F. Location of Aquifers and Recharge Areas: location, size, volume of groundwater and flow of groundwater.

Product: map and table

Aggregation: aquifer, county, region and state

Vintage: 10 years

- G. Domestic Yields of Wells: cubic feet of well use.

Product: table

Aggregation: type of well, county and state

Vintage: 3 years

- H. Water Rights: description of existing water rights.

Product: narrative/table

Aggregation: rights holder, county and state

Vintage: 5 years

State Advisory Role

Data Characteristics: Map Scale: 1:250,000
 Table Aggregation: River Basin, County, and State
 Source: State with Federal Assistance
 Vintage: See Each Data Item

- A. Annual Average Flows of Major Rivers and Streams: volume and speed.

Product: table
 Vintage: annual

- B. Water Use in Broad Categories: volume and rate of water use by activity and user.

Product: table
 Vintage: annual

- C. Water Level and Volume Change: major stream, river and impoundments.

Product: table
 Vintage: 3 years

- D. Location of Aquifers: location, size, and volume of groundwater.

Product: map and table
 Vintage: 20-25 years

- E. Water Rights: description of existing rights.

Product: narrative/table
 Aggregation: major rights holder, county and state
 Vintage: 10 years

VII. Flood Control

State Exclusive Control

Data Characteristics: Map Scale: 1:24,000
 Table Aggregation: Township, city, county, region and state
 Source: State with Federal Assistance
 Vintage: 10 years

- A. Designation of Flood Hazard Areas: 100 and 50 year floodplain.

Product: map
 Scale: 1:24,000

- B. Flood Insurance Rate Maps:

Product: map
 Scale: 1:24,000

C. Weather Data: Rainfall and rate of rainfall.

Product: table

Vintage: monthly and annual

D. Location of Flood Control Structures: location, type, size, cost, and purpose of structure.

Product: narrative/table

Aggregation: structure, township, city, county, region and state

Vintage: no updating required - one time occurrence

E. Construction of Urban Structures that Increase Runoff: general summary of structures and annual affects on runoff - runoff rates.

Product: narrative/table

Vintage: annual

F. Flood Characteristics Data: volume of flood, velocity, rate of occurrence, and value of damage.

Product: table

Vintage: as occurs

G. Elevation of Structures in Flood Prone Areas:

Product: map

Scale: 1:24,000

H. Property and Ownership Data:

Product: map and table

Scale: 1:24,000

Aggregation: individual property

State/Local Partnership

Data Characteristics: Map Scale: 1:24,000

Table Aggregation: City, County and State

Source: Federal with State Assistance

Vintage: 10 years

A. Designation of Flood Hazard Areas: 100 year flood

Product: map

B. Flood Insurance Rate Maps:

Product: map

C. Weather Data: rainfall, rate of rainfall

Product: table

Vintage: monthly and annual

- D. Flood Characteristics Data: volume of flood, velocity, rate of occurrence and value of damage.

Product: table
Vintage: as occurs

- E. Location of Flood Control Structures: type and location, size and costs.

Product: table
Vintage: no updating required - one time occurrence

- F. State Property in Flood Prone Areas:

Product: map
Scale: 1:50,000
Source: State

State Advisory Role

Data Characteristics: Map Scale: 1:50,000
Table Aggregation: City, County and State
Source: Federal
Vintage: 10 years

- A. Designation of Flood Hazard Areas: 100 year floodplain.

Product: map

- B. Flood Insurance Rate Maps:

Product: map

- C. Flood Characteristics Data: volume of flood, rate of occurrence, and value of damage.

Product: table
Source: state
Vintage: as occurs

- D. Weather Data: rainfall and rate of rainfall.

Product: table
Vintage: annual

VIII. Groundwater

State Exclusive Control

Data Characteristics: Map Scale: 1:24,000
Table Aggregation: Township, County, Region and State
Source: State
Vintage: Annual

- A. Groundwater Level and Reserves: location, amount, level, characteristics and changes.

Product: map and table

Vintage: 5 years

- B. Groundwater Use and Projected Use: amount by activity.

Product: table

- C. Location of Wells: by use or activity, consumption of groundwater, and rate of withdrawal.

Product: map and table

Aggregation: well site, township, county, region and state

- D. Irrigated Farm Acreage: by crop.

Product: table

- E. Groundwater Quality Data: chemical analysis.

Product: table

- F. Groundwater Appropriation Rights and Allocation Data:

Product: narrative/table

Aggregation: individual rights, county, region, and state

State/Local Partnership

Data Characteristics: Map Scale: 1:125,000

Table Aggregation: County, Region and State

Source: State

Vintage: Annual

- A. Groundwater Level and Reserve: location, amount, level, characteristics, and changes.

Product: map and table

Source: state with federal assistance

- B. Groundwater Use: amount of activity.

Product: table

- C. Location of Wells: by use or activity.

Product: map

Vintage: 3 years

- D. Groundwater Appropriation Rights:

Product: narrative/table

Aggregation: individual rights, county and state

State Advisory Role

Data Characteristics: Map Scale: 1:250,000
 Table Aggregation: County and State
 Source: State with Federal Assistance
 Vintage: 3 years

- A. Groundwater Levels and Estimated Reserve: location, amount, and characteristics.

Product: table

- B. Groundwater Use: amount by activity.

Product: table
 Vintage: annual

- C. Groundwater Quality Data: chemical analysis.

Product: table

- D. Groundwater Appropriation Rights

Product: narrative/table
 Source: state

IX. Water Quality

State Exclusive Control

Data Characteristics: Map Scale: 1:24,000
 Table Aggregation: Township, County, Region and State
 Source: State
 Vintage: Annual

- A. Water Quality of River, Streams and Lakes: chemical composition, biological analysis, temperature, acidity, salt concentration, dissolved solids, mineral content and suspended solids.

Product: map and table
 Aggregation: testing station, county, region and state
 Vintage: monthly on chemical and biologic analysis

- B. Erosion Data: rate, sediment load of streams and rivers, erosion potential and runoff rates.

Product: table

- C. Mining Waste: chemical composition, amount of leaching and location.

Product: map and table

- D. Mine Reclamation Information: time, cost of reclamation, type of reclamation and success of reclamation.

Product: narrative/table
Vintage: 3 years

- E. Pesticide, Herbicide and Other Form Chemical Usage: by type, amount, area covered, and concentration.

Product: map and table

- F. Oil and Gas Operations Data: location, size of operation, amount of pollution, and pollution prevention techniques.

Product: narrative/table

- G. Solid Waste Facilities: location, type of operation, size, and expected termination date.

Product: map and table
Vintage: 3 years

- H. Point Sources of Pollution: location, type and concentration of pollutant, owner of source, and volume of discharge.

Product: map and table
Aggregation: source

- I. Likely Non-point Sources of Pollution: location, type and concentration of pollutant, and volume of pollution.

Product: table

- J. Projected Pollution Loads: with and without enforcement of standards.

Product: table

- K. Discharge Standards for Point Sources:

Product: narrative/table
Aggregation: source

- L. Flood Prone Areas: location of 100 year flood limits:

Product: map
Source: Federal
Vintage: 10 years

State/Local Partnership

Data Characteristics: Map Scale: 1:125,000
Table Aggregation: County, Region and State
Source: State with Federal Assistance
Vintage: Annual

- A. Water Quality of Rivers, Streams and Lakes: chemical analysis, biological analysis, dissolved solids, suspended solids and mineral content.

Product: table

- B. Erosion Data: rate, sediment load of streams and rivers, erosion potential and runoff rates.

Product: table

- C. Point Sources of Pollution: location, type of pollution, volume and concentration.

Product: table

Aggregation: source

- D. Discharge Standards for Point Source Pollution:

Product: narrative/table

Aggregation: source

- E. Solid Waste Facilities: location, type of operation, and size.

Product: table

Vintage: 5 years

- F. Projected Pollution Levels: with discharge standards.

Product: table

Vintage: 3 years

- G. Mining Wastes: location, type of waste, amount of waste.

Product: table

- H. Mining Reclamation Data: type of project, cost and success of reclamation.

Product: narrative/table

Vintage: 5 years

State Advisory Role

Data Characteristics: Map Scale: 1:250,000

Table Aggregation: County and State

Source: State with Federal Assistance

Vintage: 3 years

- A. Water Quality of Rivers, Streams and Lakes: chemical analysis, dissolved solids, and suspended solids.

Product: table

Vintage: annual

B. Inventory of Point Sources: location, amount and type of pollution.

Product: table

Aggregation: source

C. Discharge Standards for Point Sources:

Product: narrative/table

Aggregation: source

D. Erosion Data: rate, sediment load, and erosion potential.

Product: table

E. Mining Wastes: location, type and amount of waste.

Product: table

X. Land Use Considerations

State Exclusive Control

Data Characteristics: Map Scale: 1:24,000

Table Aggregation: Townships, County, Region and State

Source: State

Vintage: 3 years

A. Land Use Patterns Around Reservoirs: by broad categories.

Product: map and table

B. Solid Waste Facilities: location, type of operation, size, and expected termination date.

Product: map and table

C. Water Quality of Reservoirs: chemical and biological analysis.

Product: map and table

Aggregation: reservoir

Vintage: annual

D. Location of Junkyards and Billboards:

Product: map and table

E. Water Quality Around Solid Waste Facilities: chemical analysis.

Product: map and table

Aggregation: solid waste facility

F. Political Subdivisions.

Product: map
Vintage: 5 years

G. Land Use Changes: by category

Product: map and table

H. Ownership of Property: amount of private and public lands.

Product: map and table
Aggregation: parcel, county, region and state
Source: local, state and federal - compiled by state

I. Population Density and Migration.

Product: table
Source: state with federal assistance
Vintage: 5 years

J. Assessed Valuation of Real Property:

Product: map and table
Source: county
Vintage: 10 years

K. Environmental Health Control Programs:

Product: narrative/table

L. Building and Construction Rates: by number of structures and type of structures.

Product: table
Vintage: annual

M. Housing Needs: present and projected, by income level and size.

Product: table
Vintage: annual

State/Local Partnership

Data Characteristics: Map Scale: 1:125,000
Table Aggregation: County, Region and State
Source: State with Federal Assistance
Vintage: 5 years

A. Solid Waste Facilities: location, type and size of operation.

Product: table

B. Generalized Land Use: broad categories.

Product: map and table

C. Water Quality of Reservoirs: chemical analysis.

Product: table
 Aggregation: reservoir
 Vintage: annual

D. Location of Junkyards and Billboards:

Product: table

E. Political Subdivisions:

Product: map
 Vintage: 10 years

F. Population Density and Migration.

Product: table
 Aggregation: city, county, region and state
 Source: federal
 Vintage: 5 years

G. Environmental Health Control Programs.

Product: narrative/table

H. Housing Needs: present and projected, by income level and size.

Product: table

State Advisory Role

Data Characteristics: Map Scale: 1:250,000
 Table Aggregation: County and State
 Source: State with Federal Assistance
 Vintage: 5 years

A. Generalized Land Use: by broad categories.

Product: map and table
 Vintage: 5-10 years

B. Location of Junkyards and Billboards

Product: table

C. Water Quality in Reservoirs: chemical analysis.

Product: table
 Aggregation: reservoir

D. Environmental Health Control Programs:

Product: narrative/table

E. Housing Needs: present, by income level and size.

Product: table

F. Political Subdivisions:

Product: map

Vintage: 10 years

XI. Wildlife Preservation

State Exclusive Control

Data Characteristics: Map Scale: 1:24,000

Table Aggregation: Township, County, Region and State

Source: State

Vintage: Annual

A. Location of Prime Animal Habitat Areas: by species.

Product: map and table

B. Location and Number of Endangered, and Threatened Species.

Product: map and table

C. Animal Kills and Projected Deaths: reason for death by major species.

Product: table

Aggregation: county, region and state

Vintage: 3 years for projections

D. Animal Populations: by species.

Product: table

Aggregation: county

E. Wildlife Management Areas: size and purpose.

Product: map, narrative/table

Aggregation: management area

F. Aquatic Species: location and number by major species.

Product: table

Aggregation: body of water, county, region and state

G. Habitat Areas Destroyed or Damaged: area by species.

Product: map and table

H. Reduction of Habitat Areas: by type of use.

Product: table

I. Wetlands and Marsh Areas and Drainage Projects: locations, areas lost to drainage projects, size of areas, size of projects, cost of project and use of wetlands for wildlife.

Product: map and table

State/Local Partnership

Data Characteristics: Map Scale: 1:125,000
 Table Aggregation: County, Region and State
 Source: State
 Vintage: Annual

A. Location and Number of Endangered and Threatened Species.

Product: map and table

B. Damaged or Destroyed Habitat Areas: by type of use.

Product: table

C. Animal Populations: by species

Product: table

D. Animal Kills and projected Deaths: by major species and reason of death.

Product: table

E. Key Habitat Areas: location, size and wildlife present.

Product: map and table

F. Wildlife Management Areas: location, size and purpose.

Product: map and table
 Aggregation: management area
 Vintage: 3 years

G. Aquatic Species: location and number.

Product: table
 Aggregation: body of water

H. Wetland Areas and Drainage Projects: location and size of wetland areas and drainage projects, cost of project, area destroyed by project, and use of wetlands by wildlife.

Product: map and table

State Advisory Role

Data Characteristics: Map Scale: 1:250,000
 Table Aggregation: County and State
 Source: State with Federal Assistance
 Vintage: 5 years

- A. Key Habitat Areas: location, size and wildlife present.

Product: map and table

- B. Animal Populations: by major species.

Product: table

- C. Animal Kills: by major species and reason for death.

Product: table
 Vintage: annual

- D. Wildlife Management Areas: location, size and purpose.

Product: table

- E. Aquatic Species: location and number.

Product: table
 Aggregation: body of water

- F. Endangered Species Inventory: number and generalized location.

Product: map and table

XII. Recreation

State Exclusive Control

Data Characteristics: Map Scale: 1:24,000
 Table Aggregation: Township, City, County, Region
 and State
 Source: State
 Vintage: 3 years

- A. Inventory of Current Recreational Areas: including historic and archeological sites.

Product: map and table

- B. Flood Hazard Areas: 100 and 50 year floodplain.

Product: map
 Scale: 1:24,000
 Source: State with Federal Assistance
 Vintage: 10 years

C. Effects of Taxing Policies on Historic Sites:

Product: table

D. Recreational Potential: by types of recreation.

Product: map and table

E. Demand for Recreational Usage: by type of recreation.

Product: table

Aggregation: major city, county, region, and state

F. Current Recreational Usage: by type of recreation.

Product: table

Vintage: annual

G. Out-of-State Recreational Visitation: number and location.

Product: table

Aggregation: recreational site, county, region and state.

Vintage: annual

H. Hunting and Fishing Recreational Usage: number and location.

Product: table

Aggregation: county, region and state

Vintage: annual

I. Recreational Activity Demand: kind of recreation - active versus passive, water based versus land based.

Product: narrative/table

Aggregation: county, region and state

J. Land Use Patterns Around Recreational Areas: broad categories.

Product: map and table

State/Local Partnership

Data Characteristics: Map Scale: 1:125,000

Table Aggregation: County, Region, and State

Source: State

Vintage: 5 years

A. Inventory of Current Recreational Areas of State Significance: including historical and archeological sites.

Product: map and table

B. Effects of Taxing Policies on Historic Sites:

Product: table

- C. State Recreational Potential: by type of recreation.
Product: map and table
- D. Recreational Demand: by type of recreation.
Product: table
Aggregation: major city, county, region and state.
- E. Out-of-State Recreational Visitation: location and number.
Product: table
Aggregation: recreational site, county, region and state
Vintage: annual
- F. Current Recreational Usage: by type of recreation.
Product: table
Vintage: annual
- G. Hunting and Fishing Recreational Usage: location and number.
Product: table
Vintage: annual

State Advisory Role

- Data Characteristics: Map Scale: 1:250,000
Table Aggregation: County and State
Source: State
Vintage: See Each Data Item
- A. State Recreational Potential: by type of recreation.
Product: table
Vintage: 10 years
 - B. Recreational Areas Inventory: by type of activity.
Product: map and table
Vintage: 5 years
 - C. Recreational Demand: by type of recreation.
Product: table
Vintage: 5 years
 - D. Out-of-State Recreational Visitation: location and number.
Product: table
Vintage: annual
 - E. Current Recreational Usage: by type of recreation.
Product: table
Vintage: annual
 - F. Hunting and Fishing Recreational Usage: location and number.
Product: table
Vintage: annual

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by

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AN ABSTRACT OF A MASTER'S REPORT

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Data Requirements for Alternative State Approaches to Land and Water Resource Conservation in Kansas

ABSTRACT

Land and water resource planning, as with all planning, requires an adequate information base. As many states have found, the provision of information has become an increasingly burdensome task. This report is an investigation into the minimum data requirements for state involvement in the conservation and management of land and water resources in Kansas. The minimum data sets have been constructed from the interplay between the recognized problems in resource management and assumed policies of three hypothetical models (role models) of state involvement.

Kansas has a particular motive for becoming involved with the provision of data pertaining to land and water resources. The state is currently evaluating its role in the management of its land and water resources and it is hoped that this report will provide some input into that process. The study is intended to provide a workable tool for decision makers by increasing their knowledge and understanding of the data implications of different state roles in land and water resource management.

The study concentrates on land related problems rather than the wide range of problems associated with resource conservation. For this reason, only limited socio-economic information has been included in this study, although it is recognized as important to resource management programs. The study also concentrated on assessing the data requirements for policy formulation and high level program development. It is not the intention of this report to address the specific needs of programs of line agencies. Policy and program development can be the most demanding activities in terms of information requirements and this study is an attempt to address these needs.

The study is divided into four parts: an overview of existing documents, the development of three role models of state involvement, the determination of data commitments by role model, and finally, a review of the Kansas situation. Each section builds upon the other until the final section which contains the recommendations of the study.

Kansas has expended considerable time and effort in identifying its existing policies and its present and expected land and water resource problems. The results of these separate efforts are summarized in a number of documents which will be reviewed in Part One of this study. The purpose of this review is to provide an initial assessment of the adequacy of the data collection efforts in addressing the resource management needs of the state. This overview is of the documents themselves, and might not accurately depict the actual situation. That type of analysis would require a much broader approach. The overview is, however, intended as a starting point in the assessment of the data collection efforts of the State of Kansas.

Part Two of the study develops three hypothetical role models that explain the level of involvement a state government might have in land and water resource management. The role models are necessary since they allow the categorization of different state approaches into a workable framework. It is assumed that the level of involvement of the state government will differ with each problem encountered in the state and its perception of that problem. The three role models are designed in recognition of this situation. The role models are: State Exclusive Control, State/Local Partnerships, and State Advisory Role. Part Two presents reviews of land and water management efforts in other states to illustrate the utility of the role models.

The third part of the study is the synthesis of the first two sections. Part Three begins with a brief introduction to the needs and characteristics

of information systems and points out that the data requirements of a program are very much a part of the design of an information system. The second section of Part Three deals with the clarification of the problems listed in Part One in light of the three role models. This is followed by the listing of the data requirements in each problem category for each role model.

The last part of the study, Part Four, ties the first three parts together and indicates what roles Kansas appears to be performing in each of the problem categories. As part of this analysis, a general comparison of the existing data gathering efforts with those elements suggested from Part Three are examined. Part Four concludes with a recommendation section covering the findings from all four parts.

A number of conclusions have been reached in the course of this study. It has been demonstrated that, with few exceptions, the state government of Kansas is performing an advisory role in the management of its natural resources. The advisory role is characterized as a minimal involvement in conservation efforts at the state level. A state performing this role would be active in technical assistance and advising local units of government as is the case in Kansas. A state under this model would not have a strong financial or manpower commitment to management programs, which generally appears to be the case in Kansas. It seems apparent, however, that the state government does recognize the need to conserve its land and water resources, but it has been unable to agree upon to what extent the state should be involved. The state has a strong tradition of local autonomy and state controlled or mandated conservation efforts are perceived as running counter to this tradition.

Specific recommendations from the study include:

1. It is recommended that the state clarify its policies related to the conservation of land and water resources.

2. It is recommended that the state reassess its policy directions and consider the overall implications of land and water resource policies.
3. It is recommended that the state evaluate its use and its analysis capability of its computer facilities.
4. It is recommended that the state investigate possible information duplications and establish a mechanism to improve both the flow of information and the compatibility of information.
5. It is recommended that the state urge and encourage the federal government to provide better coordination of their data provision activities.
6. It is recommended that the state encourage the federal government to accelerate the soil survey program.
7. It is recommended that the state continue to work with the federal government and make no effort to develop large scale land use and land cover data products.
8. It is recommended that the state undertake a survey of its existing buildings and land determining how much property the state owns and the location of this property.
9. It is recommended that the state investigate the possibility of identifying major wetlands and monitor changes in these areas.
10. It is recommended that the state accelerate the prime agricultural lands designation.