

REGIONAL LAND USE POLICY PLANNING:
A MODEL AND EMPIRICAL APPLICATION

by

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CHAPTER I

REGIONAL LAND USE PLANNING: AN INTRODUCTION AND BACKGROUND

I. INTRODUCTION

Land use planning has met with only limited success in the United States.¹

In the 1920's the Department of Commerce promulgated a model zoning enabling act which was quickly copied around the country. A few years later they tried to promote a model planning act but by then the ballgame had been lost. A great majority of people still think zoning is planning, and once zoning is adopted it is very difficult to get popular support to² spend the kind of money necessary to get good planning.

The planning of land development has, since the 1930's, been left almost exclusively in the hands of local government.³ At this level the intended control mechanisms, zoning ordinances and subdivision regulations (plan implementation instruments), have functionally become the land use plan. The typical urban general plan, besides being all too often benignly vague for political and ideological reasons, has been frequently devoid of meaningful policy content. A deluge of empirical data, without benefit of analytic interpretation, and impossibly detailed specification of future land use patterns, have helped to delegate many comprehensive plans to an appropriate inconspicuous filing cabinet. Arbitrary land use controls, unconnected from purposive societal goals, do not contribute to an effective societal guidance system.

Almost undirected land development, based implicitly on the protection of the single family residence and furthering selected community financial interests, has substituted for the creative development of our land resources. The task of "land use planning" has become ambiguously identified at the academic level with anything having to do with physical development and design, and at the practical level with code enforcement. It should come as no surprise that American land use planning has been largely a form of ineffectual land management and that our national environment has suffered significantly from lack of a purposive system of land use guidance to protect it from chaotic development and malicious exploitation.

Two important trends have emerged in recent years which offer hope for the relief of this situation. The first of these is the growing recognition within the planning profession itself of the impossibility, at the current juncture, of successfully predicting detailed future developments within a system as complex as human society. An explanatory general model of society is but a gleam in the eye of the contemporary social scientist. This is particularly true in long-range forecasting situations, where typical linearity assumptions necessary to operationalize deterministic models are inappropriate. This realization has spurred the conviction that the appropriate vehicles of the planning process are the goals statement and the policy plan, as opposed to the more traditional comprehensive plan. An explicit enumeration of public purposes and intentions in given situations offers a degree of realism and flexibility unobtainable through the older paradigm.

A second contributing factor is the growing public awareness of the ultimately non-renewable nature of the nation's land resource. This popular awakening has led public decision-makers at all levels of government to take new interest in environmental policies, one facet of which is land use planning. In the last several years there has been a spate of activity at both the state and national levels concerned with revitalized land use planning. Several states have adopted areawide land planning procedures of varying degrees of comprehensiveness. And after decades of inaction, the federal congress is finally contemplating the enactment of a national land use policy; a statement intimately embracing the planning process.

This study attempts to synthesize the essence of policy orientation and areawide scale, and to apply them to the problems of land use planning at a multi-county regional level. Such an effort would seem both timely and suggestive of further possibilities. With decision-makers increasingly aware of the necessity to enlarge the scale of perception needed for realistic land use guidance, the possibility of implementing a regional land use plan seems more heartening than in times past. And with the probability over the horizon that the states will need to draft statewide land use plans, it would seem that smaller scale demonstration efforts of some type might be instructive.

II. BACKGROUND FOR THE STUDY

A. Historical Sketch

Public planning of land use became a prominent part of the American scene in the first decades of the twentieth century. Although some

degree of regulation had been imposed on land development since the colonial period, it was with the coming of urban zoning, first in San Francisco in the 1880's and then in New York in 1913, that the concept of societal guidance of the use of private property became institutionalized in the United States.⁴ Ten years after the drafting of the Standard State Zoning Enabling Act in 1924 over 1,200 American cities had adopted zoning ordinances.⁵ Early zoning regulations were shepherded into existence by several outstanding members of the legal profession, such as Edward Bassett, Alfred Bettman and James Metzenbaum.⁶ Bassett's brilliant defense of zoning in the landmark case before the United States Supreme Court in 1926, Village of Euclid v. Ambler Realty Co., ensured zoning's constitutionality.⁷

Zoning became recognized as a legal function of the police power; a method of protecting the "public safety, health, morals and general welfare." Within the several established zoning districts in a municipality, such things as land use, building volume and use, open space requirements, and lot size could be specified. As practices, zoning has become a tool of the locality for protecting existent land values, and the guardianship of the single family residential area has been its primary task.⁸

Less heralded, but at least as important, the practice of regulating the subdivision of land followed closely upon the heels of zoning. The first example of subdivision control was in Oak Park, Illinois in 1882.⁹ Subdivision regulation is also interpreted as an aspect of the police power (limiting private actions without renumeration), which specifies the conditions under which undivided property may be laid out

into lots and improved or offered for sale. "The basis for subdivision control is land registration, a privilege that the government has power to grant or withhold on its own terms."¹⁰

In most states this power, like zoning, has been delegated to minor civil divisions through enabling legislation. Over the years the tendency has been for municipalities not only to set requirements on lot dimensions and open space, but also for some minimum of public infrastructure improvements such as implacement of streets, curbs, gutters, sidewalks, sanitary and storm sewers, etc. The vehicle for initiating such improvements is basically the dedication of land to the public use by the developer.¹¹ Obviously, with such a close overt relationship between zoning and subdivision regulations, a high degree of coordination between these two instruments is very desirable. The measure of success along these lines varies markedly from one community to the next.

The rather dismal performance of typical land use guidance efforts in the United States is only too sorely apparent after only a brief glance across the American landscape. Several factors involved in this failure, implicit in the brief historical sketch offered above, can be identified. These are inadequate: (1) foresight, (2) flexibility, (3) coordination, (4) geographic perspective, and (5) policy elaboration. There has been little relationship between land use control and the public planning process. Within the parameters of the typical local land use decision-making environment, consideration of factors from a broader geographic perspective has been completely lacking.

Although the Standard City Planning Enabling Act of 1928 (like the 1924 zoning act, prepared by the Department of Commerce) envisioned zoning regulations as merely an implementation tool of the general plan, there was widespread confusion as to the difference between the zoning plan and the land use element of the comprehensive plan.¹² Typical state enabling legislation requires land use controls (i. e., zoning and subdivision regulations) to be based on the policies and layout of a comprehensive plan. Confusion and frequent intransigence on the part of local officials, however, to say nothing of the plan's probable internal problems and the almost non-existent enforcement of state statutory requirements, have produced a situation in which many ordinances stand without a comprehensive plan for support. Or worse yet, they may be absolutely unrelated to the existing general plan.¹³

The lack of coordination between the planning and implementation processes seems destined to continue to plague sound land use development in the United States. The draft copy of the influential American Law Institute's "Model Land Development Code," while emphasizing a broad social approach to land development, takes the explicit position that zoning controls need not be based on a plan.¹⁴ Delafons suggests that "planners should be alerted to what looks suspiciously like an attempt to comprehend the whole of the land-use planning process in the zoning ordinance itself . . ."¹⁵ The model code does recognize the need for at least a minimal degree of state and regional coordination of land use control. In this the 1968 draft foreshadowed more recent developments in the American land use guidance system.

Since that time, additional emphasis has been placed on regional land use planning, statewide land use plans, and development of national land use policy legislation.

B. Recent Developments

Basic to the current reevaluation of land use planning practices is a changing conception of land. Rather than viewing land as a commodity it is visualized increasingly as a resource.¹⁶ This is especially evident in the three renditions of a national land use policy act (*i. e.*, the Administration bill, H. R. 4332, 4337, 4703 and S. 992; the Jackson bill, S. 632 and H. R. 2173; and the Mathias bill, S. 2554) introduced before the federal legislature in 1972-73. While these bills differed on details such as grants to states, techniques of state intervention, and the criteria for federal review and continued funding, they all emphasized statewide land use planning and the development of state level land use policy.¹⁸ The nearly successful Land Use Policy and Planning Assistance Act of 1973 (S. 268, the revised 1973-74 Jackson bill) went so far, in its earliest renditions, as to visualize mandatory state level land use planning.

The main elements of these envisioned guidance measures are built around environmental and economic considerations rather than land value, as are most recent state level land use planning efforts.¹⁹ If passed into law, as still seems probable, a national land use policy act would operationally require the states to become involved in both planning and control. This would include planning for state level land use policies (more specifically for areas of special state and regional

interest) and coordination of local land use controls and state and federal grant programs.

Several states have taken the lead in areawide land use planning. Notable are Hawaii, Maine, Vermont, Wisconsin and Massachusetts.²⁰ With the exception of Hawaii's statewide zoning system, these measures call for some degree of state participation in the land development guidance process, using environmental protection as an entry card. Hawaii's statewide zoning procedure is a unique attempt, in the American experience, to apply detailed advanced plans to a wide area. This method has produced mixed results, and would be inapplicable for most states. Larger areal extent and infrequent replication of the island state's centralized control traditions lie at the heart of the system's lack of appeal from an administrative viewpoint.²¹

The other four states under discussion have all entered land use planning under the aegis of environmental protection. The Wisconsin and Massachusetts models are explicitly directed toward control of wetland development (i. e., shorelines and coastlines). Vermont and Maine also approach guidance from an environmental perspective, Vermont regulating most development in areas above 2,500 feet elevation and Maine directly controlling development in politically unorganized areas of the state (over half the state) and in organized areas lacking local controls. Vermont's regulatory activity is based on what will develop into a state land use plan. This effort offers the best possibility of those initiated to date to expand its functional base (environmental protection) and provide a balanced guidance system founded on the

planning process. It must be noted that all the efforts mentioned above are "foot-in-the-door" type operations, and could be expanded both functionally and areally. Many of the site-specific measures included in these operations could be made more dynamic by greater emphasis on categorical, spatially suggestive, policy development.

The third level at which progress is taking place is that of regional planning. This is perhaps the most logical level in the larger American states to combine policy formulation with direct control procedures. At the regional level land use policy may be enacted which minimized artificial balkanization of the socio-economic landscape, recognizing functional spatial ties which cross local governmental jurisdictions, while at the same time allowing most developmental decisions to remain close to those most directly affected, the local citizenry. The other obvious advantage of regional organization over purely local operations is the economies of scale accomplished by spreading the costs of the planning effort over a wider area, thus serving more people for the same basic investment.

Regional planning activity in the United States has experienced variable degrees of support. Initial interest in regional planning was prompted by the Southern reawakening of traditional geographic regionalism, and was implemented by the federal government in the form of river basin development, most notably the T.V.A. The activities of the National Resources Planning Boards faded during World War II, with an unsuccessful revival of Southern-style regionalism after the war being supplanted by the widespread formation of metropolitan planning commissions during the fifties and early sixties. During the last decade

there has been a growing commitment to state level planning and the development of multi-county planning agencies.

Friedmann observed in 1956 that:²²

. . . urban and regional planning in this country have developed as two different specializations as, indeed, they have in most parts of the world. City planners have been concerned mainly with creating a more efficient physical environment; regional planners have been principally engaged in solving problems of resources and economic development. The reason for this divergence is shown to lie chiefly in the controls available to urban, state, and federal governments for the implementation of policy objectives.

Thus, state and national level land use planning as they are now developing fall more squarely in the tradition of regional planning, given their underlying motives. But it would appear that their implementation procedures would have to be more akin to the traditional city planning paradigm. Commenting on the current performance of regional planning bodies in implementing their planning proposals, Dueker and Drake have noted that:²³

. . . recently regional planning councils have been formed throughout many states. However, most regional councils have no enforcement powers and cannot adopt official controls. Only the local officials of the communities that make up the council can enforce a regional plan.

Contemporary regional planning efforts, both metropolitan and multi-county, have remained ineffective advisory functions despite growing environmental consciousness and the formulation of the A-95 review process. Although many regional planning commissions and Councils of Governments (C.O.G.'s) have prepared land use planning studies, the almost universal impotence of these documents strongly suggests the need for something more than cooperation to solve the conflicting interests

of competing local governments. A new environment must be provided for local land use decision-making at the regional level. The progressively changing atmosphere surrounding areawide land use planning activities, along with growing impatience with past failures, suggest that perhaps now is the time to extend some of the traditional urban allocative planning responsibilities, through policy planning, to more representative regional bodies.²³

III. STATEMENT OF PROBLEM

Within the context of the discussion above, the purpose of this paper is to construct a model non-metropolitan regional land use policy plan. This plan, following contemporary thinking, draws heavily upon factors affecting environmental protection and the stimulation of economic activities. Four central issues are woven together in a systematic fashion: (1) Compartmentalization of the regional landscape, (2) Spatial integration of functional land use clusters, (3) Improvement of regional land use processes, and (4) Development of legal implementation procedures capable of guiding the realization of the first three substantive transformations. It is argued that the first three elements capture the environmental and economic advantages to be gained through the minimization of the friction of distance, the development of regional linkages, the encouragement of scale economies in public service delivery, the endorsement of technologically functional patterns of human settlement, and the areal confinement of man's impact on his environment and the improvement of his environmental interaction.

The plan which develops looks in a rather special manner toward the provision of major public facilities of regional impact, region-serving public infra-structure, open spaces for conservation and recreation, and other amenity resources. It would ensure that: (1) adequate space is available in functionally clustered locations for the different classes of land use, (2) development of any given type is not allowed to preempt space needed for other functions, and (3) various uses do not make the area's land resources unfit for other purposes (e. g., environmental deterioration because of conflicting mixed uses, environmental degradation because of pollution, etc.). In other words, this model land use policy plan deals with use types on a regional basis according to their functional relationships, areal requirements, spatial distributions, and environmental impact. It is perhaps significant that neither property value nor the protection of residential areas, per se, are mentioned in this scheme.

Little of use can be gained at the regional scale from mapping desired future land use patterns. The format for the land use plan proposed here is a set of carefully enumerated generalized policy statements. A body of purposive, systematic land use policies can offer more flexibility to meet future situations, and thus, greater hope for the plan's implementation. The importance of inventories of existing conditions within a region and projections of probable regional futures, in the short-run, is explicitly recognized as the necessary basis for decision-making, but they are not logically conceived as an integral part of the plan.

To test empirically the policy plan's operational efficacy as a land planning instrument, it is applied to a selected group of substantive land use decision-making situations in the nine county jurisdictional area of the Southeast Kansas Regional Planning Commission.²⁴

IV. METHODOLOGY

Because of the broad nature of the problem under consideration, this paper is primarily descriptive in approach. Chapter II argues the proper role and make-up of planning theory, and presents the definition of terminology to be used and assumptions to be followed. Chapters III and IV discuss man/land relationships and geographic location theory in an attempt to clarify the primary factors involved in regional land use planning.²⁵ Before a cogent set of regional land use policies can be formulated, a thorough, theoretically based synthesis of man's interaction with his environment and the spatial interrelationships of human activities is needed. Presently no such capitalization of concepts, directed specifically toward regional land use considerations, is readily available in the urban planning literature.

From this theoretical foundation major components relevant to regional land use planning are selected in Chapter V. The interrelationships of these factors across the regional landscape are examined within the theoretical framework, and an attempt is made to encourage their harmonious interaction through a set of generalized regional goals. Based on these land use goals a policy plan is devised. The policy plan contains not only ends to be achieved by the land use guidance system, the goals, but also it lists means by which these goals are to be accomplished. It is a statement of the general intentions of a

hypothetical regional planning commission, serving as a procedural guide in short-term land use decisions.

The plan takes the form of a formal outline, with each descending level representing a further degree of specificity. It does not attempt to second guess the future with areally specific predictions of future land use patterns. Instead, it aims towards providing significantly increased uniformity, predictability and reproducibility to land use decision-making.

The brief empirical application sketched in Chapter VI presents an opportunity for the introduction of more rigorous analytic techniques. The population of Southeast Kansas is projected by means of the cohort survival method. The economic character of the region is described in part by means of a shift-share analysis, economic base study, and input-output model. Land use patterns are summarized by means of a benchmark index. And various ratios and indices are utilized in the attempt to generate substantive land use decisions from the policies formulated in the model plan.

V. RESULTS OF THE STUDY

Three tangible end products arise from this study. The first is a conceptual discussion of man/land relationships and geographic location theory, pointing up the important implications of these for land use planning theory in the regional context. The second is a model regional land use policy plan which formulates a set of land use goals and a rationale for their achievement. A brief overview of the model's application in a non-metropolitan setting in Southeast Kansas is a third

contribution of the study.

It is hoped that the framework of land use concepts suggested here might be capable of logical expansion to a broader areal scale, suitable for state level planning operations. Given the present planning climate such an effort would seem appropriate.

NOTES FOR CHAPTER I

¹As a part of the total societal guidance system, planning is conceptualized here in the sense of a process of establishing goals and devising means of achieving them, as opposed to the ad hoc managerial resolution on conflicting public and private interests.

²Fred P. Bosselman, "Components of National and State Land Use Policy," State Planning Issues '72 (Lexington, Kentucky: The Council of State Planning Agencies and The Council of State Governments, 1972), p. 11.

³Ibid., p. 10.

⁴Zoning is the practice of dividing an area under local governmental jurisdiction into a number of districts (zones) in which only selected types of land use are permitted.

⁵John Delafons, Land-Use Controls in the United States, 2nd ed. (Cambridge, Mass.: MIT Press, 1969), p. 25.

⁶For an account of the lawyer's role in the development of zoning practice see, Delafons, Land-Use, pp. 16-31; and Richard F. Babcock, The Zoning Game: Municipal Practices and Policies (Madison, Wisc.: University of Wisconsin Press, 1969), pp. 87-100.

⁷See, Euclid v. Ambler Realty Co. 272 U. A. 365, 47 Sup. Ct. 114, 71 L. Ed. 303 (1926); James Metzenbaum, The Law of Zoning, Vol. 3, 2nd ed. (Mt. Kisco, N. Y.: Baker, Voorhis and Co., Inc., 1955), Chp. 12; Daniel R. Mandelker, Managing Our Urban Environment (Indianapolis: Bobbs-Merrill Col, Inc., 1966), pp. 564-74; and Alfred Bettman, City and Regional Planning (Cambridge, Mass.: Harvard University Press, 1946), pp. 51-7.

⁸For a description of current zoning practice see, Babcock, The Zoning Game; and for an idealized introduction to the technique, William I. Goodman and Eric C. Freund (eds.) Principles and Practice of Urban Planning, 4th ed. (Washington, D. C.: International City Managers' Association, 1968), pp. 403-42.

⁹Delafons, Land-Use, p. 27.

¹⁰Ibid.

¹¹For a resume of current practice see, Goodman and Freund, Principles and Practice, pp. 443-84.

¹² See, T. J. Kent, Jr., The Urban General Plan (San Francisco: Chandler Publishing Co., 1964), pp. 31-40; and also, Charles Hear's lucid mock explanation of this point in Land-Use Planning: A Casebook on the Use, Misuse, and Reuse of Urban Land (Boston: Little, Brown and Co., 1959), pp. 730-44.

¹³ For a piece of unmatched understatement on this situation, as well as further evidence of continuing confusion between planning and zoning see, Erling D. Solberg and Ralph R. Pfister, Rural Zoning in the United States: Analysis of Enabling Legislation (Washington, D. C.: Economic Research Service, U. S. Department of Agriculture, 1972), pp. 48-9.

¹⁴ Delafons, Land-Use, p. 137. This was still the case when the A. L. I. adopted the final draft of its model code in May 1974; see, AIP Newsletter, Vol. 9 (June 1974), No. 6, pp. 11-12.

¹⁵ Ibid., p. 143.

¹⁶ Fred Bosselman and David Callies, The Quiet Revolution in Land Use Control (Washington, D. C.: Council on Environmental Quality, 1971), pp. 314-15.

¹⁷ See, Ibid., Appendix, pp. 1-13; and State Planning Issues, '72, pp. 1-12.

¹⁸ Bosselman and Callies, Quiet Revolution, pp. 1-327; State Planning Issues, '72, pp. 1-43; Journal of Soil and Water Conservation, Vol. 27 (Sept. - Oct., 1972), pp. 194-226; E. J. Croke et al., The Relationship Between Land Use and Environmental Protection (Argonne, Ill.: Center for Environmental Studies, Argonne National Laboratory, 1972); Kenneth J. Dueker and Joseph S. Draker, The Land Use Policy and Planning Assistance Act of 1972: Information Systems Implications (Iowa City, Ia.: The Institute of Urban and Regional Research, The University of Iowa, 1972), pp. 1-12.

¹⁹ See, Bosselman and Callies, Quiet Revolution.

²⁰ There are many detailed reviews in existence dealing with the Hawaiian experience. Bosselman and Callies give a balanced presentation in Quiet Revolution, cited above. For an emphasis on the shortcomings see Bosselman, "Components of . . . Land Use Policy."

²¹ John Friedmann, "The Concept of a Planning Region--The Evolution of an Idea in the United States," Regional Development and Planning (Cambridge, Mass.: MIT Press, 1969), p. 497.

²² Dueker and Drake, Land Use Policy and Planning, p. 5.

²³ Friedmann has identified local land use planning as basically a form of allocative planning, like economic planning or the planning of public service delivery, an allocation of scarce resources among competing interests — but this time dealing with space instead of capital or manpower; see, John Friedmann, Retracking America: A Theory of Transactive Planning (Garden City, N. Y.: Anchor Press, 1973).

²⁴ These counties include: Allen, Bourbon, Cherokee, Crawford, Labette, Montgomery, Neosho, Wilson, and Woodson.

²⁵ This method follows closely the approach adopted by J. Brian McLoughlin in his successful synthesis of the broader planning process, Urban and Regional Planning: A Systems Approach (New York: Praeger Publishers, 1969). McLoughlin underscores the importance of understanding the locational aspects of activities and the pattern of their spatial interaction in the title and contents of his third chapter, "Location Theory, A Foundation for Planning."

²⁶ See, Frederick T. Aschman, "The 'Policy Plan' in the Planning Program," Planning 1963 (Chicago: American Society of Planning Officials, 1963); and Goodman and Freund, Principles and Practice, pp. 327-48.

CHAPTER II

RATIONALE, DEFINITIONS AND ASSUMPTIONS

I. INTRODUCTION

Although the problems dealt with in this study were formally set forth in the first chapter, it will be useful at the outset to review the underlying motivation for the effort, to clarify the terminology to be used, and to recognize assumptions underlying the thesis. The rationale for the study is discussed first. An attempt is made to set the work in the context of contemporary planning research and to justify some of the rather presumptive positions taken in relation to what would appear to be the mainstream of work in planning theory.

Second, to minimize communicative difficulties, a section covering the definitions of several terms which may not be in general usage among planners is offered. Thus, necessary distinctions can be made more succinctly, and any appearance of excessive jargonese will be dispelled.

And third, in the same spirit of creating a common ground of understanding, the more significant assumptions which lend primary direction to development of the ideas presented here are stated explicitly. This endeavor should prove most useful during the latter parts of this paper when the model regional land use policy plan is constructed, and when an empirical application of that model is attempted.

II. RATIONALE FOR THE STUDY

This study has been undertaken for two reasons. First, it is hoped that some minor contribution can be made to the developing body of planning theory, especially as it applies to regional land use planning. This is approached by way of a synthesis of concepts developed basically in the social sciences; attempting to mold these together into a conceptual framework which can give a normative foundation to the land use planning process. Such an intellectual construct, stated in terms of the relationships which have been found meaningful in comprehending human land use and settlement patterns, is essentially absent from the planning literature.

Secondly, and intimately related to the task of theory building, an effort is made to formulate a conceptually satisfying model non-metropolitan regional land use policy plan. Most existing plans either rely on recourse to the traditional city planning paradigm, couched as it is in the principles of property rights and due process of law; directionless taxonomies, listing the 'do's and don'ts' of technocratic experience; or, at best, loose discussions of notions dealing with man/land relations and implicit scraps of location theory. It is felt that a theoretical elaboration of these last two ideas will provide the necessary foundation for more potent land use policy planning.

As stated in the introductory chapter, recent state and federal level work dealing with areawide land use planning has emphasized the importance of regional economic development and environmental protection as essential considerations in large scale land use planning. Unfortunately most of this literature remains on the level of description

and classification.¹ McLoughlin has recently discussed man in his ecological setting and location theory as a basis for planning.² It seems clear that he is pointing in the right directions, but his coverage of the topics remains superficial — acting rather as exhortation than explanation. Earlier Boverter suggested the need for an emphasis on spatial location theory in regional planning, and McHarg presented an impassioned plea that regional land use planning be done from the ecologist's perspective. Friedmann has emphasized the importance of spatial theory as a basis for regional planning, while touching on a few of the broadest concepts developed in that explanatory literature.³ Chadwick, Foley and Webber have all discussed the conceptual importance of understanding society's spatial structure.

A. Distinctions between Theory and Methodology

Planning, like any professionally applied field of academic inquiry has a broader scope of interests than the traditionally defined subject-oriented disciplines. It should not only share their concern for epistemology, but must as well determine ways to fulfill its role as an active change agent. Such a position properly prompts methodological considerations at two scales. First, methods must be devised to handle raw information describing the phenomenal objects of concern. In land use planning these objects are presented by the cultural landscape, the maze of settlement and productive land use patterns which combine to create the physical milieu of human society. In a desire to understand these phenomena, to describe, analyze and predict them, planning shares a common interest with the social sciences, and should rightly draw from and add to their methodological techniques.

Secondly, in achieving the role of an effective agent of rational social change, planning must lean for support on the methodological paradigms of disciplines concerning themselves with administration, government, education and the like. It is in this area that planning has made the most striking methodological advances, moving from the production of static visions of the future in the form of comprehensive maps, to the view of planning as a continuing process which centers around the formulation of public policy and staff assistance to general government. In so doing, planning has progressed from a design-oriented profession which tried to induce a conception of the general welfare from projected patterns of urban growth, to a goal seeking exercise which attempts normatively to deduce and implement future urban development based on explicitly enunciated public wishes.⁴

The great breadth of these methodological demands, ranging from techniques of analysis and projection of socio-economic data to goal formulation and effective implementation of governmental policies, goes far in explaining what would appear to be a pre-occupation with the mechanics of planning. But consideration of the history, philosophy, scope and methods of planning should not, as seems to be the case, be carried on under the guise of theory building.⁵ (See Figure 2-1).

A brief examination of the more notable "theoretical" essays in the urban planning literature will suffice to point up this apparent confusion.⁶ Such discourses tend to be discussions of planning methods, usually attempting to suggest the proper placement of the planning function in the institutional structure of a democratic society, or advocating devices for making the planning process more responsive to

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FIGURE 2-1
METHODOLOGIES AND THE PLANNING PROCESS

PROCESS COMPONENT	METHODOLOGY	
	RESEARCH	IMPLEMENTATION
1. Decision to Plan		X
2. Pre-Planning Studies	X	
3. Selection of Alternatives	X	X
4. Plan Preparation	X	X
5. Plan Adoption		X
6. Plan Implementation		X
7. Review and Revision	X	X

the desires of the citizenry. These concerns must be commended as vital efforts, both philosophically and methodologically, if planning is to define and serve its guidance role in American society. But, equally important, they must be recognized as what they are: normative discussions of philosophy, scope and methodology — what to do and how to do it. Only in the most vernacular usage of the term can they be regarded as theorizing. One must go to the second or third preferred entry in a standard dictionary to find a definition which conceptualizes theory as abstract thinking, speculation or supposition.

One paperback desk reference defines theory as:⁷

Systematically organized knowledge applicable in a relatively wide variety of circumstances, esp., a system of assumptions, accepted principles, and rules of procedure devised to analyze, predict, or otherwise explain a specified set of phenomena.

This definition follows generally the accepted terminology of the philosophy of science, which views theory building as an attempt to formulate deductively a body of assumptions, models, principles and rules which present a simplified construct of some portion of objective reality. Theory allows the scientist, with a relatively high measure of probability, to explain, predict, and thus potentially control some systematic class of phenomena.⁸

Note in the above definition that "rules of procedure" chronologically follows "assumptions and principles," being a logical outgrowth of the parameters set by the latter.⁹ It is argued here that such a nomothetic body of knowledge is required to provide the necessary conceptual framework for the development of effective research and application methodologies for the planning process.¹⁰ The objective system

in question, however, is not the planning process itself, but rather the observable attributes of land use and settlement patterns which stand as the primary artifacts of human society. If one is to plan for desired changes in human land use patterns, a theoretical understanding of the apparent internal dynamics of the cultural landscape is essential.¹¹

B. A Conceptually Sound Framework for Land Use Planning

Planning then, like engineering or medicine, should be a professional-level technological activity, which applies theoretically organized knowledge drawn from the systematic sciences to real world problems.¹² In a recent article Mann has argued that "to an important extent, American urban planning has become applied social science."¹³ He has also recognized, at least implicitly, the difference between theory, research methods, and implementation-applications set out in the above discussion.¹⁴ One of the bodies of theoretical knowledge Mann recognizes as important to planning is categorized as "Geography and Location Economics."¹⁵

Friedmann, recognizing the need for a theoretical basis for regional planning activities,¹⁶ rightly implies that planning's identity is provided by its spirit and its methods.¹⁷ He goes beyond Mann by asserting that:¹⁸

Perhaps it is in geography and the economics of location that one can discover an adequate theoretical foundation for planning on a scale larger than the city.

Although Friedmann points out that the emphasis to date in regional science has been on methodology, he feels that a set of generalizations

of established validity do exist and that they can provide a nascent theoretical base for regional planning.¹⁹ He ends by defining regional planning as ". . . the process of formulating and clarifying social objectives in the ordering of activities in supra-urban space."²⁰

As noted before, Boventer and McLoughlin basically share this conviction, and McLoughlin would want to add principles established from the consideration of society in its environmental milieu to the theoretical base. McHarg argues this latter point throughout his Design with Nature.²¹

As pointed out by Clarkson, the geographic discipline, as aspiring science which has traditionally bridged the gap between the social and physical sciences, has developed a formidable literature dealing with both man/land relationships and the spatial aspects of human activities.²² Generalizations taken primarily from that literature are used in this paper as conceptual models, building blocks of what Blacklock called verbal theory,²³ to synthesize the beginnings of a theoretical foundation for regional land use planning.

This approach lays emphasis on the land use planning factors currently stressed by state and pending federal legislation, while attempting to help place the planning process on a sound theoretical course. The difficulty of integrating anthropocentric models of industrial location and ecologically balanced models of man/environment relations in a rationally consistent fashion must be recognized from the beginning. It is felt, however, that such an attempt is imperative.²⁴

The first aim, then, of this thesis is to suggest one possible first approximation of a conceptually sound framework for regional land use planning. Such an exercise is not in the proper sense theory building; for planning, like any applied field, has no theory as such of its own. Rather, it is a task of assemblage: a synthesis of several theoretical constructs from the social sciences to provide a foundation for technological application—for planning.²⁵

C. A Model (Non-Metropolitan) Regional Land Use Policy Plan

The second goal of this paper is to attempt to develop a model non-metropolitan regional land use policy plan, employing the notions synthesized from the social science literature to provide a sound theoretical base. The policy plan, as suggested in Chapter I, is perhaps the most hopeful social application methodology yet developed for the planning process.²⁶ After an explicit set of public goals and objectives has been enunciated, the policy plan—a systematic general statement of governmental policies for action in a specific area of public responsibility—provides a deductive energizing mechanism for governmental activities upon which to base routine decision-making.

Because of its generality the policy plan offers reasonable flexibility and is applicable as a standard for the decision-making needs of a dynamic system. As such, it offers a degree of reality (read implementability) unattainable in the static visions of the future presented in the traditional comprehensive plan. If the policy plan is conceived upon the informed desires of the public, evolved from a reasonable theoretical base, and backed up by a workable set of implementation tools, it should have an acceptable probability of

realization.

By its very nature, the policy plan implies the proper location of the planning function in societal affairs: at the heart of governmental decision-making. It recognizes planning above the site level as an inherent function of government, and places the immediate output of the planning effort (the plan document) in its necessary place at the womb of the public decision-making process.

Policy planning holds the potential for furthering the democratization of American government, introducing a new measure of accountability into the evaluation of official actions, while at the same time increasing governmental efficiency through the clear identification of ends and means. It offers efficiency and flexibility to the decision-maker, and clear purposiveness and accountability to the citizen.

The model regional land use policy plan developed here is meant to be applicable, with adequate localization, to any non-metropolitan region. The non-metropolitan emphasis is chosen for three reasons: (1) the problems involved are less complex, making it rather less difficult to adapt the generalized conceptual models synthesized from the social science literature into meaningful land use policy statements; (2) the author has had direct practical experience in a non-metropolitan regional land use planning situation, having written the initial land use element of a comprehensive plan for a nine county regional planning area; and (3) sufficient empirical data is available to support operationalization of the model as a guide to land use planning decision-making in a selected multi-county non-metropolitan region in

Kansas.

III. DEFINITIONS

A. Cross-Disciplinary Nature of the Study and the Need for Clarity

This paper attempts to address needs of the planning profession perceived by the author, and to integrate ideas spawned in several related fields of academic inquiry into a form applicable to meet such requirements. Unavoidably the terminology of planning, geography, economics, regional science and ecology are rather freely intermingled throughout. Understandably a rather diverse lexicon of expressions is required in the name of precision.

Most of the vocabulary employed is known to planners. Much of it is in general usage. This section presents definitions for several terms, the exact mutual comprehension of which is probably imperative for effective communication. In several instances clarification takes the form of an operational definition, offering a specific, usable definition of a word which might otherwise carry a more general connotation.

B. Definition of Terms

The following terms are thought to be useful, expressive tools and will be employed for the purposes of this study as defined below, unless specified otherwise in particular instances.

1. Land (earth's surface). Subsuming the vernacular usage and the economist's terminology, land is used here to refer to that portion of the earth which acts as a stage for human pursuits. It is the interface of the earth's land/water surface (lithosphere and hydrosphere)

with the atmosphere; the environmental setting for the biosphere and, what Teilhard de Chardin has called, the noosphere. Since there is no discrete separation between these several elements, the earth's surface is used here to include the earth's crust, the short distance beneath that crust in which man is inclined to delve, the smaller bodies of water and the sea coasts where human activities know no effective barrier, and the thin layer of air which is full of man's buildings, his wastes, his communications, and his vehicles. These three interwoven states of matter comprise the "land" of contemporary man: he breathes it, drinks it, walks on it, and he and his thoughts and ideas fly through it.

2. Physical environment. Broader than the notion land, physical environment includes all the tangible objective world man observes around himself: the earth's surface; the biota; man's own tinkering on the earth's surface - his roads, dwellings, and productive land uses; and the atmosphere, with its winds, clouds, thunder and rain. It is useful to make a distinction at times between the "given" (or less accurately, the "natural") environment and the "humanized" environment. This distinction becomes more and more difficult to define with any degree of surety with the passage of time, and our increasing understanding of past human transformations of the earth's surface.

Physical environment includes this objective milieu, but specifically excludes, to the extent possible, the social environment. It includes man's cultural artifacts, but attempts to exclude learned societal behavior and human cultural intercourse which shape and are shaped by the physical landscape.

(With the advent of 'social planning' in the United States, it has become increasingly fashionable to discount the physical structures in which human activities unfold. The efficacy of purposively locating human activities in relationship to each other on the landscape is commonly belittled as a tool for achieving social ends. It is argued throughout this study that such a position is patently in error.)²⁷

3. Ecosystem. Ecosystem is used in this paper to denote the complexly related chain of interacting forces, creatures and things which exist in a finely balanced state of dynamic equilibrium on the earth's surface. Although it is applied at several different scales of areal generalization, it always refers to the life-process system which is evolving on the earth's surface from the interplay of the sun's energy, the waters, and the earth's legion symbiotically related plants and animals, including man.

4. Resource. The concept resource is used here to mean those objects located differentially throughout the physical environment which are culturally defined as useful by some segment of human society. The absolute physical extent of a resource is one constraint on its availability for human use, but cultural selectivity and the stage of a society's technological development are equally important factors limiting its exploitation. Resource substitution tends to play an important role in ameliorating constraints imposed by physical availability, although such replacement has logical limits. Omitted from this definition of resources is any consideration of "human resources" or potentials. Relevant examples include: minerals, potable water,

soil fertility, various plant crops and animals, or particular climatic characteristics (amenity resources).

5. Areal differentiation. This term explicitly recognizes the fact that phenomena vary from one place to another over the earth's surface. It is this variety from one place to the next which one observes when traveling and which urges one to see what lies around the next jog in the road. It is this difference in phenomenal characteristics over the earth's surface which makes some sites potentially more attractive for particular human activities than for others. One example might be the variable elevation above sea level of the earth's crust. Another could be the random distribution of a particular recognized mineral resource such as coal. The concept can be applied equally as appropriately to differences in socio-economic characteristics such as population density, unemployment, predominant economic activity or religious persuasion.

6. Region. An extensive literature has developed in several academic disciplines dealing with the regional concept. No attempt is made in this study to exploit its richness. The word region is used loosely here to imply an area of the earth's surface, of variable size, which can logically be viewed as a unit.

The intellectual importance of detailed taxonomic distinctions is readily recognized, but their utility in the identification of planning regions is doubtful. A planning region is defined here as any supra-urban administrative unit assigned planning and management responsibilities as a function of general or special purpose government.

7. Regional specialization. Referring especially to economic activities (although equally applicable to other cultural pursuits), regional specialization concerns the tendency of people in any given region to emphasize particular activities and to neglect others. The localization of economic pursuits in an exchange economy is the primary example of such areal specialization of labor. Regional specialization is usually explained as a variable function of the areal differentiation of resources, cultural preferences, and levels of technological development. Such specialization is an intimate part of the urbanization process.

8. Complementarity. A trait of two or more regions, complementarity is characteristically said to exist when the particular regional specializations of the individual areas under consideration offer the potential for development of a symbiotic interrelationship. The term is typically used to refer to economic complementarity, the market system's impetus for trade. Obvious examples are the potential exchange of primary agricultural products from a farming area for secondary industrial products assembled in an urbanized region.

The concept of intervening opportunity suggests that the potential complementarity of any set of regions may fail to materialize if the exchange needs of such areas are met by other more conveniently located regions. This phenomenon is most readily explained in terms of the next two concepts discussed below, spatial interaction and the decay function of distance.

9. Spatial interaction. The movement of people, goods and ideas from one place to another over the earth's surface is termed here

spatial interaction; a prerequisite for exploiting potential regional complementarity and accelerating regional specialization—and thus urbanization. The intensity of spatial interaction over any given portion of the earth's surface is caught up in a circular chain of causation with the density of a region's population, the level of its socio-economic activity and cultural development, and the development of transportation and communication technologies. (Transportation and communication can be conveniently subsumed under the term circulation.)

Spatial interaction is used at times in the abstract sense to denote activity flows and feedbacks between relative locations in hypothetical space. It is the thread which binds together different areas with bonds of interdependency, while offering the unique opportunity for cultural and economic cross-fertilization and exchange. Such circulation networks can lead to the development of civilization among men.

10. Distance decay function. The typically inverse relationship found between any two points on the earth's surface and the distance separating those points is thought to be a function of the effort required to overcome the time/distance separating them. In the vernacular this concept is represented by the commonly accepted notion that the farther away two places are from one another the less contact there will be between them. It must be remembered, of course, that such a generalization requires a priori the assumption that all other factors affecting spatial interaction among a population of N points can be considered equal. This is an unrealistic assumption which must be

modified, for empirical utility, to reflect myriad "push," "pull" and catalytic factors, e. g.: lack of employment opportunities, variety of goods and services offered, the differential selectivity prompted by existing circulation networks, etc. Factors such as complementarity and cultural affinity tend to cause major deviations from this expected pattern.

The device most commonly used to predict interaction between any set of points, the gravity model, employs this assumption, modified by the most apparent skewing variable, "mass" (size) of the N points. In general form this model postulates that:

$$I_{ij} = \frac{P_i P_j}{D_{ij}} \quad (1)$$

where: i, j represent the points in question, I is the index of interaction, P_i, P_j equal the population (mass) of points i and j, and D_{ij} equals the distance between the two points. Researchers have found, when properly modified and calibrated, such a model typically predicts traffic flows and other such phenomena with a reasonable degree of accuracy.

11. Cultural landscape. This term is used in two fashions. Most broadly, it refers to the earth's surface as transformed by human occupation. More typically though, it is used in this paper to label the hierarchical pattern of population and activity concentrations (nodes), and connecting flows (circulation networks) which characterize human organization of the biosphere, and tend to provide a substantive skeleton for the noosphere. The difference between these two usages should be clear from context, but at any rate it is, in fact, only a matter

of abstraction.

The most commonly portrayed abstract cultural landscape is probably the Loschian economic landscape, derived largely from Christaller's theoretical central place hierarchy (See No. 14 below). Empirically observed cultural landscapes, or potential surfaces generated by use of gravity models, are frequently represented by means of iso-line mapping; thus showing a topography of peaks and valleys of intensity. Computer mapping techniques are popular for this work.

12. Settlement pattern. Settlement patterns are the most conspicuous component of the overall cultural landscape. The term is used here to refer to the morphological arrangement of inhabited dwellings in relationship to one another and the area that they occupy. An attempt is made to specify between 'settled places' (any significant clustered grouping of human dwellings, from a village to a metropolis) and 'dispersed settlement' (isolated dwelling units such as farm steads).

At times, the pattern of settlement as a component of the cultural landscape is referred to as "clustered," "random," or "uniform." These terms relate to a continuum of patterning which can be rigorously specified by descriptive statistical techniques such as the nearest neighbor method of point pattern analysis.

13. Urban function. The role played in the organization of human society by settled urban places, the city's raison d'etre, is designated as an urban function. Historically several purposes for urbanization have been identified, including: ceremonial, military,

administrative and economic functions. Although many cities show evidence of fulfilling to some extent all these roles, most urban places tend to display a relative degree of specialization -- depending primarily on one particular function or subset of functions for their meaning.

The urban place serves a purpose for the larger population unit, providing specialized secondary, tertiary and quaternary human activities as a service to a surrounding hinterland (defined by a given set of criteria). In the present age of heroic materialism (advanced market economy), obsessed by the objective world and its possession, management and consumption, most cities are viewed as serving an economic function. Three important urban economic functions are resource exploitation, transportation, and distribution of goods and services. The relationship between an indigenous, exchange-economy urban place and its hinterland is characterized as symbiotic, and its relative location on the cultural landscape is largely determined by its function.

The economic functions which are provided by an urban place to any exogenous population constitute that city's economic base, the services the community sells to the outside world in order to earn a living. Economic base theory suggests that since wealth can only be created by bringing outside buying power into an area, economic growth is the result of expansion in a city's economic base, which in turn increases internal demand for consumer products and thus causes expansion of the place's residentiary functions.

14. Multiplier effect and economic linkages. Expansion in the

output of a particular sector of an area's economy, acting as an energizing mechanism for general economic growth, is often referred to as multiplier effect. This swell of production activities is induced because of the interindustry connections between the various economic pursuits in an area -- the vertical and horizontal linkages which are built by the use of one activity's output as another activity's inputs of production. As suggested above, it is conceptualized that this entire iterative process is set in motion by exogenous consumer demand.

15. Scale economies. (Agglomeration economies). It is generally recognized that the relationship between the amount of effort expended (e. g.: production costs) and the quantity of a task completed through that effort (e. g.: economic outputs, or value added) is not a first degree linear function. Increases in the output capacity of a productive operation will not require unit per unit increases in production cost. This relationship is probably best conceptualized as a stepwise function: a lagging direct relationship characterized by a series of flattened plateaus in intervals along a cost curve. At given points along the production-unit size continuum, an increase of X units of production could be realized without adding proportionately to production costs. This notion is referred to as economies of scale, and generally they are thought to increase with size until, at some upper limit, congestion and lack of manageability set in and reduce efficiency.

In terms of the space economy, three different types of agglomeration economies are typically identified. First, there are internal

scale economies of the individual firm or production unit. These are savings that can be gained internally by the discrete enterprise through expansion, thus exploiting the stepwise nature of the cost curve. Second, there are external economies of concentration. Such savings are available to firms of any given size (and frequently lower minimum threshold size of a viable production unit), based on location in an area specializing in that firm's line of activity. Secondary production costs can often be shared among individual producers, and the random quality of production inputs tends to rise while price per unit falls. The most immediately linking activities (both horizontally and vertically) frequently choose nearby locations, thus accelerating the process. The ready availability of skilled labor, specialized services, and, perhaps, suppliers and industrial consumers offer obvious relative locational advantages.

The third category of scale economy is usually termed economies of urbanization, and refers to the relative locational advantage accrued by production units when situated in urban areas. This concept is in fact a vastly expanded logical extension of the proceeding notion. In urbanized locations not only are specialized labor, production and maintenance inputs available to the firm, but access to administrative and financial sources, as well as use of the sophisticated urban infrastructure and access to the urban market, all offer the potential of significantly increasing the competitive position of an enterprise. The higher cost of urban land is typically insignificant in comparison to scale economies gained by choice of an urban production site.

It should be noted that external economies of concentration and

urbanization are often substituted for internal scale economies of the firm. Contrary to popular opinion in some quarters, net costs for small firms are thus frequently higher in rural locations than in more built-up areas. Cheap land and labor can seldomly make up for all the additional real costs of economic life an enterprise must withstand itself when located in a remote situation miles removed from urban markets. (The substitutability of factors of production in any particular industrial sector accounts for much of the variation between types of economic activities on this point.) One need only look to the many abandoned nonurban branch plants for empirical verification of this fact. Within logical bounds, the most economical production unit still tends to be a large plant located in a large urbanized area.

16. Central places. In number at least, the most common urban economic function is the service and goods distribution center, the central place. This type of city takes its generic name from the fact that it is typically centrally located within its hinterland, providing necessary secondary and tertiary services to a trade area population. Because most Kansas communities serve primarily as central places, this concept will play an important role in the present study.

Originally postulated by Christaller in the mid-nineteenth century to explain the location of service centers in southern Germany, central place theory conceptualizes a nested hierarchy of central places, graduated by the number of service functions available and the size of the city's hinterland. This uniformly distributed pattern of urban places and its interconnecting web of circulation networks tends to lend regularity to settlement patterns and provide a skeleton for

the cultural landscape. There is a reciprocal arrangement between the number of central place activities taking place in a city and the size and/or population density of its hinterland; the larger the central place the larger its hinterland. There is typically an inverse relationship between city size and the frequency of occurrence in any sample of urban places, a fact attributed to the requirements of the central place hierarchy.

Two basic components of the central place concept are: (1) threshold population, and (2) range of a good. These notions, applied as minimum requirements for maintenance of viable urban units, could be said to calibrate the nested central place hierarchy in any given instance.

17. Threshold population. (Threshold demand). Threshold population is used in this paper to refer to the minimum population necessary in any given area to create an aggregate demand of sufficient size to support a viable production unit for a particular good or service. It is explicitly recognized that the demand characteristics of a population vary as a function of income, the elasticity of demand, culturally defined needs and other such factors, but in general it is assumed that the demand curve is constant throughout a regional population; i. e., one additional consumer represents one added unit of demand. Thus, threshold demand and threshold population are employed as rough synonyms.

For purposes of abstract discussion it is also assumed that population is distributed relatively evenly over the cultural landscape, and that areal demand can be uniformly increased by the expansion of

an activity's hinterland. This assumption is of course distinctly unrealistic, and is relaxed as the discussion progresses, especially in dealing with empirical information. The spatial margins of feasibility of any given economic activity are defined as the broad boundaries in which a viable production unit of that activity may be located, experiencing at least a threshold level of demand.

18. Range of a good. Range of a good refers to the relative distance on the cultural landscape over which a given good or service produced in a particular location can compete successfully with similar products originating at other points in the space economy. Depending on the nature of the good or service in question, only a certain amount of transport expense can be added to the direct costs of production if the item is to remain saleable. Lower order goods and services, such as convenience items, can only bear minimal transport costs, while higher order functions such as specialized medical services or major capital expenditures display much more tolerance to the costs of overcoming distance. People typically will not go far to purchase groceries or hardware goods, but may travel hundreds of miles to buy a new car or visit a heart specialist. Range of a good, then, suggests the bounds within which the distance decay function does not overbalance an activity's attractiveness -- the border in which consumer demand will withstand the costs of production and overcoming distance.

High level central place functions, because of the relative expense of their production inputs, require a comparatively large threshold population, but because of the high price of such items they display a relatively broad range. The reverse is true of lower order activities.

Thus, small central places which offer only lower order functions will dominate a fairly small market area, and higher order places offering more sophisticated goods and services will interact with a much larger tributary area.

19. Optimum location. Within the spatial margins of feasibility of any activity it has been suggested, in classic least-cost location theory, that an optimal location exists for the placement of a viable production unit, which may be identified empirically. Typically such places have been identified on the basis of least production and delivery costs, or, more recently, the absolute maximization of profit. The continuous areal data necessary for any realistic operationalization of this concept are typically unavailable, and generalized trend surfaces constructed as a part of an economic landscape are often used to supply the necessary information. The discontinuous nature of the areal distribution of socio-economic characteristics, and the frequent observation of similar production units at variable locations, encourages the employment here of the margins of feasibility notion.

20. Optimizing and satisficing behavior. These relatively commonplace notions, first compared by the sociologist Simon, have been successfully applied to characterize hypothesized human locational behavior. The concept of an optimizing ("economic") man, rationally utilizing, in single minded fashion, perfect knowledge to select the "best" location for a particular activity has largely been dismissed in recent years. In its stead the idea of a satisficing man, in terms of locational behavior has been introduced. In this conceptualization an individual is

motivated to pursue the activity in question at a location within the spatial margins of economic feasibility and personal expectations.

21. Measures of socio-economic growth. The operational measures of socio-economic growth used in this paper are: (1) population growth, (2) absolute increase in employment, (3) increase in the labor participation rate, and (4) increase in the value of the gross areal economic product.

IV. ASSUMPTIONS

In the discussions that follow several assumptions are made concerning such things as the nature of social change, the dynamics of environmental relations, and the place of planning in American society. For purposes of logical defensibility it is necessary to specify the essential points of these assumptions explicitly. It should be acknowledged that the assumptions set out here fall roughly into two categories. First, there is a group of empirically founded generalizations about the objective world which represent highly probable statement of fact. And secondly, there is a class of more questionable assertions which are adopted for the sake of convenience. While no adequate defense can be offered for this second group of tactical statements, it is thought that they will prove useful in limiting and directing the scope of the present inquiry.

A. Guiding Assumptions

The following assumptions are made concerning the nature of man, his relationship to his physical environment, and the workings of human society. At given times in the next two chapters some of the ideas

set forth here are brought under discussion, but otherwise it can be taken for granted that the logical points of departure for the arguments presented in this paper are those stated below.

1. Reality of the objective world. The world of sensual perception as it can be objectively known is assumed to be "real" and the only source of "true" knowledge. While man may not have the capacity to discern "ultimate reality" through his observation of the phenomenal objects of experience, he is capable of learning about reality through the application of reason to his perceptual experience of the world.

This is basically an "empirical-realist's" view of the origin of knowledge, and reflects the thoughts of Hobbs, Locke and Hume, among others. (It is probably most clearly represented in the philosophy of David Hume, 1711-1776).²⁸

It is perhaps rudimentary to make this particular assertion. But with the popular questioning of the nature of society and existence in general that occurred during the late 1960's and early 1970's it seems necessary to make such an avowal; particularly since some of the effects of extreme rationalistic and intuitionistic positions are still being felt within the planning profession. Especially within some quarters of its academic branch, planning, like other fields, has gone through a thorough examination of challenges to the scientific-empirist's view of reality. Such alternative schemes are evident in the writings of even conventional ecologists such as McHarg and radical social advocates like Kuenzlen.²⁹

2. Usefulness of the nomothetic viewpoint. If one assumes the reality of the phenomenal world and that that world can be known through the senses, the immediate question with which one is presented is how best to employ man's perceptive and cognitive powers to learn about objective reality. Several paradigms have been set forth historically, ranging from intuitive models, resting on implicit reasoning and authority as their validating principles, to the methodology of science.

In this paper it is assumed that the most effective approach to learning about man's world is embodied in the philosophy of science. A nomothetic paradigm of knowledge is assumed, which states that our comprehension of the human milieu is best secured by a method of deductive generalization from accepted principles. No extensive defense of this viewpoint is undertaken here. Although this position confronts head-on the idiographic tradition represented in much planning literature, which emphasizes the uniqueness of the individual situation (both in the comprehensive planning tradition and in the writings of many social activists and anti-urbanists), it is held here that the planner may best approach his task from a theoretical conception of reality — based on the experience gained by the social sciences over the course of the last several decades.³⁰

3. Possiblism and bounded freewill. Man's fate is neither set by the accident of his environmental circumstances, nor does he operate in a realm of unfettered free choice and perfect, single-minded rationality. It is assumed in this thesis that man's environment

offers a relatively wide range of alternative courses of action to him, which are perceived and acted upon as a limited idea-set, filtered through the beholder's internalized cultural matrix and defined largely by his state of socio-economic and technological development.

It is further assumed that in any given situation man chooses between his perceived alternatives in a "satisficing" manner. He is barred from even attempting optimal solutions by imperfect knowledge, imperfect reasoning ability, complex multi-goal purposes, and a subjective view of his surroundings. He accepts outcomes within the bounds of his expectations.³¹

For the planner this suggests that even in the ideal situation, the decision-making process will be clouded by faulty information, a residual component of unpredictability, inadequate decision-making methodologies, and cross-purposes at work among the most dedicated of decision-makers. Human kind tend to judge success within the bounds of the feasible. So although man's response to his situation is not dictated by his environment, his own inadequacy prevents him from carrying purposive courses of action to their optimal solution.

4. The linearity of social change. Human society, by the force of inertia, tends to continue moving along prevailing vectors of socio-economic evolution in an incremental fashion. As Teilhard observed, it is all but impossible to identify the origin of new mutations in any evolutionary sequence.³² We always seem to become conscious of directional trends after they are established, overwhelming realities. Thus, although breaks in continuity along any escalating linear dimension must be recognized, it is most realistic (in a

probablistic sense) to assume that perceived social trends will continue in the short-range to follow a constant time/space linear function.

In a specific application, it is assumed here that socio-economic growth in the United States (as defined above) will continue to take place in the same patterns that have been predicted by prevailing social theory and observed empirically over the last two or three decades. In the absence of catastrophic discontinuities in the chain of socio-economic interdependencies (such as an escalation of the present energy crisis, political disenchantment, severe environmental degradation, etc.), and disregarding the rhetoric of non-metropolitan politicians, the pattern of human settlement and social interaction will continue to concentrate. American metropolitan areas will continue to monopolize the society's dynamism. External economies or urbanization will continue to dominate the economic sector of our national life, and social opportunities will continue to follow money sources. For good or ill, the only disaggregation likely to take place in the near future is within the metropolitan conurbations. By current measures of magnitude (including amenities), non-metropolitan and rural America will continue to decline in importance and influence.³³

5. Usefulness and public acceptance of a rational public planning process. Although there is widespread disagreement at present as to the proper philosophy and methodology of planning, and in spite of both continuing political and academic arguments over the usefulness and desirability of public planning, a tactical assumption is made here that rational public planning is an accepted principle of government in the

United States.

6. Existence and importance of the general welfare. Despite its continued discreditation on the intellectual level,³⁴ and little overt support (at the micro-level at least) from empirical observation, it is assumed in this thesis that an identifiable public interest exists and that public planning is only justifiable for the promotion of the general welfare. The public interest is not conceived naively as a general consensus among citizens in a pluralistic (heterogeneous, perhaps) society. Rather, it is defined as the product of functional social interdependencies which arise among disparate groups as a result of proximity, shared circumstance, and organizational structures.³⁵ It is argued that the recognition and identification of this functional public interest is imperative for the progress (if not preservation) of contemporary large-scale representative democracy.

Although the above assumptions may be relaxed during the discussion of particular points during the next several chapters, in general they may be considered as the point of departure for the logical extension and syntheses which follow. The next chapter examines in some detail the relationship between man and his natural environment.

NOTES FOR CHAPTER II

¹ A brief glance over Bosselman and Callies' compendium The Quiet Revolution in Land Use Control, cited frequently in the first chapter, will serve to verify this observation.

² J. Brian McLoughlin, Urban and Regional Planning: A Systems Approach (New York: Praeger Publishers, 1971), esp. pp. 19-74.

³ Edwin von Boverter, "Spatial Organization Theory as a Basis for Regional Planning," Journal of the American Institute of Planners, Vol. 30 (May, 1964), No. 2, pp. 90-100; Ian L. McHarg, Design with Nature (Garden City, N. Y.: Doubleday & Co., Inc., 1971); John Friedmann, "Regional Planning as a Field of Study," in John Friedmann and William Alonso (eds.) Regional Development and Planning (Cambridge, Mass.: M.I.T. Press, 1964).

⁴ Donald L. Foley, "An Approach to Metropolitan Spatial Structure," in Melvin M. Webber et al., Explorations into Urban Structure (Philadelphia: University of Pennsylvania Press, 1964), pp. 21-78. Foley states, "In the simplest terms, perhaps, this is a distinction between product and process." (p. 56) He suggests the terms "unitary" and "adaptive" as descriptive of the traditional design-oriented comprehensive plan and the policy plan respectively. Foley states:

The essence of the unitary approach, as this relates to urban and metropolitan planning, is to view the city or the metropolitan community as having a spatial, physical form that can be grasped and reduced to maplike graphic presentation. Planning is viewed as an activity dedicated to forming a picture of a future physical environmental pattern for a community and to fostering such development and control measures as will best ensure that the community will develop toward that future pattern. In short, a future spatial pattern is proposed as a goal. The traditional means for communicating this future goal is the general plan, comprehensive plan, or master plan. Implicit in this unitary approach is the assumption that there will be a reasonably centralized governmental authority to prepare, approve, and carry out such a plan. (pp. 56-7)

In support of this description, Foley quotes Mitchell (Robert B. Mitchell and Chester Rapkin, Urban Traffic: A Function of Land Use (New York: Columbia University Press, 1954), p. 171.) to the effect that: "Most planning today is static. It portrays a desired urban pattern at some future date."

Concerning adaptive planning, Foley states:

This approach focuses on process, particularly the interactions that take place on a daily or short-term cycle—such as commuting, shopping, weekday business dealings, week-end recreational trips and activities, etc.—rather than on a longer term cycle. Metropolitan planning, from this point of view, would seek first to gain a full understanding of how establishments and households interact (via the myriad actors involved), and how the metropolitan area develops over time. It then would seek to identify alternative policies and to examine the probable implications of each in light of certain established criteria as to desirable future conditions or optimal decision-making conditions. Planning, according to this approach, would seek to influence various of the development forces at work rather than aiming for a future metropolitan form as a goal. (p. 57) (emphasis added)

⁵ Chadwick offers a confused rebuttal to this assertion; an apologia for planning theory which contains all of the confusion and misuse of terms alluded to here.

This (planning's interdisciplinary nature), some would argue, stems from planning's historical roots in other professions, and, they would say, its still heavy reliance on other disciplines and lack of meaningful theoretic core of its own. We reject this view and proffer instead an argument which sees planning as holistic, spreading outwards from a central philosophy in a logical and coherent manner. This philosophy is that of a systems view of planning, which we have advanced in a previous chapter but it is also concerned with that which is planned, not in the "practical" sense of day-to-day planning, but in a general, that is, comprehensive way, as a basis for a general theory of planning. The hypothesis is that planning of the sort we are concerned with—and indeed of any sort—involves the arrangement of spatial patterns over time. (p. 84)

He also notes in his introduction, "Because both of the need for a General Theory of Planning and of the fact that stressing process leads us to consider purpose, a great deal of this book is taken up with the HOW? of planning—. . ." (p. xii) See George Chadwick, A Systems View of Planning: Towards a Theory of the Urban and Regional

Planning Process (Oxford: Pergamon Press, 1971.)

As will be noted in the above quotations, first Chadwick argues that planning does indeed have a theory of its own. Then he identifies that theory as a holistic philosophy (planning as a system), but remarks that in some manner planning must also be concerned with the objective world to be planned. Together this process/object relationship make up a general theory of planning. No distinction is made between philosophy and theory. (See Peter Davis (ed.), The American Heritage Dictionary of the English Language, Paperback edition (New York: Dell Publishing Co., Inc., 1970), p. 532: "Philosophy" - la. Speculative inquiry concerning the source and nature of human knowledge. b. Any system of ideas based on such thinking. Compare this to the definition of theory used below.) And then general theory is said to be a methodology (the HOW? of planning), with secondary importance assigned to that which is to be planned. In short, philosophy, theory and methodology are used ambiguously as approximate synonyms.

For a clearly drawn distinction between philosophy, methodology and theory see, David Harvey, Explanation in Geography (New York: St. Martin's Press, 1970), pp. 2-23; and for a less comprehensive statement related to history and philosophy see, Hubert M. Blalock, Jr., Theory Construction: From Verbal to Mathematical Formulations (Englewood Cliffs, N. J.: Prentice Hall, 1969), pp. 1-2; and also, Robert Dubin, Theory Building (New York: The Free Press, 1969).

⁶ Prominent examples would be: John Friedmann and Barclay Hudson, "Knowledge and Action: A Guide to Planning Theory," Journal of the American Institute of Planners, Vol. 40 (January, 1974), No. 1, pp. 2-16; Lawrence D. Mann, "Practicable Planning Theory," Paper presented at 1973 A.I.P. Conference, Atlanta; Paul Davidoff and Thomas Reiner, "A Choice Theory of Planning," Journal of the American Institute of Planners, Vol. 28 (May, 1962), No. 2, pp. 103-15; John Dyckman, "Planning and Decision Theory," Journal of the American Institute of Planners, Vol. 27 (November, 1961), No. 4, pp. 335-45; _____, "The Practical Uses of Planning Theory," Journal of the American Institute of Planners, Vol. 35 (September, 1969), No. 5, pp. 298-300; Martin Blessing, "Planning for the Poor: The Advocacy Approach," in Managing Our Urban Environment; Paul Davidoff, "Advocacy and Pluralism in Planning," Journal of the American Institute of Planners, Vol. 31 (November, 1965), No. 4, pp. 331-8; Lawrence Haworth, "An Institutional Theory of the City and Planning," Journal of the American Institute of Planners, Vol. 23 (1957), No. 3, pp. 135-43; A. Benjamin Handler, "What Is Planning Theory," Journal of the American Institute of Planners, Vol. 23 (1957), No. 3, pp. 144-50; and Allen Altschuler, The City Planning Process: A Political Analysis (Ithaca, N. Y.: Cornell University Press, 1965). In the last entry cited, Altschuler roundly damns planners and planning--with a spirit of internecine jealousy--for their lack of theoretical justification for their work. It must be noted however that Altschuler proves himself to be primarily concerned with methodological problems, not the lack of theoretical

support. (Although this too is typically lacking as well in the case studies he presents.) See Altschuler, The City Planning Process, pp. 409-453.

Several notable exceptions to this generalization must be recognized, including: Gerald P. Carrothers, "An Historical Review of the Gravity and Potential Concepts of Human Interaction," Journal of the American Institute of Planners, Vol. 22 (Spring, 1956), pp. 94-102; Kevin Lynch and Lloyd Rodwin, "A Theory of Urban Form," Journal of the American Institute of Planners, Vol. 24 (November, 1958), No. 4, pp. 201-14; Albert Z. Guttenberg, "Urban Structure and Urban Growth," Journal of the American Institute of Planners, Vol. 26 (May, 1960), No. 2, pp. 104-10; Britton Harris, "Some Problems in the Theory of Intra-Urban Location," Operations Research, Vol. 9 (Fall, 1961); Edwin von Boverter, op. cit.; Britton Harris (ed.), Special Issue on Urban Development Models, Journal of the American Institute of Planners, Vol. 31 (May, 1965), No. 3; and _____, "The Uses of Theory in the Simulation of Urban Phenomena," Journal of the American Institute of Planners, Vol. 32 (September, 1966), No. 5, pp. 258-73. It should be noted that these articles are either drawn from planning sources, or were written by people trained or regarded primarily as planners. While this second list is quite equivalent in entries to those cited directly above, it becomes rapidly apparent when reading the literature that such papers are conceived of as techniques sources, not additions to planning theory. Planning theory, it is held, deals with how planning should be done. (See especially Dyckman's introductory article to the special edition of the J. A. I. P. cited above, and the Friedmann and Hudson article). It should be added, of course, that planners tend also, as they should, to borrow from the theoretical literature produced wholly within other disciplines. But here again, it would appear that they are basically looking for another source of the tech-fix. A distinction such as Isard's, between 'theory and methods of regional analysis,' is hardly recognized. In Isard's aging volumn theory, he deals obviously with the nature of regions, while methods refers to techniques for their analysis. As pointed out above, Chadwick, for example, uses theory and methods as synonyms. (See, Chadwick, Systems View, pp. 275 and 285).

In Handler's interesting article cited above ("What Is Planning Theory," The summary of a faculty seminar held at the University of Michigan.), it is noted that:

Several of the speakers questioned the existence and even the possibility of a unique theoretical framework for planning. Professor Walter Isard expressed himself as being not too sure what planning means and doubtful that there is any planning theory to speak of. He made sharp distinction between a focus on understanding and one concerned with goals and problem solving. The latter area--planning--must apply the techniques and theories of the former. The difficulty, as he sees it, is that in the field of urban and regional studies the last

generation or two has seen no development of basic theory which might lead to good problem solving. Nor is it possible simply to utilize the theoretical structures of other areas because the established fields have not developed the needed techniques and theories. When queried about the character of the theoretical framework which needed to be developed, he cited, as examples gravity models, communications theory, input-output techniques and linear programming; referred to any social science theory bearing upon the region; and recommended exposure to different theories which might throw some light on urban problems. To sum up: He could see no planning theory as such, the theoretical framework for planning consisting of any and all social science theoretical structures suitable for helping to solve urban and regional problems. (p. 144) (emphasis added)

It should be noted that all of Isard's suggested theoretical input to planning deals with conceptualization for explaining the objective world—the subject matter of planning.

In summary Handler concludes:

The first two speakers eschew the idea of planning theory as such. The last two see the necessity⁷ and the desirability of heavy borrowing of techniques from other fields, but appear to see in land use theory at least the beginning of a specialized theoretical structure for planning.* If they are correct, then up to now planning theory, insofar as it has a separate and independent existence, is a branch of economic theory. This puts us right back to the position taken by the first two speakers—that there is no such distinct thing as planning theory.

* During the discussion at one of the Seminars, Professor Burnham Kelly said that planning can be defined as dealing entirely with definite effects on land. If this concept is coupled with the notion that there can be an independent planning theory, then land use theory is both its beginning and end. (p. 145)

⁷ Davis (ed.), American Heritage Dictionary, p. 718. Compare this to Dubin, Theory Building, pp. 29 and 223.

⁸ For a treatment of these ideas set in a frame easily applicable to planning, see: Harvey, Explanation, pp. 87-99; Hans L. Zetterverg, On Theory and Verification in Sociology (Totowa, N. J.: The Bedminster Press, 1965), pp. 9-29; and Henry Margenau, "What's a Theory," in Sherman Kuhn (ed.) The Structure of Economic Science (Englewood

Cliffs, N. J.: Prentice Hall, 1965).

⁹ Although this sequence may legitimately be viewed as 'chicken and eggish,' both Harvey, Ibid. and Zetterberg, On Theory, make this chronological distinction.

¹⁰ Here it is perhaps useful to re-emphasize the distinction between theoretical constructs and methodological techniques. The two are symbiotic, but certainly discrete. The method is developed to analyze the systematic relationships hypothesized by theory, during the model testing process used to expand theoretical horizons and test accepted notions. Thus, for example, input-output analysis is a method devised to measure the interrelationships suggested in economic growth theory.

It is argued here that all too frequently the planner tends to adopt techniques such as input-output analysis into his methodological bag, with little more than a nod to its parent--and necessary antecedent--economic growth theory. This tendency helps explain (1) the tech-fix atmosphere surrounding so much planning work and education (although any applied field will tend to be highly concerned with the application of scientific knowledge), and (2) the lack of normative defensibility in many planning analyses and recommendations. Intricate analytical techniques are often adopted wholesale as a diversionary devices, in hope of feigning understanding; even though they are so frequently misused. Sophisticated data analysis and projection is only as reliable (and defensible) as the theoretical base behind it (see, Harvey, Explanation, pp. v-vii).

The tendency to borrow methods, without their prerequisite conceptual backing, might well be accounted for in part by the prevailing view of theory building within the planning profession, the view suggested above in the text and note number 7. Another factor adding to this inclination is the general distaste for theorizing displayed by the practitioner profession at large. It is informative to observe that the only theoretical publication listed in Bestor and Jones' City Planning Bibliography under the explicit heading "theory" is the J. A. I. P. issue edited by Dyckman cited above, "The Practical Uses of Planning Theory."

This, in turn, is probably in part a function of the American distrust of government in general and the intelligentsia in particular. Tocqueville observed in 1835 that this unwillingness to accept the validity of the trained opinion is a direct function of ideological equality among men, and a general trait of democracy. (See, Alexis de Tocqueville, Democracy in America). Practitioner planners may, along with many they serve, believe that any further theoretical support might only increase planning's idealistic, authoritarian nature.

A more general tendency, one which most applied technologists seem to share, is the thirst for only practical kinds of knowledge. The furniture maker wants to know how to shine the wood, not why it shines. The civil engineer typically wants to know how to make the bridge stand up, not why it stands up. The traditional planner asks how to arrange

a city's land use, not why land use patterns tend to develop as they do. Unfortunately, perhaps, for the craftsman, as the chore at hand becomes more complex, it becomes more difficult to approach without knowing more of the "why's"—the craftsman becomes a technologist, his task demands more knowledge, time and money to complete. Along with these developments, he is more frequently unsuccessful in implementing his wishes in the objective world.

As failure and a long time span for completion of his work become more common, in order to improve his performance, keep his job, and maintain necessary financial support for his projects, he must be able to justify his efforts in terms of that real world he is trying to affect—not in explanations of the internal dynamics of his faltering efforts. The best analogy for planning is possibly the medical profession. The medical practitioner must base his applications on a knowledge of how the human body functions. Methods of intervention are vitally important. They must be learned by trial and error; the intern must learn how to perform a tracheotomy or how to de-fibrillate a person in cardiac arrest. But knowing when such actions are required, and the original development of such methods of operation, must be based on empirical observation and theorization—the biological sciences, not medical training per se. The medical student studies the biological and physical science for years before he learns to make his first diagnosis, before he takes his first temperature or gives his first shot.

The physician's ability to aid his patient depends first of all on his understanding of human biological functions, and only then on his ability to analyze malfunctions and initiate corrective measures. If a doctor does not know that the probable outcome of adding more fluids to a person with pulmonary edema is additional liquid build-up, he may well apply a bronchial cleanser in hope of clearing the lungs, which, being water-based, merely adds to the problem, decreasing the patient's ability to ventilate himself still further, and perhaps speeding his death. Complex theoretical biological and physical inter-relationships must be deduced and tested; a laboratory procedure which includes modelling exercises on sub-human animals and eventually on human kind. But the development of methods to cope with various problems which occur in the human anatomy must be based on such a knowledge of its functioning and its predictable behavior, not just the desired ends of medical practice.

How many malpractice suits today actually stem from the physician not knowing what was necessary, as opposed to misapplication of healing techniques? Obviously the former source of error is by far the most basic! Is it not the gap which separates the chiropractor from the medical doctor? Either may perform their bag of remedies well enough, but only one has much hope of setting an arrested heart to beating again. The difference in their methods is based upon differing theoretical understandings of how the body functions; one seems to have some empirical verification while the other does not.

The planner, like the M. D., should be a professional level applied technologist. The systems the planner is want to deal with

are certainly as important ultimately to human survival as the functioning of the body itself. And without a doubt, they are at least as complicated, and less well understood.

Human society is just beginning to recognize that the common fate of mankind, and therefore every individual man, is tied up with how we develop our primary, and most important, human artifact: the humanized landscape—man's functional development of his environment, man in nature.

¹¹ This position has long been recognized by practicing regional planners, trained in economics or other systematic disciplines. (See the numerous dated publications of the National Resources Planning Board; and Friedmann, "Regional Planning as a Field of Study.") But regional planning, as Friedmann recognized, has traditionally been a separate activity from urban planning, and urban planners have certainly been predominant in terms of numbers. Design oriented urban planners seem yet today not to recognize the actual subject matter of planning deliberations—the objective system being planned.

Foley has noted that, "What is currently confusing is that the physical planners seek reasonably to bound their own scope, and yet know that, willy-nilly, they are assuming broad responsibilities for the kinds of activities and the patterns of social contacts facilitated by their physical designs." He went on to suggest, speaking of hypothetical relationships drawn from his conceptual model of metropolitan spatial structure, that, "Such hypotheses have in common a concern for the extent to which, or the conditions under which, the physical environment, through the spatial pattern it provides, either encourages or prevents the spatial arrangements of a functioning organization or system. To date, we have had relatively little systematic study of this, although obviously assumptions about this relationship intrude into what the physical planner undertakes. We suggest that a theory for metropolitan (and city) planning will need to give central consideration to this class of relationship." (emphasis added) (Foley, "Approach," pp. 43 and 45 respectively.)

Hightower, although inclined to view the dichotomy sympathetically, has noted the need to recognize the difference between procedural and objective abstractions. (Henry C. Hightower, "Planning Theory in Contemporary Professional Education," Journal of the American Institute of Planners, Vol. 35 (September, 1969), No. 5, pp. 326-29.)

A major distinction must be made between theories of the planning process—procedural theories—and theories concerning phenomena with which planning is concerned. Davidoff and Reiner's "Choice Theory" is a well-known example of purely procedural theory. Reilly's Law is a theory that attempts to explain, by means of a gravity model, the relative attraction of consumers to competing locations, and so is clearly

a part of the substance with which some planners must be concerned but is not a part of the theory of planning per se. Some subjects or bodies of theory may involve both process and matter, so the distinction between them is sometimes arbitrary. Citizen participation, for example, is a part of some theories of the process as well as an attribute of our urban environments. (emphasis added) (p. 326)

Recently Friedmann has quoted Hightower on this point. See, Friedmann, "Knowledge and Action," p. 2.

George Chadwick, in A Systems View of Planning, follows the A. I. P. definition of planning, observing that planning's concerns include: "the unified development of urban communities and their environs and the states, regions, and the nation, as expressed through determination of comprehensive arrangement of land uses and land occupancy and their regulation." (emphasis added) (pp. 83-4) In relation to this he states, "What is urgently needed . . . are methods of spatial process in an essentially spatial discipline, and a major issue must be the spatial representation of many-dimensional situations: first comes the understanding of the nature of space and spatial relationships, then follows their representation—in spatial terms." (emphasis added) (p. 109) So although Chadwick tends to use the terms theory and methodology rather confusingly, he seems to grasp the substance and sequence of their relationship.

¹² Zetterberg presents this position well, as it applies to engineering; see, Zetterberg, On Theory, pp. 10-11. Erich Jantsch, Technological Planning and Social Futures (New York: John Wiley, 1972), esp. pp. 11-61, describes the integrative technological approach which is proper to planning.

¹³ Lawrence D. Mann, "Social Science Advances and Planning Applications: 1900-1965," Journal of the American Institute of Planners, Vol. 38 (November, 1972), No. 6, p. 346.

¹⁴ Ibid., Table 1, pp. 348-50. Note the taxonomy of advances as they are characterized as: theoretical, methodological, and applied.

¹⁵ Ibid., pp. 355-6.

¹⁶ Friedmann, "Regional Planning as a Field of Study," p. 61.

¹⁷ Ibid.

¹⁸ Ibid., p. 62.

¹⁹ Ibid., pp. 62-3.

²⁰ Ibid., p. 64; and Foley ("Approach," p. 45) also stresses this same point at the metropolitan scale:

Since the physical planner is so responsible for recommending spatial patterns, the critical question is how much difference it makes for the functioning of an activity system whether it is arranged in one spatial pattern or another. The metropolitan planner shares responsibility for exploring this question with a myriad of other researchers—those concerned with business administration, public administration, the economics of location, the design of transportation and communication systems, the effect of social relations, and so forth.

²¹ McHarg, Design with Nature.

²² James D. Clarkson, "Ecology and Spatial Analysis," Annals of the Association of American Geographers, Vol. 60 (December, 1970), No. 4, pp. 700-16.

²³ Blalock, Theory Construction, pp. 1-4.

²⁴ For an elaboration of this notion, see: U. S. Dept. of State, Stockholm and Beyond, Report of the Secretary of State's Advisory Committee on the 1972 United Nations, May 1972, Department of State Publication 8657 (Washington, D.C.: U.S.G.P.O., 1972), esp. pp. 5-76 and 116-28.

²⁵ For a variant discussion of similar ideas see, Ernst Greenwood, "Relationship of Science to the Practice Professions," Journal of the American Institute of Planners, Vol. 24 (1958), No. 4 pp. 223-32. Greenwood's "practice-theory" is called a body of practice-principles that can guide the activities of the practitioner. (p. 223)

²⁶ Policy planning was first formally discussed by Frederick T. Aschman, "The 'Policy Plan' in the Planning Program," Planning 1963 (Chicago: American Society of Planning Officials, 1963), pp. 105-11; and Franklyn H. Beal offers a thorough discussion of policy planning within the framework of the comprehensive plan in Chapter 12 of William I. Goodman and Eric C. Freund (eds.), Principles and Practice of Urban Planning (Washington, D. C.: International City Managers' Association, 1968), pp. 327-48; see also, F. Stuart Chapin, Jr., The Policies Plan: Instrumentality for a Community Dialogue (Pittsburgh: Institute of Local Government, University of Pittsburgh, 1965), pp. 105-20; and Herbert J. Gans, "From Urbanism to Policy-Planning," Journal of the American Institute of Planners, Vol. 36 (July, 1970), No. 4, pp. 223-5.

²⁷Foley has made this point forcefully in his conceptual discussion of metropolitan spatial structure:

The key question is how to examine the implications of alternative spatial arrangements on the functioning of given units of social organization. At the metropolitan community level, this is to ask in what alternative ways a metropolis may be spatially structured and with what relative facilitating or restricting of activities as indicated by the effect on the functional organization and, indirectly, the values.

And again, "For the physical environmental pattern, once fixed, would seem to constitute a forceful determinant, having impacts or providing restraints on the spatial patterning of activities and, via the kind of relationships we are discussing, on the functional organization of the community."

See, Foley, "Approach," pp. 32 and 29 respectively.

²⁸ See, Frank Thilly and Ledger Wood, A History of Philosophy (New York: Holt, Rinehart and Winston, 1962), pp. 282-383, esp. 367-81; C.E.M. Joad, Philosophy (Greenwich, Conn.: Fawcett Publications, Inc., 1962), pp. 72-102; and Herbert Feigl, The "Mental" and the "Physical" (Minneapolis: Univ. of Minnesota Press, 1967).

²⁹ McHarg, Design with Nature; and Martin Kuenzlen, Playing Urban Games: The Systems Approach to Planning (Boston: I Press, Inc., 1972). For an extension of some of McHarg's intuitional notions; see, Theodore Roszak, Where the Wasteland Ends (New York: Doubleday and Co., Inc., 1972).

³⁰ An explanation and defense of the philosophy of science applied to social inquiry may be found in many standard social science texts on the subject, including: Zetterberg, On Theory; Blalock, Theory Construction; Harvey, Explanation; and a classical statement (written in confrontation of a traditional holistic, idiographic paradigm) Fred K. Schaefer, "Exceptionalism in Geography: A Methodological Examination," Annals of the Association of American Geographers, Vol. 43 (1953), pp. 226-49. See also any the standard philosophy of science treatments of this topic, such as: John G. Kerneny, A Philosopher Looks at Science (Princeton, N. J.: D. Van Nostrand Co., 1959); Philipp Frank, Philosophy of Science (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1957); Morris R. Cohen and Ernest Nagel, An Introduction to Logic and Scientific Method (New York: Harcourt, Brace & Co., 1934); Wesley C. Salmon, The Foundations of Scientific Inference (Pittsburgh: Univ. of Pittsburgh Press, 1967); and Carl Hempel, "Theoretician's Dilemma: A Study in the Logic of Theory Construction," in Carl Hempel (ed.), Aspects of Scientific Explanation (New York: Free Press, 1965).

³¹ The classical statement of this position is presented by Herbert A. Simon, Models of Man: Social and Rational (New York: John Wiley and Sons, 1957); refer also to D. McGregor, The Human Side of Enterprise (New York: McGraw-Hill, 1960). A review of models of man is presented in S. Doniger (ed.), The Nature of Man (New York: Harper, 1962). See also Friedmann and Hudson, "Knowledge and Action," pp. 7-10 for a planning oriented comparative discussion of rationality and decision-making; and the discussion of "Satisfaction or Optimisation? The Bounds of Rationality" in Chadwick, A Systems View of Planning, pp. 301-19; and the classic statement in the planning literature, John W. Dyckman, "Planning and Decision Theory," Review Article, Journal of the American Institute of Planners, Vol. 27 (November, 1961), No. 4, pp. 335-45.

³² Pierre Teilhard de Chardin, Le Phénomène Humain (Paris: Editions du Seuil, 1955), Trans. Bernard Wall, The Phenomenon of Man (New York: Harper & Row, Publishers, Inc., 1959).

³³ For recent, overwhelming empirical evidence in support of this contention, see, Brian J. L. Berry, "Regional Growth Centers: A Status Report," in Proceedings of the Regional Economic Development Research Conference, April 19, 1972 (Washington, D. C.: U. S. Dept. of Commerce, 1972), pp. 9-45.

³⁴ Friedmann and Hudson present Arrow's refutation of the community welfare function in "Knowledge and Action," p. 8; see also, Kenneth J. Arrow, Social Choice and Individual Values (New York: John Wiley and Sons, Inc., 1951).

³⁵ Foley and Webber both argue this view of functional integration as a solidarity that emerges from difference, and relate its encouragement to what they term an "adaptive" planning process. See, Foley, "Approach," pp. 60-3; Melvin M. Webber, "Urban Place and Nonplace Urban Realm," pp. 93-4, 108-114 and 132-7; and _____, "Order in Diversity," in Lowdon Wingo, Jr.(ed.), Cities and Space: The Future Use of Urban Land (Baltimore: The Johns Hopkins Press, 1969), pp. 23-56, esp. pp. 24, 48-9 & 52; Frederick Bair's discussion of "Planning and the General Welfare," in Frederick Bair, Planning Cities (Chicago: A.S.P.O., 1970), pp. 89-140; and also, Meyerson and Banfield's discussion of conceptions of the public interest in Martin Meyerson and Edward C. Banfield, Politics, Planning and the Public Interest (Glencoe, Ill.: The Free Press of Glencoe, 1955), pp. 322-9.

CHAPTER III

SAFEGUARDING THE NATURAL ENVIRONMENT:

AN ASPECT OF MAN/LAND RELATIONSHIPS

I. INTRODUCTION

A sketch has been offered above of the evolution of land use planning in the United States, the principle emphases in contemporary regional land use planning efforts have been identified, and one argument as to the proper role and content of planning has been put forward. Recent state land use initiatives and proposed federal legislation tend both to concentrate on (1) protection of the natural environment and especially its renewable resources, and (2) the location of human activities, with particular regard to the location of economic activities (and the distribution of economic growth), large scale urban development, and key public facilities. The unsuccessful Land Use Policy and Planning Assistance Act of 1973-74 offers abundant evidence of the perceived importance of these factors:¹

The Congress finds that many Federal agencies conduct or assist activities which have a substantial impact on the use of land, location of population and economic growth, and the quality of the environment, and which, because of the lack of consistent land use policies, often result in needless, undesirable, and costly conflicts between Federal, State, and local governments, thereby subsidizing undesirable and costly patterns of development.

The Congress finds that intelligent land use planning and management can and should be a singularly important process for preserving and enhancing the environment, encouraging beneficial economic development, and maintaining conditions capable of improving the quality of life.

In specifying the necessary content of state land use planning processes and programs, S.268 provides that:²

[State planning processes must include] the compilation and continuing revision of data, on a statewide basis, related to population densities and trends, economic characteristics and projections, environmental conditions and trends, and directions and extent of urban and rural growth; [as well as]

the establishment of methods for identifying large-scale development and development of public facilities or utilities of regional benefit, and inventorying and designating areas of critical environmental concern, areas which are suitable for key facilities, and areas which are, or may be, impacted by key facilities. . .

[State land use programs must include] methods of implementation for—

(A) exercising control over the use and development of land in areas of critical environmental concern to assure that such use and development will not substantially impair historic, scientific, or esthetic values or natural systems or processes within fragile or historic lands; that loss or reduction of long range continuity and the concomitant endangering of future water, food, and fiber requirements within renewable resource lands are minimized or eliminated; and that unreasonable dangers to life and within natural hazard lands are minimized or eliminated;

(B) exercising control over the use of land within areas which are or may be impacted by key facilities, including the site location and the location of major improvements and major access features of key facilities;

(C) assuring that local regulations do not arbitrarily or capriciously restrict or exclude development of public facilities, housing, or utilities of regional benefit;

(D) influencing the location of new communities and controlling the use of land around new communities; [and]

(E) controlling proposed large-scale development of more than local significance in its impact upon the environment;

The intent of S.268 (like the several state originated programs discussed in Chapter I) is clearly to improve the quality of American life by upgrading the quality of the country's cultural landscape

through initiation of a nationwide land planning process based on protection of the natural environment and purposive location of major land developments. But how can the myriad goal, policy, and programmatic statements proposed in such contemporary land use legislation be achieved? Even if one is willing to make the necessary causal assumptions between environmental quality and human satisfaction;³ even if one is willing to speculate that the courts will continue to re-define Anglo-American common law more in line with present popular environmentalist arguments;⁴ upon what rationale can planners and decision-makers base their implementation policies to assure that land development does not "substantially impair historic, scientific, or esthetic values or natural systems or processes within fragile or historic lands?" Upon what basis should decision-makers guide the "location of key facilities of regional benefit," "control large-scale development of more than local significance," and "influence the location of new communities?"

An attempt is made in this and the following chapter to provide the outlines of a conceptual framework which might be useful in posing answers to these questions. The remainder of this chapter addresses the problem of environmental quality, as an aspect of more broadly defined man/land relationships. Chapter IV faces questions dealing with the location of major land developments and key facilities, from the perspective of settlement and economic location theory.

II. THEORETICAL MODELS OF MAN'S RELATIONSHIP TO THE LAND

A. Necessity of a Theoretical Approach

Robert Kates, a noted geographer and environmental behavioralist, observed recently that there has been a marked tendency of late, in many quarters of society, to pontificate at some great length concerning actions which should be undertaken to improve industrial man's interactional relations with his environment.⁵ Battle lines have been drawn between the advocates of opposing viewpoints, although varying degrees of environmental protectionist rhetoric have come to be expected from large industrial corporations as well as traditional conservationist groups. What perhaps surfaced in the national consciousness with the Alaskan pipeline controversy, has flowered more recently in legion institutionalized attempts to halt "environmental pollution" and control more fundamental aspects of man/environment dynamics. Unfortunately, to paraphrase and elaborate on Professor Kates' comments, the logic and theoretical validity of much of the current thinking (and action) is questionable.

Those espousing both the fundamentalist and popularized ecology stances suggest that man "copy" nature.⁶ All apologies to the contrary notwithstanding, the legitimacy of the earth's surface as the home of man—as the provider of ever more discerning human demands and the stage of an increasingly complex socio-economic superstructure—is apparently at odds with their conceptual underpinnings. Teilhard's interface between the biosphere and the noosphere, Webber's non-place communities of interest, and Chadwick's multi-dimensional social spaces do not fit into their scheme of reality.⁷

On the other hand, the waning credibility of the couched positions of industrialists, some futurists, "growth is good" advocates, and conservatively-oriented individual liberties groups must also be taken at less than face value.⁸ The would be rational planner, decision-maker, or concerned citizen is forced to stand waveringly some place along this continuum; with most public action to date best characterized as a curious mixture of the two.⁹

The need for a sound theoretical basis from which to elaborate more effective planning policy is sorely evident. Burton, Kates and Kirkby have noted that:¹⁰

In seeking to provide an orderly and explanatory description of the earth as the home of man in times of rapid population growth and environmental degradation, the needs for credible theory and effective prescriptions are urgent. The theory must be able to bear the weight of modern scientific evidence and intellectual scepticism, and the prescriptions must show practical ways to contain the hazards and stresses of global environmental change.

The necessity of a theoretical approach to environmental planning was succinctly summarized earlier by Firey:¹¹

Most governments today are committed to the idea that they can improve their people's use of land and resources. In countries which are close to the subsistence level, the purpose is usually a fuller exploitation of those natural resources. In other countries, particularly the more industrialized ones, the goal is likely to be the conservation of natural resources. In either case, there is the intention of making some change in present uses of land and resources.

The idea that a government can change customary practices in the use of natural resources rests on some assumptions concerning the necessary and sufficient conditions for successful planning. There is no doubt that changes in resource practices do at times accompany deliberate efforts in that direction. It is just as true that such changes sometimes take place anyway, without

governmental intervention. On still other occasions, customary resource practices prove to be quite resistant to governmental planning efforts. This ambiguity in the relationship between plans and results is an obvious deterrent to rational policy making. Without dependable knowledge of the conditions for successful planning, resource policies are likely to turn into rash adventures, opportunistic compromises or unaccountable triumphs and failures.

Of course some discrepancy between plans and results is inherent in all purposive behavior, individual as well as social. In the case of governmental planning, however, the political consequences of such a discrepancy are likely to confront the planner with an ideological problem: how is he to explain his miscalculation? What general principles can he invoke which would, as it were, account for his errors by stating some systematic connections between them and various other kinds of events? Putting the matter another way, what general theory may there be which will specify the necessary and sufficient conditions for effecting changes in people's use of land and resources?

If one is to accept, then, the considered opinions of Burton and Firey, rational planning for protection of the natural environment can only occur within the framework of a systematic theory of the relationship between man and the land.

B. A Method of Focusing the Discussion

What kind of insight is provided in the literature of the social sciences that may be useful in sketching the relationship between man and his natural environment? Burton suggests one possible arrangement of the several existing models of man/land relationships. Figure 3-1 presents a modified variation of their "Matrix of Man-Environment Relationships."¹² On the abscissa the organizational principle of each model is characterized, ranging along a continuum from an environmentally initiated subject-object mechanism to a dynamic interactance system. On the ordinate the conceptual nature of the environmental

component of each construct is classified, moving along a progressively anthropocentric scale from a "natural" phenomenal view of reality to a subjective internalized picture of the world. If a diagonal were extended from point X in the upper left-hand corner of the diagram to point Y in the lower right-hand corner, relatively simplistic, static, universal, aggregate-scale explanations of man in nature gradually merge into systems models of increasing complexity, subjectivity and specificity. Row x₂ of the matrix, Humanized Landscape, is perceived by this author to be properly the province of more rigidly defined social and economic modelling, and has been left largely undifferentiated in this representation. Location theory, one of its major aspects, is dealt with in Chapter IV.¹³

It might be useful, in integrating the man/land matrix into a planner's frame of reference, to conceptualize Figure 3-1 as basically a subset in cell 3A of Foley's conceptual model of metropolitan structure.¹⁴ Figure 3-2 suggests this relationship. As Foley pointed out, the pivotal cells in this variant of his model are 2A and 3A; with prime attention given to the latter.¹⁵ Concentrating on 3A-2A relationships, the focal point of inquiry rests on the physical objects of the natural environment (including the quality of such objects) and the aspatial functional organization of society. Secondary attention is aimed at the impact of social values (e. g.: cultural patterns, norms, institutional setting) and technology upon functional social organization, and the interaction between physical phenomena and their spatial distribution.

X	MAN-ENVIRONMENT RELATIONSHIPS				
	SUBJECT-OBJECT			INTERACTIONAL	
	ENV. → MAN	MAN → ENV.	STATIC	DYNAMIC	
X ₁ PHYSICAL ENVIRONMENT	Environmental Determinism	Possibilism Landscape Modification Cultural Determinism	Biological Ecology Human Ecology		
X ₂ CULTURAL LANDSCAPE	↔	Location and Development Theories			
X ₃ COGNIZED ENVIRONMENT	Probabilism	Land Resources Environmental Behaviorism	As Resources		
	Y	Y ₁	Y ₂	Y ₃	Y ₄

FIGURE 3-1
A MATRIX OF MAN-ENVIRONMENT RELATIONS

Source: Highly modified from Burton, Kates and Kirkby, "Environmental Approaches," p. 17.

	(A) ASPATIAL	(B) SPATIAL
(1) VALUES	1A	1B
(2) SOCIAL ORGANI- ZATION	2A	2B
(3) PHYSICAL ENVIRON- MENT	3A	3B
	Matrix of Man - Environment Relation- ships	

FIGURE 3-2

"FOLEY'S CONCEPTUAL MODEL OF METROPOLITAN STRUCTURE"

The following discussion will focus on cell 3A, but unavoidably consideration will need to be given to its ties with cells 2A (and through it 1A) and 3B. In Chapter IV orientation will be shifted to the right-hand ordinate of Foley's diagram.

III. THE PRINCIPLE COMPONENTS OF SELECTED MAN/LAND MODELS

The intent of the following discussion is not a comparative evaluation of the major conceptual models of man's relationship to the land. Several scholarly treatments of that broader topic are presently available in the social science literature.¹⁶ The aim here is to isolate the more important interrelationships posited by each construct, and use these principle components as input to the formulation of a model non-metropolitan land use policy plan.¹⁷

A. Environmental Determinism

Dating from classical antiquity, environmental determinism states that man is a captive creature of his environment and that the immediate use of the land as well as a society's cultural development is a function of the stage upon which the human drama unfolds. In its purest form, environmental determinism views the natural environment as presenting the necessary and sufficient grounds for human social development.¹⁸ The land not only offers opportunities for man's exploitation, but causes him to accept them. Although the most powerful natural force for predestination has been frequently conceived to be climate, the land (narrowly defined) is also considered a potent factor.¹⁹

Hippocrates (c. 420 B.C.) in his discussion On Airs, Waters and Places contrasts the easy-going Asiatics living

in a very favorable region with the penurious Europeans, who must seek through greater activity some amelioration of their poor environment. He also contrasts the tall, gentle, brave folk of the most windy mountain lands with the lean, sinewy, blond inhabitants of the dry lowlands. Similar observations are recorded by Aristotle in his Politics. 'The inhabitants of the colder countries of Europe are brave, but deficient in thought and technical skill, and as a consequence of this they remain free longer than others, but are wanting in political organization and unable to rule their neighbours. The peoples of Asia on the contrary are thoughtful and skilful but without spirit, whence their permanent condition is one of subjection and slavery.' Greeks however living in the intermediate region, he considered, combined the best qualities of both.

Strabo's geographical writings contain many comparable references. He attempts, for instance, to explain how slope, relief, climate, and space relations of Italy affected the rise and the strength of Rome.

This rudimentary form of social explanation posed a chain of causation running something like the following: the natural environment exists as a formative stage for human activity; when man enters the scene he puts himself under its influence; and as a result of this happenstance the human character is shaped and human culture is evolved; and thus the humanized landscape is created. In symbolic terms:

$$\begin{aligned} (E \wedge M) &\longrightarrow (C \rightarrow H), & (2) \\ \therefore E &\longrightarrow H ; \end{aligned}$$

where E = natural environment, M = man, C = culture, and H = humanized landscape.

With the exception of the scientific writings of Alexander von Humboldt, this general hypothesis, E H, was carried over into the classical foundations of modern geographic thought.²⁰ Through the misinterpretation, perhaps, of Carl Ritter's sentiments by such students as Reuter, the idea of a purposive nature was passed down to

Kirchoff and, some would argue, to Friedrich Ratzel.²¹ Burton quotes Kirchoff to the effect that, "Basalt is conducive of Piety,"²² and the Sprouts cite Ratzel from "Man as a Life Phenomenon on the Earth," as saying:²³

The course of history in America, just as in corresponding periods of time in northern Asia, in Africa, and in Australia, only confirms the belief that lands, no matter how distant from one another they may be, whenever their climates are similar, are destined to be scenes of analogous historical development.

And this predisposition was by no means limited to German scholars. In the tradition of Montesquieu, the French historian Edmond Demolins insisted:²⁴

On the earth's surface there are an infinite variety of populations. What is the reason for this variety? It is the route (land areas lived in by a people) that creates the race and that creates the social type. Change one or the other of these routes; right away the social type is changed and you have another race. I will go a step further: if the history of mankind began again, without the earth's surface having been transformed, that history would repeat itself in its major facets. There would certainly be secondary difference . . . but the same routes would produce the same social types, and would give them the same basic characters.

This is indeed a strong position, and may help to explain the reaction of Vidal de la Blache and Brunhes that is discussed below.

A guarded, but equally dogmatic, form of environmental determinism originated in the United States in the works of Ellen C. Semple and Ellsworth Huntington. Griffith Taylor followed a special variant of environmentalism in Great Britain, which is dealt with at the end of the present discussion.

Semple studied under Ratzel in Germany, and despite careful explanation to the contrary, introduced the English speaking audience

to Ratzel's deterministic thought in her book Influences of Geographic Environment. The felt need on the part of Semple and Huntington to, at least by way of preface, qualify their deterministic arguments points to the course suggested partially by Taylor and developed by the French and American "Possibilists."²⁵ Nevertheless, Semple's writing displays her true inclinations:²⁶

Man is a product of the earth's surface. This means not merely that he is a child of the earth, dust of her dust; but that the earth has mothered him, fed him, sets him tasks, directed his thoughts, confronted him with difficulties that have strengthened his body and sharpened his wits, given him his problems of navigation or irrigation, and at the same time whispered hints for their solution. She has entered into his bone and tissue, into his mind and soul.

Griffith Taylor, in his teleological "Stop-and-Go Determinism," made hesitating concessions to environmental possibilism as a valid approach to man/land relations in certain instances.²⁷ He argued that "nature has laid down a Master Plan for the world," and that:²⁸

the best economic programme for a country to follow has in large part been determined by nature, and it is the geographer's duty to interpret this programme. Man is able to accelerate, slow, or stop the progress of a country's development. But he should not, if he is wise, depart from the directions as indicated by the natural environment.

Lewthwaite concluded:²⁹

. . . this is clearly an assertion that it is what man ought to do rather than what he does in fact do which is determined, a point made still more apparent when man is conceded 'the choice between wise and foolish actions' and the ability to force nature's hand, at least temporarily, if he is willing to pay the price.

Although this position is a considerable modification from those of earlier writers, the environmental determinist's argument always operates between Foley's cells 3A-2A-1A and 3B.³⁰ The natural

environment is always conceived as providing both necessary and sufficient grounds for a particular type of human cultural development, and thus human use of the land. To quote the Sprouts:³¹

In all its variants, environmental determinism is always reducible to the proposition that some environmental factor \underline{e} , or set of \underline{e} -factors, constitute the sufficient as well as necessary condition, or conditions, for the occurrence of \underline{x} . Thus, in the deterministic theorem, the observation of $\underline{e}_1 \dots \underline{e}_n$, justifies the prediction that \underline{x} will occur.

Or, as stated above, $\underline{E} \rightarrow \underline{H}$. Put in another fashion, $\underline{E} = \underline{H}$.

It is this simplistic reductionism that has tended to discredit environmental determinism. Too many human cultural varieties have been found to develop in similar environments for the environmental hypothesis to readily pass Burton's tests of scientific substantiation and skepticism. Most contemporary scholars would posit that $\underline{E} \neq \underline{H}$. With Hartshorne they would argue that "physical environmentalism has long since ceased to be the organizing principle of any school of geographic theory."³²

In conclusion, however, it must be noted that the Sprouts,³³ Lewthwaite,³⁴ and Freeman³⁵ all suggest that environmental determinism can still be a useful analytic tool in explaining limited subsets of human behavior. This, they argue, is especially true in particular situations in which, because of man's ill-preparedness, the environment takes the leading role.³⁶ By virtue of erratic and violent events—natural catastrophes (defined as hazards)—the environment may supposedly dictate at least man's immediate reactions; especially in a state of low cultural development. This position might be stated as:

$$(\underline{E}_i \wedge \underline{C}_i) \rightarrow \underline{H}, \text{ where } \underline{E}_i \in \underline{E} \text{ and } \underline{C}_i \in \underline{C}. \quad (3)$$

Burton's counter to this argument is discussed below in the subsection on Cognitive Behavioralism.

B. Environmental Possibilism

Perhaps it was the influence of the Enlightenment and the industrial revolution, which recognized and demonstrated man's prowess. Perhaps, as Tatham suggests, it was the influence of historians and other non-physical scientists coming into the geographic discipline. Or perhaps, it was partly a product of French reason and the critical cynicism of the Gallic mind. However; just after the turn of the last century, French historical and geographic thought rejected the environmental determinist's hypothesis and introduced an alternative model, named by Febvre "Possibilism." The Sprouts suggest that no one since Febvre has better caught and put to print the essence of the possibilist viewpoint:³⁷

There are no necessities. Possibilities are everywhere. And Man, master of possibilities, judges their use: it is to place him, therefore, in the forefront, a necessary reversal: man and no longer the earth, nor the influences of the climate, nor the determining characteristics of places.

This particular perspective took deep root in France through the promulgation of the Vidalienne tradition. Paul Vidal de la Blache and his more noted followers such as Brunhes, Demangeon, and Blanchard developed the possibilist hypothesis in a series of absorbing "regional monographs" which set the tone for most "regional geography" and "regional analysis" until, perhaps, sometime after World War II. Bowman and Sauer were notable proponents of possibilism in the United States.

The point of departure of possibilism is that man has the initiative. The natural environment is not only unpurposive, it is mute—just there, if you will. Whatever latent possibilities or limitations lurk in the environment can only be discovered through man's self-set goals, decisions and actions. The inclusion of the idea of limitations as a complement to possibilities recognizes that the possibilist model does not attempt to describe man as omnipotent. ". . . limitations," to quote Sprout, "there indubitably are, limits which will affect the outcome of any course of action undertaken, irrespective of whether or how perceived and reacted to by the actor in question." (emphasis added)³⁸ The environmental possibilist hypothesis might be stated symbolically as

$$(C_i \wedge E_i) \rightarrow H_i, \quad (4)$$

where all terms are defined as before and $H_i \in H$.

Note that man is not affected directly, and that a particular subset of culture intercepting with any given natural environment combine to produce a particular landscape. But man sets his own goals.³⁹ This lack of teleological purposiveness in nature even prompted many possibilists to argue for the study of the humanized landscape as the main role of geographic inquiry.⁴⁰ A more complex equation, refining the above simplification is suggested below.

Possibilism is not an explanatory model of man/land relationships; human goals and decisions are assumed as given. Possibilism sets itself only the chore of empirically identifying the possible interactions between human culture and the natural environment in any given place. In any such interrelationship there are obviously two sets of

variables; i. e., culture and environment. And, since by definition environment is neutral, it is the components of culture, largely social values and level of technological development, which produce human goals, decisions, actions, and thus, the humanized landscape.⁴¹

The possibilistic analyst attempts to specify what opportunities and limitations exist, or might exist, in any given cultural/environmental setting. The environment sets mute constraints, but culture takes the initiative, with technology playing a paramount role, and calculations frequently stated in terms of cost:⁴²

In the words of George Tatham, Canadian geographer: 'The opportunities offered by an environment are not all equal. Some demand little effort from man, others continual struggle; some yield large, others meager returns. The ratio between effort and return can be looked upon as price. . . ' Isaiah Bowman put the same idea in the 'punch line' that man 'cannot' move mountains without floating a bond issue,' and he 'conforms to many defective layouts because it would cost him too much to alter them.'

The contemporary "tech-fix" attitude, discussed by Burton is a logical extension of this method of calculation.⁴³

In the strict frame of possibilism, man's motives and decision-making processes can only be assumed. "It is the essence of the possibilist hypothesis that the milieu sets limits to achievement of whatever is attempted; and that these limits are operative irrespective of whether or how they are perceived and reacted to by relevant persons on the scene."⁴⁴ Symbolically,

$$\left[(S_1 \dots S_n, T_1 \dots T_n) \wedge (O_1 \dots O_n, L_1 \dots L_n) \right] \rightarrow H_i, \text{ and for}$$

$$\text{the analyst, } (P_i, D_i, G_i) \quad , \quad (5)$$

where, $\left[(S, T) \in C \right], \left[(O, L) \in E \right], \left[(P, D, G) \in A \right], \text{ and}$

S = social values, T = level of technological development, O = opportunities posed by the environment, L = limitations set by the environment, A = a set of assumptions made by an analyst, and P = assured perception of the environment by the subject group, D = assumed decision-making processes of the subject group, and G = assumed goals of the subject group.⁴⁵

C. Modification and Cultural Determinism

It is part and parcel of possibilism that man plays a major role in modifying or changing the face of the earth, and only a minor matter of deletion (forgetting that environmental limitations are the complement of opportunities) to hypothesize that man, equipped with an advancing technology, is omnipotent. Both of these emphases have been developed in respective sub-literatures which may logically be conceived as deviations from the mainstream of possibilist thought.

Modification. Landscape modification or man's role in changing the face of the earth as a perspective for viewing man/land relationships has presented man's cultural impact on environment in both positive and negative terms. This viewpoint did, in fact, pre-date formulation of the possibilist hypothesis, and the work of George Perkins Marsh is said to have substantially affected the development of French geographic thought.⁴⁶ Marsh's major publication, Man and Nature, was originally printed in 1864, and its first proposed title, "Man the Disturber of Nature's Harmonies," suggests its largely negative appraisal of man's modification of the land. In his commentary Marsh developed the argument that, from classical antiquity through the

mid-19th century, man had continuously despoiled the landscape as he modified it (typically, simplified it) to meet his economic desires. Non-renewable resources were exhausted, landscape was transformed and simplified to the point of instability and despoilation, and renewable resources were "mined" out of existence.⁴⁷

Two generations later, Sauer, in formulating his view of the present use of the land and its future possibilities, bridged the gap between the mainstream of possibilist thought and the literature of modification with his emphasis on cultural landscape evolution. In the words of the Englishman Freeman:⁴⁸

The work of Sauer, like that of many Americans, is partly based on the idea of the transformation of the natural into the cultural landscape--that is, the change from an area virtually uninfluenced by man to one greatly modified by his efforts. But it is interesting to compare Sauer's work with that of G. P. Marsh two generations earlier, for each had the idea of man's transformation of the landscape in folly or wisdom, in vastly different times.

It might be fair to suggest that by comparison with Marsh, Sauer took a rather more positive view of man's creative transformation of the earth.

An international symposium, dedicated to Marsh, was held in Princeton, N. J. in 1955 on the topic of Man's Role in Changing the Face of the Earth. The published proceedings of that meeting, edited by William L. Thomas in 1956, encompass the continuum of modification thought; with contributions from such scholars as: Gutkind, Sauer, Glacken, Teilhard de Chardin, Wittfogel, Gourou, Mumford, Sears, Thornthwaite, Strahler, Ullman, and Harris.

Although assessments of man's impact on the land range from visions of man as a legitimate creative force to an exogenous despoiler, one theme can perhaps be generalized from the thousand some odd pages: man plays a significant role in the evolution of the surface of the earth; technology is man's instrument, and in general, the replacement of natural complexity by social complexity is man's method.⁴⁹ The stability of the resulting cultural/environmental milieu depends on the compatibility (goodness of fit, if you will) of the human and natural systems. The paramount question for consideration may be whether the complex cultural superstructure is grounded in the cogs of the formerly more complex environmental system in a (substituting) symbiotic fashion, or whether the cultural framework is superimposed in a thoughtless, exploitative fashion. Will the cultural paradigm encourage long term inter-system stability, or will one-sided complexity (and complementary decline) create a degenerating situation?⁵⁰

A symbolization of the modification thesis is probably redundant. The differences between it and possibilistic representations are more a matter of tone and emphasis than substantial premises; with the former more interested in impact and outcome than the dynamics of the process.

Cultural determinism. Speaking first of Sauer's school of landscape chorology, and then turning to the employment of its methods in sequential historical studies, James observes:⁵¹

Studies in sequent occupance [of an area] represent the antithesis of environmental determinism. In a sense they represent a form of cultural determinism, for it is recognized that with any significant change in attitudes, objectives, or technical skills of the inhabitants of a region, the significance of the resource base must be reappraised.

Whether evidence of cultural determinism can be found in classical modificationist thought may be debatable. That the seeds of such hypotheses are to be found in the modification thesis is obvious. If the modifier, in typical possibilist fashion, believes that $(C_i \wedge E_i) \rightarrow H_i$; the cultural determinist posits that C_i is not only necessary, but, sufficient grounds for H_i . The limitations (L) of the environment are forgotten, and only the opportunities (O) are recognized. Symbolically,

$$[(S_1 \dots S_n, T_1 \dots T_n) \wedge O_1 \dots O_n] \rightarrow H_i \quad (6)$$

Based on such obvious observations as Yi-Fu Tuan's that, "... man submits to nature all the time whether he knows it or not," such a proposition as human omnipotence would seem falsified on logical grounds alone.⁵² But as Sears has observed:⁵³

Unfortunately, the situation [the normative evaluation of man as an agency for environmental change] is clouded by a widespread confidence that this impact of man upon environment can continue indefinitely. We are told that the greatest resource is human resourcefulness and that the ways and means will be found, through the applications of science and technology, to meet all emergencies as they arise. The economy and the social and political policy of the United States are based upon this assumption of more and more, big and better. The phrase 'an expanding economy' is frequently heard without any qualifying explanation.

Thus it would appear evident from this aging quotation, that, as early as 1955, Sears had identified cultural determinism with the

wide-spread industrial culture "tech-fix" mentality. Although the tech-fix thesis has met with increasing cynicism over the last twenty years, it is still undeniably the organizing assumption of contemporary urban-industrial society. This overriding mental set, in combination with unprecedented short-term human potential for environmental intervention, although no less misguided than environmental determinism, is a continuing attribute of contemporary decision-making.

Tuan has made an equally fundamental observation: "In modern society, limits to our freedom tend to be conceived wholly as arising from the antagonism of other people. This is a mistake."⁵⁴ When Tuan, an academician, speaks of conceptualization of restraints to human free-will he is obviously commenting on more than popularly held notions. He is speaking also, perhaps almost primarily, of his own peer groups—the community of scholars. With the exception of ecological activists of varying shades, the typical contemporary social scientist is a cultural determinist by indoctrination. In a knee-jerk like reflex over the last half century, geographers, anthropologists, sociologists, social psychologists, political scientists, and economists have retreated en masse from all but tangential consideration of man/land relationships in social explanation.

Rather ironically, it has been through an increased interest in cognitive behavioralism—the most subjective of realms—that environmental considerations have been lent a hint of respectability.⁵⁵ The perhaps excessive enthusiasm of both scientific and romantic environmental ecologists has had little perceptible impact on the development of analytic theory in the social sciences. Operationalized explanatory

models continue to be built all but exclusively from metrics of social attributes, and a broader frame of reference is truly external to their organizing conceptual frameworks.⁵⁶ Looking on the positive side, this may well be at least partially a result, as Tuan argues, of the fact that:⁵⁷

Combining study of the total biotic community in one scientific discipline promises to strain the synthetic capacity of any one human mind; and by including man as well the attempt to comprehend the total system, if it is other than groping toward an intuitive grasp, seems a high ideal difficult to achieve.

The writings of such scholars as George F. Carter represent the most fundamental form of cultural determinism;⁵⁸ while, by almost uniform omission, much contemporary social theorizing implicitly rests upon a similar, yet unheralded, conceptual base. At the same time, though, Tuan advises against narrow minded adherence to the competing ecological paradigm.⁵⁹

D. Ecology - Possibilistic and Deterministic

The ecological approach to man/land relations has formed the theoretically and empirically grounded core of the more generalized "environmental protectionist" movement. Although the ecosystems viewpoint could be handled at several junctures during the present discussion, it seems reasonably appropriate here because the ecological argument apparently provides the first systematically grounded departure from cultural determinism to have gained significant levels of support for, perhaps two generations.

The term ecology is subject to considerable confusion, even in scholarly circles. This fact may account, in some measure, for its

proselytic success; it certainly makes the ecologist's a priori position subject to genial ambiguity. The advantages of this vagueness may be the consequent ease with which ecologists (1) construct rather questionable analogue models between natural and cultural phenomena (without typically being brought to task for the logical gap in such arguments), and (2) escape the critical eye of their culturally deterministic colleagues, through espousal of a systematically based determinism—rather than through the embrace of overtly teleological assumptions.

There seem to be three separate systems which go under the general title of ecology; these tend to extend along a deterministic-possibilistic continuum, and may be based on largely scientific or ideological belief structures.⁶⁰ These three conceptual subgroups might be labelled (a) biological ecology, (b) cultural ecology, and (c) human ecology.

Biological ecology. This first group has typically been the domain of biological scientists, and has largely concentrated its energies on the study of subhuman populations and their mutual and environmental interactions. It is from this literature that such terminology as ecosystem, biomass, symbiotic, trophic, niche, homeostasis, chreod, homeorhetic, etc. has been introduced into the broader ecological vocabulary.⁶¹ Biological ecology views the world life support system, or any subset thereof, as a community (ecosystem) of symbiotically related members, each occupying its own adapted niche, or life space. This biomass of creatures tends to develop through a

self-correcting homeorhetic process, along groups of chreods (self-correcting paths), toward ever more complex structural stability—a state of homeostasis.⁶² Man is quite peripheral to the biological ecologist's theoretical foundations. The ideal of biological ecology is the "ecosystem complex"—the maximum level of homeostasis possible in a given situation, which provides the highest possible level of stability.⁶³ Complexity buffers the systemic effects of stochastic changes which can destroy simpler symbiotic systems because of breaks in the web of interdependency.⁶⁴

When man is introduced as an agent in such systems, he is conceived as an aspiring system dominant, whose main object is a reorientation of the energy flows within the system toward himself, and whose means is simplification. Odum argues for instance:⁶⁵

The goal of agriculture or intensive forestry, as now generally practised, is to achieve high rates of production of readily harvestable products with little standing crop left to accumulate on the landscape—in other words, a high P/B efficiency. Nature's strategy, on the other hand, as seen in the outcome of the successional process, is directed towards the reverse efficiency—a high B/P ratio. . . . Man has generally been preoccupied with obtaining as much 'production' from landscape as possible, by developing and maintaining early successional types of ecosystems, usually monocultures.

Likewise, John McHale observes:⁶⁶

Man's function in the ecosystem may then be viewed as:

- a. Entrophic - in using energies to reduce complex material resources to simpler structures. . . .
 - b. Anti-entrophic - where he uses energies more consciously to modify and transform his environment toward higher levels of complexity.
- Through the application of organized information/knowledge in his 'artificial' systems, he increasingly reprocesses, reorders, and redistributes energy and materials in more, rather than less, complex forms.

The prescription for human adjustment to the natural ecosystem (environment) is typically described as follows:⁶⁷

The cause-and-effect relationship between diversity and stability is not clear and needs to be investigated from many angles. If it can be shown that biotic diversity does indeed enhance physical stability in the ecosystem, or is the result of it, then we would have an important guide for conservation practise. Preservation of hedgerows, woodlots, non-economic species, non-eutrophicated waters, and other biotic variety in man's landscape could then be justified on scientific as well as aesthetic grounds, even though such preservation often must result in some reduction in the production of food or other immediate consumer needs. In other words, is variety only the spice of life, or is it a necessity for the long life of the total ecosystem comprising man and nature?

Like Semple, after the proper apologia, Odum goes on to build a normative land planning prescription—based on "nature's strategy"; purposive nature. He suggests a "compartment model" for development of the landscape; a functional greenbelt strategy to fit nature's teleological scheme. What difference is there between Odum's "natural strategy" and Taylor's "Natural Plan or Programme?" Is not Odum's strategy for ecosystems development a complicated, systematic form of environmental determinism?

Tuan notes that "modern scientific environmentalism is modest in its claims. No longer does it pretend to explain national traits, whole cultures and civilizations. It's contributions now lie in the attempt to relate physical characteristics of the environment to human behavior within well-defined contexts."⁶⁸ But, is Odum modest? Does he not put the obedience of nature's strategy into an "either/or" frame? In the long-run, is this not a "necessary and sufficient" argument?

If one can question Odum's intent, there is no such ambiguity in McHarg:⁶⁹

Processes are expressive; morphology is a superficial expression of the process examined. The creation of a twentieth-century tradition requires an understanding of natural process and the morphology of the artifacts of man as process. Thus, natural processes are deterministic, they respond to laws; they then give form to human adaptations which themselves contain symbolic content. . . . (p. 529)

The search for a theology of man-nature-God does not exclude exchanges which involve the coinage of time and place. This requires that the proponents of nature also attribute values to natural processes so that these may be recognized as parameters in the planning process. (p. 530)

For the regional planner, landscape architect, city planner, and architect, the development of concepts of prohibition and permissiveness inherent in natural process is the beginning of a modern applied ecology, the gift of natural form, the program for intervention which has relevance to the house and its site, the subdivision, hamlet, village, town, city, metropolis, and the nation. (p. 532)

McHarg offers "ecological processes" as the theory called for as a basis for planning in Chapter II, and identifies it as a "theology of man-nature-God.: Is this modest or scientific? Tuan notes:⁷⁰

Environmentalism and ecology are useful scientific concepts through which one can select and study phenomena. But they have also become folklores and ideologies for modern man who can no longer look to religion to provide the frame for structuring the world. It is not always easy to keep the dual purposes of these fields apart. The ideological arm of ecology reaches into the traditional domain of environmentalism.

Indeed, Roszak, a humanist and romanticist, after discussing McHarg's arguments in Design with Nature, goes on to observe:⁷¹

Ecology already hovers on the threshold of heresey. Will it be brave enough to step across and, in so doing, revolutionize the sciences as a whole? If that step is to be taken, it will not be a matter of further research, but of transformed consciousness. Kathleen Raine, in a single line of poetry, gives us the razor's edge of the issue neatly honed: 'It is not birds that speak, but men learn silence.'

For many of our cultural drop-outs who have already learned that silence—which is the symbolic resonance—ecology represents a last tenuous connection with the scientific mainstream. It is the one science that seems capable of assimilating moral principle and visionary experience, and so becoming a science of the whole person. But there is no guarantee ecology will reach out to embrace these other dimensions of the mind. It could finish—at least in its professionally respectable version—as no more than a sophisticated systems approach to the conservation of natural resources. The question remains open: which will ecology be, the last of the old sciences or the first of the new?

Tuan manages to summarize quite succinctly the nature of biological ecology—with man grafted to a systematic natural milieu:⁷²

A perfectly determined world allows no change, a perfectly designed earth requires none. Both environmentalism and ecology are disposed to emphasize stability. Ecology recognizes change in plant and animal communities but the changes are perceived as moving toward the condition of quasi-equilibrium or climax. Once ecology embraces man the idea of climax is difficult to sustain; for wherever he is found he tends to break the orderly succession of life forces and make use of the stored wealth of plants, animals and soil for his own ends. In theory man has no privileged position in ecology: he is one organism among many. In fact man often receives special treatment because of his status as the ecological dominant. As a popular belief, ecology gives modern man the intellectual satisfaction of being able to say to his confreres: you can go this far but no further, for Nature forbids and to break ecological laws is to court disaster. In this respect, environmentalism also asks of nature, physical nature, to provide the external authority that will sanction and delimit the sphere of human action.

Biological ecology offers a short-run view of man and the land which might be symbolized as

$$[E'_1 \dots E'_n \wedge (T_1 \dots T_n, S_1 \dots S_n)] \rightarrow H' \quad , \quad (7)$$

where \underline{T} and \underline{S} are defined as before, \underline{E}' = a complex stable environment and $\underline{E}' \notin \underline{E}$, and \underline{H}' = a humanized landscape based on a simplified environment tending toward instability and $\underline{H}' \notin \underline{H}$. Biological ecologists argue that this situation in the long-run must be rectified to

$$[(E'_1 \dots E'_n \wedge M_1) \rightarrow (T_1 \dots T_n, S_1 \dots S_n)] \rightarrow H'' \quad , \quad (8)$$

where all terms are defined as before, \underline{H}'' = a humanized landscape based on a complex environment tending toward stability, and $\underline{H}'' \notin \underline{H}$. This, pure and simple, is environmental determinism!

Cultural ecology. Cultural ecology is a creation of sociology, and as such deals with the interaction of men in their cultural environment. If cultural ecology were to take a position on the man/land issue, it would probably range from the neutral possibilistic genera to some form of cultural determinism. In fact, cultural ecologists have shown little interest in the consideration of non-social aspects of the environment. For this reason cultural ecology seems only tangentially related to the present discussion of man in the setting of a truly socio/natural environment. Sidney Willhelm offers a good comparative discussion of cultural and human ecology, under the titles voluntaristic and materialistic ecology, in the context of land use control.⁷³

Human ecology. Human ecology has grown primarily out of human geography and cultural anthropology. It is based in large part on the holistic conceptualizations of the French and American possibilists, and finds much of its expression in the intuitive regional monographs

of an earlier period, as discussed above.⁷⁴ The intention of human ecology is to explain the interaction between human and natural systems in a given place. Like all possibilistic thought, it gives man the initiative and conceives the environment as a mute but unswerving set of opportunities and limitations. By way of distinction, human ecology views such interaction in a complicated systems fashion—often appropriating its vocabulary from biological and cultural ecology.⁷⁵ By adopting the methodology of biological ecology, but not its deterministic conclusions concerning natural complexity and stability, human ecology offers real insight into the arguments of the former, and their meaning for planning.

Geertz offers perhaps the classical example of the insight to be gained from the human ecologist's perspective.⁷⁶ Geertz's discussion revolves around differential adaptation to the tropical environment in Indonesia, and compares two vastly different co-existing agricultural systems: swidden and sawah (shifting or slash/burn agriculture and paddy rice farming).

Many discussions of shifting agriculture exist in the geographical and anthropological literature.⁷⁷ In essence, shifting agriculture is a subsistence, non-sedentary farming method, in which a human group within a given region burning off small segments of the natural landscape. Annual plants and other unprotected vegetation is destroyed, their ash fertilizing the soil, while woodier varieties tend to survive the slash/burn operation. By means of hoe culture, a variety of crop plants are interspersed with the remaining native land cover. The resulting landscape, in appearance at least, largely replicates the

natural ecosystem climax and maintains a semblance of local systems equilibrium. After several years of cultivation, when declining soil fertility causes diminishing returns in crop production, the cultivators move on to another site, allowing their former plot to move back toward former "steady state," if cleaning and cropping was not too extensive. If a proper interval is allowed to pass before any given site is recultivated, swidden cultivation seems to provide a stable vehicle for human manipulation of the tropical environment.

Paddy rice farming, on the other hand, represents a drastic transformation of the earth's surface. Through massive technological intervention the entire tropical landscape is transformed into a system of man-regulated ponds which produce wet rice and fish. The natural tropical rainforest habitat is entirely erased, yet sawah cultivation has proven to be a remarkably stable agricultural system—steadfastly yielding predictable levels of human sustenance for millennia!

Geertz summarizes his discussion:⁷⁸

. . . the characteristics of swidden and sawah as ecosystems are clear and critical: On the one had a multi-crop, highly diverse regime, a cycling of nutrients between living forms, a closed-cover architecture, and a delicate equilibrium; on the other, an open-field, mono-crop, highly specialized regime, a heavy dependency on water-born minerals for nutrition, a reliance on man-made waterworks, and a stable equilibrium. . . . In their contrasting responses to forces making for increase in population—the dispersive, inelastic quality of the one and the concentrative, inflatable quality of the other—lies much of the explanation for the uneven distribution of population in Indonesia and the ineluctable social and cultural quandaries which follow from it.

Both swidden and sawah, given the proper social milieu, represent stable agricultural technologies in a tropical environment. They are

as different as night and day; one attempts to replicate the natural ecosystem, the other literally replaces it. Both manage to reap the opportunities of the environment, and at best, operate within the boundaries of its limitations. If anything, the homogeneous, yet complicated, socially imposed environment appears more stable!

It would appear, that as the possibilist would argue, no matter if the natural environment is conceived in terms of broad generalizations or complex interacting systems, it presents a set of mute opportunities and limitations. Cultural initiative--within these bounds--develops the humanized landscape:

$$[(S_1 \dots S_n, T_1 \dots T_n) \wedge (O_1 \dots O_n, L_1 \dots L_n)] \rightarrow H_i \quad (9)$$

In other words, while a viable ecosystem may be a prerequisite for stable man/land relations; this does not imply necessarily a "natural ecosystem" How then can the policy-maker specify normatively desirable relationships between man and the land in any given situation?

E. Probabilism and Cognitive Behavioralism

Environmental determinism in its various forms seems to be of questionable empirical validity, and thus is of only limited usefulness in explaining man's relationships with the land and offering a foundation for social prescription. The possibilistic model merely asserts the physical parameters and constraints which set the background for human action. If this latter viewpoint is to be employed as a guide to decision-making, it must be supplemented by a method for assessing the direction of human responses to the mute opportunities and limitations of the habitat. Two such positions are represented in the assertions of Probabilism and Cognitive Behavioralism.

Probabilism. Probabilism is the paradigm which suggests that human actions, in the aggregate, can be explained by reliance on a general model of some subset of the phenomenal world, deducing human behavior in a given situation based on nomothetic assumptions concerning human aspirations, knowledge, decision-making mechanisms, etc. This is basically the method of science, and was discussed in Chapter II of the present paper.⁷⁹ In relation to man/land behavior, probabilism would attempt to describe the average individual's behavior in a particular socio-natural environment, given a series of empirically based assumptions regarding social values and capabilities and the best available analysis of natural opportunities and limitations.

Such a model, while typically avoiding the complications of analyzing individual decision-making processes, supposedly gives the analyst the capability of predicting the most likely tendencies in future relationships. This method usually assumes some degree of rationality in human behavior (see Chapter II), and its reliability is thought to rest on: (1) the validity of assumptions used in constructing the general model, (2) the size of the aggregate population subject to analysis and prediction, and (3) the quint-essential soundness of the notion of dynamic linearity in social change. No claim is made that individual actions can be accurately specified; no reliable method of assessing individual deviations from the group mean is available. What is suggested is that reasonably precise--thus useful--predictions can be made concerning the nature of future man/land interrelationships.⁸⁰ Symbolically the probabilistic model holds that:

$$pH_i = [(S_{1...n}, T_{1...n}) \wedge (O_{1...n}, L_{1...n})] , \text{ when,} \quad (10)$$

$$(P_i, D_i, G_i) = SE \quad ,$$

where all terms are defined as before, pH = the probability of a given humanized landscape, and SE = the reality of the assumed social environment.

The Sprouts rightly point out that the accuracy of the vital assumptions upon which any general model is based is largely a function of the analyst's intuitive understanding of the society in question. Thus, cross-cultural and cross-periodic analysis and prediction are profoundly difficult. On the matter of time sequence analysis, the Sprouts argue that (1) the economic cost of modifying past physical adaptations and (2) the psychological effect of historical value systems ("tradition") tend to interfere significantly in objective specification of probable human actions in a given setting. Assumptions concerning human knowledge and rationality tend to be very shaky in such situations.⁸¹

One trend which may have already passed its popularity zenith is the attempt to fabricate more accurately assumptions descriptive of a particular society through gauging that group's perception of its environment. In such a manner, it is argued, positions concerning operational knowledge and power in a society are more properly portrayed, and rationality becomes a less significant factor—although linearity remains equally important.

Cognitive behavioralism. Cognitive behavioralism, environmental perception, and environmental psychology are several of the names applied in recent literature to describe a general model of man/land

relationships which rests on the importance of determining any particular group's subjective apperception (cognition and interpretation) of its surroundings. This viewpoint offers the advantage of largely overlooking the traditional man/nature dichotomy, through basically downgrading the importance of the "real world" and asserting the paramount role of man's internalized picture of that world. This model, founded on the work of Lewin and Deutsch—and to a lesser extent possibilists such as Febvre and Kirk—, urges that the objective world is largely irrelevant to human action, because man's goals and choices are based exclusively on cognized information and the "objective world" is itself a concept. Wolpert has recently developed this theme as a heuristic tool, while White and Burton and Kates have applied it to the analysis of natural environmental hazards.⁸²

Symbolically, cognitive behavioralism posits that

$$H_i = [(S'_1 \dots S'_n, T'_1 \dots T'_n) \wedge (O'_1 \dots O'_n, L'_1 \dots L'_n)] \quad , \quad (11)$$

where the prime designation (') transforms all symbols to represent the apperceived rather than the objective environment. In point of fact, the cognitive analyst attempts to plug these empirically defined subjective values into a probabilistic framework; thus, supposedly, producing a generalized, subjective model of society's probable interrelationship with its environment.

Burton attempts to show the usefulness of this viewpoint in their discussion cited above. They argue that man's adaptation to a given milieu, even under the severe stress of potential natural hazards, is a product of both the event itself and human adjustment techniques. They emphasize that the human use system combines with the natural events

system to produce the hazard, and that its real effects on society (the humanized landscape) are primarily a function of internal managerial decisions and external managerial propensities.⁸³ This viewpoint is largely at odds with the more traditional observation, accredited to Sprout and others above,⁸⁴ that under severe conditions—especially given a low state of cultural development—the environmentalist thesis is substantially correct.

For the cognitive behavioral model to remain within the scope of mainstream probabilistic possibilism, some measure of balance must be maintained between underscoring the O's and L's and recognizing the O's and L's. Tuan recognizes that, "Perfect mesh between cosmology and the natural order is seldom realized. Cosmology arises out of the biosocial needs and experiences of man; the natural order is ultra-human reality, indifferent to human aspirations."⁸⁵ Without such recognition on the part of the analyst, his conceptual position slips into the realm of cultural determinism. Without the realization of the legitimacy of both realms on the part of society, the end product is without doubt man/milieu dysfunction. Tuan argues,⁸⁶

Dysfunctional signs in an advanced technological society appear both as social ills and in the amount of lasting damage done to the natural environment. With primitive communities and fringe (utopian) groups dysfunctions are manifest primarily in the social order and in the unkeptness of the landscape.

In stable situations there tends to be a relatively high degree of correspondence between the cognitive and objective environments.⁸⁷ This is fortunate, and imperative, for as Spate argued, "people cannot use a raw material that does not exist, no matter how they think about it."⁸⁸ Cognitive analysis may well help to calibrate the probabilist's model.

The possibility of short-term incongruities between real and cognized environments must be recognized, and perhaps identified as one of the major sources of socio/natural environmental dysfunction. Firey has constructed one possible model which attempts to functionally integrate the cognitive and natural environments. This scheme is discussed next.

F. Resources as Cultural Assessment

One dimension of the possibilist hypothesis was developed in its classical statement by Zimmerman.⁸⁹ Zimmerman argued that while the "stuff" of natural resources is provided by nature, the "creation" of resources is a product of human culture: man's social values, environmental perception, and technological capabilities. If the notion of resources is defined broadly (as Murphey is want to argue for⁹⁰) as "things on which man depends or which support him," the idea of cultural assessment of resources may provide a general model of man's adaptive relationship to the land. Firey has developed one such general model of man/land relations, within the context of resource systems, which seems to synthesize in operational form many of the ideas presented in the preceding pages.⁹¹

Firey attempts to specify both the necessary and sufficient conditions for the maintenance of a stable system of resource processes, which he identifies as a resource complex. This he differentiates from an unstable resource system, labelled a resource congeries. The stable system of resource processes is characterized by a set of resource practices which expresses the properties of lawful invariance which are

possessed by a structural whole. The internal integrity of a resource complex buffers it from externally originated changes, while the resource congeries tends to vary widely in its response to external stimuli. Ambivalence on the part of resource users is the mechanism which maintains structural stability in a resource complex, and this ambivalence is a function of the competing motivations (1) individual economic gain, and (2) peer group pressure toward conformity. Resource practices are attributable to a moral necessity which is expressed in the willing conformity of their human agents.

A resource complex is, thus, made up of practices which are gainful and likely and those which are ungainful and likely. A resource congeries includes a third element: those resource processes which are gainful but unlikely. It is willing social conformity to a set of resource practices, which is functionally imperative to the society's well-being, that stabilizes the human side of a resource process (man plus nature). Social stability is based on a minimum condition of social order, predictability: the ability of every member of a group to assign a high degree of likelihood to all the possible activities of his fellows. Firey argues:⁹²

In the absence of this minimum condition, there can be little basis in personal relationships for the maintenance of an ambivalent attitude toward a set of adoptable resource processes. Hence, in place of a willing commitment of resource users to just the two subsets G L, -G L i. e., [gainful & likely and ungainful & likely], there is a calculated involvement of resource users in the three subsets G L, -G L and G -L [gainful & unlikely]. In place of an attitude of willing conformity, there is an attitude of calculating opportunism.

In an urbanizing/industrializing situation, for instance, the

interdependencies which maintain the sanctions of a resource complex are gradually violated by exogenous employment and profit opportunities which slowly destroy the system's necessary predictability. At some threshold point the resource system is structurally transformed to an erratic resource congeries: a set of externally controlled resource processes, generally guided by profit and fed on technological innovation. This unwieldy system changes unpredictably in response to market and other similar pressures, and is the source of drastic social displacements as well as dysfunctions in the socio/natural environment. System stability may be re-introduced when the human community in question has exploited the perceived opportunities of innovation, and social predictability is again introduced as a value for mutual protection. Then perceived long-range self interest encourages willing conformity to peer group pressures, and a newly adjusted resource complex is established.

Two characteristics of this model must be noted. First, all "adoptable" resource processes (culturally acceptable resources processes, within the sets $S_{1...n}$ and $T_{1...n}$) must also be within a subset of "possible" resource processes; *i. e.*, resource processes which are within the opportunities and limitations of the natural environment. This latter subset, environmental possibilities, while only weakly developed throughout Firey's lengthy presentation, prevents his thesis from degrading into cultural determinism. This is an important point which is raised again. Secondly, it must be noted that Firey displayed only the narrowest conception of the range of human motivations. The functional theory of attitude, a standard construct in

social psychology, offers a rather wider range of human goals than merely economic gain and peer group approval. Smith, Bruner and White, in an early taxonomy, identified three groups of reasons why persons may hold given opinions (e. g., attitudes toward adoption of resource processes): object appraisal, social adjustment, and externalization.⁹³

These two weaknesses in Firey's model are not fatally damaging. He does identify social complexity as one prerequisite for stability in a man/land system, and he argues that culturally defined practices must be within the limits of the given natural environment. Importantly, he also observes that the typical urban/industrial system of mechanized commercial agriculture is a resource congeries, lacking in stability.

Symbolically, then, in Firey's notation,⁹⁴

$$\begin{aligned} A > G > (G \cdot L) < X' < L < A, \\ \therefore X' &= (G \cdot L) \vee (-G \cdot L), \text{ and, } X' < X'', \\ \therefore X'' &= (G \cdot L) \quad (-G \cdot L) \quad (G \cdot -L). \end{aligned} \quad (12)$$

Firey's notational symbols are defined on Table 3-1.

Resource development. Firey argues that new resource processes can be developed only when there have been instabilities in either the cultural or physical environments. New resource processes become adoptable when processes which were once limited by nature or culture are no longer excluded because of instability. Symbolically,⁹⁵

$$\begin{aligned} [\alpha \neq 0] &\supset [(\pi \vee \psi) \neq 0], \quad \text{thus} \\ p \in -A &\text{ becomes } p' \in \alpha; \end{aligned} \quad (13)$$

FIREY'S NOTATIONAL SYMBOLS

TABLE 3-1

Symbol	Definition
P,	the set of resource processes which are <u>possible</u> in a given organic and physical environment.
A,	the set of resource processes which are <u>adoptable</u> by a given population.
G,	the set of resource processes which are <u>gainful</u> for the members of a given population.
E,	the set of resource processes which are <u>efficient</u> for the members of a given population.
C,	the set of resource processes which are <u>culturally</u> available to a given population.
X,	the set of resource processes which are included in a resource <u>system</u> .
X',	the set of resource processes which are included in a resource <u>complex</u> .
X'',	the set of resource processes which are included in a resource <u>congeries</u> .

Source: Walter I. Firey, Man, Mind and Land: A Theory of Resource Use (Glencoe, Ill.: The Free Press, 1960), pp. 99-100.

which are necessary, but not sufficient, grounds for the creation of new resources. Where: $\underline{\alpha}$ = a set of resource processes once outside of A, but now within A; $\underline{\pi}$ = a set of resource processes which has the characteristic of being outside the set of \underline{P} possible resource processes at certain periods of time and being inside of \underline{P} at other periods; $\underline{\psi}$ = a set of resource processes which has the characteristic of being outside the set \underline{C} of socially defined activities at certain periods and being inside of \underline{C} at other times; \underline{p} = a given natural resource; and \underline{p}' = a given resource process.

To understand when newly created resource processes will be adopted, $\underline{p}' \underline{X}$, Firey argues one must understand the adoption of gainful but unlikely processes into a resource congeries, $(\underline{G} \cdot \underline{L}) \underline{X}'$. He hypothesizes that the necessary, but not sufficient, grounds for this event are:⁹⁶

$$[(\underline{G} \cdot \underline{L}) < \underline{X}] \supset [(\underline{\pi} \vee \underline{\psi}) \neq 0], \quad (14)$$

and more specifically

$$[(\underline{G}_j \cdot \underline{L}_i) < \underline{X}] \supset [(\underline{\pi} \vee \underline{\psi}) \neq q];$$

where terms are defined as before, \underline{q} = an immediately prior state of the physical and cultural environment, and $\underline{j} \quad \underline{i}$.

Resource conservation. Resource conservation, the reduction or replacement of certain processes, is said to be a function of adopting less gainful but more likely processes in an increasingly stable environment:⁹⁷

$$[(\underline{G}_i \cdot \underline{L}_j) < \underline{X}] \supset [(\underline{\pi} \vee \underline{\psi}) \leq q] \quad . \quad (16)$$

Eventually, when⁹⁸

$$(\underline{In}'' , -\underline{n}'') \cdot (\underline{In}' , -\underline{n}') \cdot (-\underline{Kn} , -\underline{n}) \supset (\underline{On} , -\underline{n}) \quad , \quad (17)$$

(where: $(In, -n)$ = a time when the conservation practice \underline{n} is more idealized than the non-conservation practice $-\underline{n}$; $(In, -n)$ = a time when \underline{n} is considered more likely than $-\underline{n}$; $(-Kn, -n)$ = a time when \underline{n} is not considered comparable, relative to value, with $-\underline{n}$; and $(On, -n)$ = a time when \underline{n} is considered more obligatory than $-\underline{n}$) this social process transforms \underline{X}' to \underline{S}' , because the necessary ambivalence toward resource practices has been re-introduced. Firey concludes, "In such a resource system, the type of use to which a people puts natural resources is an indicator of the survival capacity of that people's social order. Conservation of natural resources becomes conservation of the social order."⁹⁹

So, in Firey's model, the development and adoption of new resources is a function of cultural/natural instability, and the mechanism which brings about their adoption is the expansion of culturally defined possibilities. Conservation comes about through increasing stability and narrower cultural limits. Firey's notions of natural stability remain largely undifferentiated, and could be usefully elaborated upon by defining his subset \underline{P} in terms of a possibilistic ecological model.

IV. SUMMARY

In this chapter a group of models of man/land relationships has been discussed, in hopes of synthesizing a theoretical position which can act as a partial basis for land use policy planning. As shown in Figure 3-1, the models reviewed have been arranged along two dimensional continuums: (1) Environmental - Cultural Determination (abscissa Figure 3-1) and Holistic - Systematic Disaggregational

Organization (ordinate Figure 3-1).

It has been suggested that while holistic environmentalism is dead, limited applications of rigorously defined systematic determinism may be of use. A possibilistic systems view of the humanized landscape, founded on an explanatory base of cognitive probabilism, may best describe overall man/land relations; while either natural or cultural systems complexity would seem to be a necessary condition for the prevention of socio/natural dysfunctions.

Firey's resource assessment model provides one possible device for attempting an integration of these notions; recognizing that both his subsets of resource processes A and P could be (and perhaps should be) more elaborately defined. For the purposes of this paper it is argued that subset P of R should be defined in possibilistic ecosystems terms. In the next chapter, dealing with the spatial side of Foley's structural matrix, subset A of C is defined within the limits of Smith's spatial margins of profitability. In Chapter V this framework is used to develop a consistent rationale for safeguarding the quality of the natural environment.

NOTES FOR CHAPTER III

¹ "Land Use Policy and Planning Assistance Act of 1973 (S. 268)," Title I, Section 101, paragraphs (f) and (h) respectively.

² Ibid., Title II, Section 202 (a), (2) and (4); and 203 (a), (3), (A) - (E). While the passages selected for quotation were chosen pointedly, they accurately capture the spirit and intent of the bill. See also, for example, Title II, Sec. 202 - 204; Title III, Sec. 307; and Title VI, Sec. 601.

³ This issue is discussed at length in Foley, "Approach."

⁴ See especially Bosselman, Callies and Banta, The Taking Issue: An Analysis of the Constitutional Limits of Land Use Control (Washington, D. C.: Council on Environmental Quality, July 9, 1973).

⁵ From notes taken by the author at an informal seminar presentation given by Professor Robert W. Kates (Department of Geography, Clark University) on 19 February 1974 in the Department of Geography, Kansas State University.

⁶ Ibid.

⁷ See, Teilhard de Chardin, The Phenomenon of Man; Webber, "Urban Place and the Nonplace Realm;" and Chadwick, A Systems View of Planning, Chapter 5.

⁸ Murphy rather poignantly pointed up the horns of this dilemma in quoting Kenneth Boulding's impromptu lines, "A Conservationist's Lament" and "The Technologist's Reply," written while he was participating in the 1955 Princeton, N. J. symposium, "Man's Role in Changing the Face of the Earth." See, Rhoads Murphey, An Introduction to Geography, 3rd Ed. (Chicago: Rand McNally and Co., 1971), pp. 77-9.

⁹ Enlightening discussions of this situation and examples of alternative views are presented in William R. Ewald, Jr. (ed.) Environment and Policy. Commissioned and edited on behalf of the American Institute of Planners. (Bloomington, In.: Indiana University Press, 1968), pp. 328-58; and F. Fraser Darling and John P. Milton (eds.) Future Environments of North America: Transformation of a Continent. The Record of a Conference held during April, 1965 by the Conservation Foundation in Warrenton, Virginia. (Garden City, N. Y.: The Natural History Press, 1966), esp. pp. 22-130, 225-34, 261-76, 355-71, 413-612, and 628-87. It is of heuristic value to compare the mutually exclusive viewpoints expressed by Richard L. Meier ("Technology, Resources, and Urbanism--The Long View," pp. 277-88) and Ian L. McHarg ("Ecological Determinism," pp. 526-38) in the latter publication.

¹⁰ Ian Burton, Robert W. Kates and Anne Kirkby, "Interdisciplinary Environmental Approaches, Theory by Disciplines: Geography," for a Symposium Issue of Natural Resources Journal (in press), p. 1. Special thanks are extended to Professor Kates and Professor David Kromm (Department of Geography, Kansas State University) for making this as yet unpublished material available for the author's use. Page numbers cited refer to the preliminary manuscript.

¹¹ Walter I. Firey, Man, Mind and Land: A Theory of Resource Use (Glencoe, Ill.: The Free Press, 1960), pp. 11-2. Although Firey's terminology in regard to the genera of planning activity in question (*i. e.*, resource planning) is at variance with the designation employed here, this would appear to the author more a function of usage than conceptualization. In elaboration of the above cited passage, and directly relevant to the dilemma noted by Murphey and Boulding, Firey went on to say in his concluding chapter:

Common sense can have a blighting effect upon planning. The reason for this paradox lies in the ad hoc character of common sense statements. Their truths are contingent; they are unsystematic; and they are unrelated to other truths in specified way. The resource planner or policy maker who would eschew theory for common sense is likely to find himself relying on contradictory precepts to guide him in his decision making.

In no area is this more true than in the area of natural resources. 'Of course we should develop idle resources for use.' 'Of course we should conserve resources for posterity.' In these two 'self evident' assertions there is likely to be, for the unwary at least, a real contradiction. No amount of factual information can dispel the confusion that may arise out of relying upon discrete statements such as these. Nothing less than a systematic theory, one which remains unfalsified by experience, can serve as an adequate instrument for rational decision making in resource development and conservation. (pp. 243-4)

¹² Burton et al., "Environmental Approaches," p. 17. Major revisions have been introduced in the matrix presented here, which would not in all probability meet with the approval of the original authors.

¹³ The environmentally derived models of areal and locational differentiation which chronologically, at least, provide a base point for the theory of the location of human activities have also been deleted from the original Burton matrix. This is done on the rationale that such spatially discriminating constructs add little to the fundamental understanding of man/land relationships, and would be more

logically covered in the next chapter. What is presented in Figure 3-1 is a highly generalized outline of man's aspatial intercourse with his natural habitat.

¹⁴ Foley, "Approach," p. 25. In an interesting conversation with Professor David Kromm, it was pointed out to the author that Foley's model might be viewed as largely an elaboration of the La Place/Geddes "Place, Work, Folk" construct.

¹⁵ Ibid., p. 33.

¹⁶ A partial list of such works would include: O. H. K. Spate, "Toynbee and Huntington: A Study in Determinism," Geographical Journal, Vol. 118 (1952); R. S. Platt, "Determinism in Geography," Annals of the Association of American Geographers, Vol. 38 (1948); Isaiah Bowman, Geography in Relation to the Social Sciences (New York: Charles Scribner and Sons, 1934); O. H. K. Spate, "How Determined is Possibilism?" Geographical Studies, Vol. 4 (1957); K. G. T. Clark, "Certain Underpinnings of Our Arguments in Human Geography," Transactions and Papers of the Institute of British Geographers, No. 16 (1950); T. C. Platt, "Environmentalism vs. Geography," American Journal of Sociology, Vol. 53 (1948); George Tatham, "Environmentalism and Possibilism," in Griffith Taylor (ed.) Geography in the Twentieth Century (New York: Philosophical Library, 1951), pp. 128-62; A. C. Montefiore and William Williams, "Determinism and Possibilism," Geographical Studies, Vol. 2 (1955); Harold and Margaret Sprout, "Man-Milieu Relationship Hypothesis," (Princeton, N. J.: Center of International Studies, Princeton University, 1956); _____, The Ecological Perspective on Human Affairs (Princeton, N. J.: Princeton University Press, 1965); Gordon R. Lewthwaite, "Environmentalism and Determinism: A Search for Clarification," Annals of the Association of American Geographers, Vol. 56 (1966); Yi-Fu Tuan, "Man and Nature," Commission on College Geography, Resource Paper No. 10 (Washington, D. C.: Assoc. of Amer. Geogr., 1971); _____, "Ambiguity in Attitudes Toward Environment," Annals of the Association of American Geographers, Vol. 63 (1973); and Burton et al., "Environmental Approaches."

¹⁷ In light of the discussion carried out in Chapter II concerning the nature of theory, it must be noted here that the models dealt with in this section might be more properly described as "theoretical hypotheses." None of them have been developed into concise predictive instruments. Kates has noted, in the course of the seminar cited above, that the area of man/land relationships has received rather less coverage in recent years than that labelled broadly as "spatial relationships" (or human location theory).

¹⁸ Following Harold and Margaret Sprout's explanation in "Man-Milieu," pp. 73-4:

The search for explanations is directed to the ideal of ascertaining the necessary and sufficient conditions for

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- 26 Ellen C. Semple, Influences of Geographic Environment (New York: Holt and Co., 1911), p. 1.
- 27 Lewthwaite, "Environmentalism and Determinism," p. 11.
- 28 Quoted in Ibid.
- 29 Ibid.
- 30 This argument seems like a direct precursor of those presented by such contemporary ecologists as Ian McHarg. See McHarg, "Ecological Determinism," and _____, Design with Nature. This similarity between classical environmental determinism and contemporary ecosystems literature is discussed below. It is interesting to note in this context the passage from Kirchoff quoted by Tatham, p. 151:

Since progress in civilization involves an increasing exploitation of natural advantages and the development of closer relations between a land and its people, it is an erroneous idea that man tends to emancipate himself more and more from control of natural conditions forming at once the foundation and environment of his activities. On the contrary, he multiplies his dependencies upon Nature, but while increasing their total sum he diminishes the force of each. As his bonds become more numerous, they also become more elastic. Civilization has lengthened his leash and padded his collar so that it does not gall; but the leash is never slipped.

- 31 Sprout, "Man-Milieu," p. 23.
- 32 Quoted in Ibid., p. 35.
- 33 Ibid., p. 31.
- 34 Lewthwaite, "Environmentalism and Determinism," pp. 16-7.
- 35 Quoted in Ibid., from T. W. Freeman, A Hundred Years of Geography (Chicago: Aldine Publishing Co., 1962), pp. 74-7.
- 36 Tatham, "Environmentalism and Possibilism," p. 151.
- 37 Sprout, "Man-Milieu," p. 39. Translated by the author.

Des nécessités, nulle part. Des possibilités partout.
Et l'homme, maître des possibilités, juge de leur emploi:
c'est le placer dès lors au premier plan un renversement
nécessaire: l'homme et non plus la terre, ni les influences
du climat, ni les conditions déterminantes des lieux.

- 38 Ibid., p. 40.

- 39 Ibid., p. 48.
- 40 See for example, Carl O. Sauer, "The Morphology of Landscape," reprinted in John Leighly (ed.) Land and Life (Berkeley: University of California Press, 1963), pp. 315-350.
- 41 Sprout, "Man-Milieu," p. 48.
- 42 Quoted in Ibid., pp. 43-4.
- 43 Burton et al., "Environmental Approaches," p. 21 and Figure 2B p. 22.
- 44 Sprout, "Man-Milieu," pp. 48-9.
- 45 It must be underscored that element (P, D, G) is external to the possibilist hypothesis.
- 46 See David Lowenthal's introduction to George P. Marsh, Man and Nature, 1965 Ed. (Cambridge, Mass.: Harvard University Press, 1965), p. xxii.
- 47 Marsh developed an extensive documentary argument for the paramount influence of man as an agent in transforming the land. Based on the history of agricultural development and the rise and fall of ancient civilizations, he stressed the importance of the "transfer, modification, and extirpation of vegetable and animal species" at the hand of man from the primitive state onward. The bulk of his treatise then turned to the specific unfortunate effects of human intervention on one particular renewable resource, forests. See the 1965 edition of Man and Nature, pp. 113-280.
- 48 Freeman, A Hundred Years of Geography, p. 167.
- 49 Yi-Fu Tuan, in "Man and Nature," pp. 9-13, argues that man has from primitive levels of cultural development to present played an important role in landscape modification.

Where the man-induced metamorphosis of nature is at a slow pace or where it has sunk beyond the reach of memory, we may be inclined to accept the result as natural. . . . The fact of diminishing nature. . . and human ubiquity is now obvious. In the Western world there is a tendency to denounce modern man for upsetting 'the balance of nature' and to hold up primitive peoples and some traditional societies as models of ecological propriety. The truth of the matter is far more complex. The deliberate withholding of power in the interest of a 'land ethos' and against the claims of perceived material benefit is, and was, probably very rare. (p. 9)

From the beginning, Tuan argues, man's most conspicuous impact on fauna has been domesticated species substitution—an impoverishment of diversity, a simplification. The impact on flora has been the simplification of vegetation complexes, frequently to the point of single species (or near single species) dominance. Vegetative monoculture, especially under mechanical and commercial agriculture, has led to soil structure and drainage pattern simplification and deterioration.

⁵⁰ Ibid. In his closing remarks, Tuan suggests,

Whether man achieves a harmonious relationship with his natural environment or not does not depend necessarily on his level of technology, nor on his socio-political philosophy. . . . In a capsule, we may say the ecological balances are threatened when man over-specializes (even though it is in a simple skill such as big game hunting); when population increases rapidly; when people move to a new environment and have to adjust their habits to new conditions; when wealth permeates down the structure of society so that every man wants his Walden Pond and summer home.

There are large parts of the world where man has succeeded in living harmoniously with nature.

In another place he summarizes:

Human power has had two major, closely-related effects: one is to construct a man-made world of increasing complexity, and the other is to simplify nature's structured systems. Both tend to make for instability. (p. 42)

Man's impact on nature is to disseminate and simplify the components of use to him. . . . The common effect of man on the plant cover is to simplify it. (p. 43)

And finally, Tuan also notes that, in nature, severe physical conditions prevent the evolution of complex biotic structures; "(i)n the densely populated parts of the world man plays the role of a physical force. He not only breaks but reverses the course of plant and animal succession." (p. 43)

⁵¹ Preston E. James, All Possible Worlds: A History of Geographical Ideas (Indianapolis: The Odyssey Press, 1972), p. 408.

⁵² Tuan, "Man and Nature," p. 5.

⁵³ Paul B. Sears, "The Processes of Environmental Change by Man," in William L. Thomas, Jr. (ed.) Man's Role in Changing the Face of the Earth (Chicago: University of Chicago Press, 1956), p. 473.

⁵⁴ Tuan, "Man and Nature," p. 5.

⁵⁵ This idea will be discussed in more detail in the next chapter dealing with human location theory.

⁵⁶ See for instance Walter Isard's Ecological Economic Analysis for Regional Development (New York: Free Press, 1972), where environmental "costs" are transformed to the supposedly common metric of money values. In a recent Kansas State University example, environmental limitations are tacked on as a weak afterthought to a 1974 update of the Kansas Input-Output Model of the Kansas economy. See M. Jarvin Emerson et al., "The Future of the Kansas Economy," an unpublished report prepared for the Planning Division of the Kansas Department of Economic Development with financial assistance provided by the Ozarks Regional Commission, April 1, 1974.

⁵⁷ Tuan, "Man and Nature," p. 28.

⁵⁸ See for instance, George F. Carter, Man and the Land: A Cultural Geography (New York: Holt, Rinehart and Winston, 1964), pp. 3-37; Lewthwaite, "Environmentalism and Determinism," p. 13, discusses the deterministic nature of other systematic constructs; as do the Sprouts, "Man-Milieu," pp. 72-101.

⁵⁹ Tuan, "Man and Nature," pp. 9, 26-9, and 38.

⁶⁰ Ibid., p. 38.

⁶¹ See for instance Eugene P. Odum, "The Strategy of Ecosystem Development," and C. H. Waddington, "Biology and Human Environment," both in Gwen Bell and Jaqueline Tyrwhitt (eds.) Human Identity in the Urban Environment (Harmondsworth, England: Penguin Books Ltd., 1972), pp. 49-58 and 59-72 respectively.

⁶² See Ibid., and Eugene P. Odum, Ecology (New York: Holt, Rinehart and Winston, 1963).

⁶³ The stabilizing effect of complexity is an assumption of years past which has more recently been treated as a testable hypothesis. Operationally though, the complexity-equals-stability notion is still an organizing concept in biological ecology—rather like the friction of distance idea in human location theory. See Robert M. May, Stability and Complexity in Model Ecosystems (Princeton, N. J.: Princeton University Press, 1973), esp. 37-78, "Stability vs. Complexity in Multispecies Models."

⁶⁴ Waddington, "Biology," pp. 66-8; Odum, "Ecosystem Development," pp. 49-51.

⁶⁵ Odum, "Ecosystem Development," p. 53. In Odum's notation: P = production, and B = biomass.

⁶⁶ John McHale, The Ecological Context (New York: George Braziller, 1970), p. 39.

⁶⁷ Odum, "Ecosystem Development," p. 52-3.

⁶⁸ Tuan, "Man and Nature," p. 28.

⁶⁹ Ian McHarg, "Ecological Determinism," respective pages. McHarg's Design with Nature presents 200 pages of fascinating, well-intentioned environmental determinism. R. S. Dorney, "Role of Ecologists as Consultants in Urban Planning," Human Ecology, Vol. 1 (March 1973), No. 3, pp. 183-200, offers a position rather modified from that of McHarg's. He attempts, somewhat as a tangential recommendation, to incorporate "economic considerations" and "fiscal costs" into the ecological paradigm. It would appear, however, that his stance is still environmentally deterministic.

Geoffrey Wandesforde-Smith, in "The Study of Environmental Public Policy: A Preliminary Directory," Human Ecology, Vol. 2 (January 1974), No. 1, pp. 45-62, presents a good discussion and bibliography of environmental policy issues to date.

⁷⁰ Tuan, "Man and Nature," p. 38.

⁷¹ Theodore Roszak, Where the Wasteland Ends (Garden City, N. Y.: Doubleday & Co., Inc., 1972), p. 404.

⁷² Tuan, "Man and Nature," pp. 28-9.

⁷³ Sidney M. Willhelm, Urban Zoning and Land-Use Theory (Glencoe, Ill.: The Free Press of Glencoe, 1962), esp. 13-49.

⁷⁴ See for example: H. H. Barrows, "Geography as Human Ecology," Annals of the Association of American Geographers, Vol. 13 (1923), pp. 1-14; A. H. Clark, The Invasion of New Zealand by People, Plants and Animals: The South Island (New Brunswick, N. J.: Rutgers University Press, 1949); and Robert E. Dickinson, Regional Ecology: The Study of Man's Environment (New York: John Wiley & Sons, Inc., 1970). The many French School monographs are fascinating examples of this approach.

⁷⁵ Of course, human ecology frequently picks up a bit of the spirit of its terminology sources. See for instance Nathaniel S. Shaler, Man and the Earth (New York: Fox, Duffield & Co., 1906). Shaler, a geologist/geographer, writes his narrative in physical systems terms, and comes out sounding like first an environmentalist and then a cultural determinist.

⁷⁶ Clifford Geertz, "Two Types of Ecosystems," in Andrew P. Vayda (ed.) Environment and Cultural Behavior: Ecological Studies in Cultural Anthropology (Garden City, N. Y.: The Natural History Press, 1969), pp. 3-28. Reprinted from Chapter 2 of Clifford Geertz, Agricultural Involution in Indonesia (Berkeley: University of California Press, 1963).

⁷⁷ See for example: H. Conklin, "An Ethnological Approach to Shifting Agriculture," Transactions of the New York Academy of Science, Series II, Vol. 17 (1954), pp. 133-42; P. Gourou, The Tropical World (trans. E. D. Laborde) (New York: Longmans Green, 1953); and Karl J. Pelzer, Pioneer Settlement in the Asiatic Tropics (New York: Institute of Pacific Relations, 1945).

⁷⁸ Geertz, "Two Types of Ecosystems," pp. 24-5.

⁷⁹ See also, Sprout, "Man-Milieu," pp. 50-7 and 72-101.

⁸⁰ Ibid., p. 50.

⁸¹ Ibid., pp. 52-3.

⁸² See: Ibid., pp. 58-71; Tuan, "Man and Nature," esp. pp. 17-26; Burton et al., "Environmental Approaches," pp. 13-26; and J. Wolpert's article in Paul English and Robert C. Mayfield (eds.) Man, Space, and Environment: Concepts in Contemporary Human Geography (New York: Oxford University Press, 1972).

⁸³ Burton et al., "Environmental Approaches," esp. Figure 4B, p. 25. For a largely psychologically oriented discussion of the theory of man-environment relations and environmental cognition (both terms being used in a broader sense than their present definitions), see, Wolfgang F. E. Preiser (ed.) Environmental Design, Vol. II, Symposia and Workshops, 4th International E. D. R. A. Conference (Stroudsburg, Penn.: Dowden, Hutchinson & Ross, Inc., 1973), pp. 98-260.

⁸⁴ During a formal presentation which followed the seminar cited above, Kates argued that American and South Asian adaptation to hurricane hazards are typically similar; thus claiming that perception problems were of overriding importance. To this author it would appear that such an observation tends to substantiate the opposite position. See Tuan, "Man and Nature," pp. 28, 38, etc.

⁸⁵ Ibid., p. 33.

⁸⁶ Ibid.

⁸⁷ Sprout, "Man-Milieu," pp. 70-1.

⁸⁸ Ibid.

⁸⁹ Erich W. Zimmerman, World Resources and Industries: A Functional Appraisal of the Availability of Agricultural and Industrial Materials, Revised edition (New York: Harper & Brothers, Publishers, 1951), esp. pp. 12-16 and 31-40.

⁹⁰ Rhoads Murphey, An Introduction to Geography, 3rd edition (Chicago: Rand McNally and Co., 1971), p. 55.

⁹¹ Walter Firey, Man, Mind and Land: A Theory of Resource Use.

⁹² Ibid., p. 124.

⁹³ M. Brewster Smith, Jerome S. Bruner and Robert W. White, Opinions and Personality (New York: John Wiley, 1956), pp. 39-47. More recent schemes offer a wider variety of functions for opinion, and there are several other well-known models of reasons for opinion formulation, such as the cognitive approach and others discussed by Allport. The gap, then, between opinion and action is very wide and has been modelled extensively. See for instance Wrightsman's discussion of "Theories of Attitude Change," in Chapter 10 of Social Psychology in the Seventies (Monterey, Calif.: Brooks/Cole Publishing Co., 1972), pp. 291-319.

⁹⁴ Firey, Man, Mind and Land, pp. 105 and 123.

⁹⁵ Ibid., pp. 151-6.

⁹⁶ Ibid., p. 210.

⁹⁷ Ibid., pp. 202-3.

⁹⁸ Ibid., pp. 212-16 and 222-4.

⁹⁹ Ibid., 203.

CHAPTER IV

SELECTED ASPECTS OF HUMAN LOCATION THEORY

whenever something new is being created, and thus in settlement and spatial planning also, the laws revealed through theory are the sole economic guide to what should take place

-Lösch, 1954

I. INTRODUCTION

The locational aspects of the humanized landscape were intentionally deleted from consideration in Chapter III. Areal differentiation and notions concerning locational advantage were conspicuously absent from their logical niches in the development of the prior discussion, but in many ways it seems tidier to handle them here under a separate heading. In large part this is due to the fact that most contemporary location theorists deal with their subject through basically culturally deterministic conceptualizations, and their work is treated as a separate subfield of inquiry.¹ During the course of this chapter several fundamental aspects of human location theory are reviewed, and at appropriate points in the discussion these ideas are related to concepts drawn from the former summary. An attempt is made to bring these two bodies of hypotheses together in a functional, problem-oriented fashion in the next chapter.

A. Planners and Location Theory

In Chapter II reference was made to several sources in the urban planning literature which handle various ideas concerning spatial

organization and location theory. Notable among these are B venter, Chadwick, Foley, Friedmann, McLoughlin and Webber.² William Alonso's article, written for inclusion as Chapter IV in Regional Development and Planning, is no doubt the best review of classical least-cost location theory current in the readily available planning literature.³ The B venter and McLoughlin resumes are rather superficial, although McLoughlin does branch out into the demand theory of location and other related geographical concepts. McLoughlin's bibliography is the best to be found in the planning literature.⁴ In the current author's view Webber's discussion of non-contiguous communities and Chadwick's escape into topology are interesting and perhaps useful intellectually, but they offer little of use to the planner by way of theoretical foundation for land use policy formulation. Many other planning discussions dealing with location and spatial structure focus on internal urban structure and/or follow the intuitive design paradigm, a model perhaps more useful to physical designers and architects.⁵

The intent of this chapter is to review several main sub-schools which have developed concerning the theory of the location of economic activities and the location of settlement on the regional landscape. This review is aimed toward identifying locational principles which may be useful in the formulation of regional land use policy. Once again, Foley's model of metropolitan structure is referred to for orientation purposes. Fortunately, considerably more rigorous theoretical work is available on the character of human locational patterns than is the case with the man/land question, and this discussion can move along more rapidly.

B. Focusing the Discussion

Looking back to Figure 3-2 in Chapter III, consideration of the locational features of the humanized landscape centers on Foley's cell 3B, spatial characteristics of the physical environment. Because of immediate functional interrelationships with the aspatial attributes of place (site characteristics) and the spatial aspects of human social organization, the discussion frequently converges into cells 3A and 2B. It is probably useful to identify the phenomenal system discussed here as the "cultural landscape" (defined above in Chapter II), which might be most properly located in Foley's matrix in a zone overlapping the boundary between cells 3B and 2B.

II. THEORIES OF SETTLEMENT AND ECONOMIC LOCATION

The topic of human location theory is very broad. Substantive contributions have been made to its development by scholars from several fields of inquiry including geography, economics, regional science, sociology, planning and landscape architecture. The location theory literature encompasses a wide range of related topics which consider spatial organizational characteristics of different social functions at a variety of scales. The form, function and process of spatial distributions are considered both statically and over time, with distinctions being drawn between punctiform, linear and areal phenomena. The theoretician typically attempts to outline the bounds of orderliness in this world of objects by identifying hierarchies and topological surfaces which describe in some measure the patterns and tendencies

observable in the human organization of space. Spatial interaction is probably the major energizing principle identified. Reference to Haggett or Bunge, for example, will suggest the breadth attempted in this literature.⁶ Rural and urban settlement systems, transportation networks, migration and mobility processes, diffusion of innovation, rural and urban land use development, and the location of industrial activities are several of the important strands interwoven in a series of theoretical and empirical efforts dealing with what might be called the morphological aspects of regional science.

In this chapter only the briefest outline is roughed in concerning selected aspects of two components of location theory: the regional location of settlement and the location of economic activities. Perhaps surprisingly, theories devoted to the explanation of land use patterns themselves are not dealt with. This choice is made because of the emphases of current areawide land use legislation and because the explanatory value of land use theory proper seems more potent at smaller scales of areal aggregation. Also, agricultural land use as an economic activity in a metropolitan dominated society seems to this author rather ill-explained by traditional models based on Thunen's 19th century conceptualization.⁷

A. Some Thoughts on Urban and Rural Settlement

Theories of settlement and urbanization are perhaps the aspect of regional spatial organization which has had the best exposure to urban planners. Several regional planners such as Friedmann have been leading advocates and interpreters of its usefulness to areawide planning

activities.⁸ The sketch presented here is very selective, and is meant largely as a prelude to the discussion which follows on demand oriented economic location theory.⁹

Although an extensive literature presenting various conceptualizations of human settlement has developed, Garner argues that these numerous constructs seem to share six basic traits:¹⁰

1. The spatial distribution of human activity reflects an ordered adjustment to the factor of distance.
2. Locational decisions are taken, in general, so as to minimize the frictional effects of distance.
3. All locations are endowed with a degree of accessibility but some locations are more accessible than others.
4. There is a tendency for human activities to agglomerate to take advantage of scale economies.
5. The organization of human activity is essentially hierarchical in character.
6. Human occupance is focal in character.

Urban settlement. Taxonomies for classification of urban centers abound.¹¹ For the purposes of the present discussion it is probably sufficient to follow Harris and Ullman's classic functional breakdown.¹² Although contemporary urban centers are multi-functional, they tend to exhibit a residual urban economic base which historically, at least, may be useful in explaining their situation on the cultural landscape. The predominant economic functions are identified as (1) transportation, (2) resource exploitation, and (3) service delivery. Garner cogently summarizes Harris and Ullman's morphological conclusions:¹³

A map showing the pattern of settlement [read urban settlement] in a region can be broken down into three basic parts; (1) a linear pattern consisting of transport centres performing break-of-bulk and allied services and for which location is related to the disposition of transport routes; (2) a cluster pattern, consisting of places performing specialized services such as manufacturing, mining or recreation, and for which location is related to the localization

of resources, and (3) a uniform pattern, consisting of places whose prime function is the provision of a wide range of tertiary goods and services and for which location is related to a dispersed population.

This generalized division of the regional urban landscape seems reasonably accurate. King found that nearest neighbor indices for urban places in selected areas of the United States largely conform to a pattern predictable from the simple Harris and Ullman model.¹⁴ Resource centers and transport links tend to be clustered and linear, whereas service centers tend toward a uniform distribution.¹⁵ Location of the basic economic activities of the first two types of cities, when considered separately as the dependent variable in an economic location problem, is best explained through Weberian style input factor analysis. The economic base of central places is accounted for locationally by a demand model derived from Christaller's central place construct.¹⁶

The central place hierarchy supposedly provides the primary matrix of the urban system, with the calibrated distances between the rungs of the nested hierarchy a function of the range of the services offered and the necessary aggregate threshold demand. The theoretical dynamics of a center's hinterland are discussed below in reference to Losch, but it can be noted here that Huff's variation of Reilly's "law" appears to be adequate to estimate empirical trade area boundaries; symbolically:¹⁷

$$P_{A_1} = \frac{\frac{S_1}{T_{A_1}}}{\sum_{i=1}^r \frac{S_{a_i}}{T_{A_i}}} \quad (18)$$

"where p_{A_1} is the probability that a consumer located at A will visit center 1 , and there are r differing shopping opportunities of sizes $S_1 \dots S_r$ located at travel times $T_{A1} \dots T_{Ar}, \dots$ and of course $\sum_i p_{Ai} = 1.0$ is a parameter which varies for different levels of the hierarchy."¹⁸

The population served by a central place can be identified as:¹⁹

$$P_c = P_t^s W^{-s} Q t^{-s}$$

where: $w = k \{ \log^{-1} [q b_1^{-1} (a_2 - a_1 b_2)] \}$ (19)

and $s = (b_1) / (q b_2)$.

Finally, the population density within a city's hinterland declines exponentially as a function of distance, and can be estimated simply as:²⁰

$$P_m = 2d_o \pi b^{-2} [1 - e^{-bm} (1 + bm)] \quad (20)$$

where: d_o = central density, extrapolated into the city's CBD

and b = the density gradient.

It must be noted, with Berry, in conclusion that:²¹

Planning uses of the central-place framework are piecemeal, for the central-place concept has yet to be systematically incorporated into planning models. If the reality of empirical regularities is accepted, convergence of the regularities and deductions from theory acknowledged, a parallelism of cross-cultural differences and historical sequences admitted, any programmatic activity directed at retail location must take note of it, however. Whether the effort be to find new drugstore locations in growing North American suburbs, rationalize public services in Saskatchewan, plan new market centers on the polders, or identify growth poles in the regional planning of India, the ideas presented concerning the economic geography of the distributional system must play an increasingly significant role.

Rural settlement. A few lines above it was noted that the urban population can be expected to decline at a predictable rate away

from settled places. But what is its probable pattern of distribution in areas of isolated rural settlement? Historically, at least, the smallest settled places can be reasonably be considered a part of the lowest order of the central place hierarchy.²¹ Several models of rural settlement have been developed in the literature. The one most useful for present purposes is the Hudson/Weaver stage model. This construct attempts to explain the pattern of isolated rural dwelling units in areas of recent commercial agricultural settlement, such as Kansas. The model, as tested, has four stages, related to (1) colonization, (2) settlement spread, (3) agricultural competition, and (4) depopulation (external urbanization).²³ Hudson hypothesized that while passing through the first three steps of this process the dispersed settlement pattern would progress from randomness to clusteredness to regularity.²⁴ He managed to represent this transformation as an ever increasing tendency toward regularity.

Operationally, Hudson enumerated settlement distributions in several selected areas of Iowa by the use of quadrat frequency counts. Because these densities have a definite arithmetic mean and variance from the mean, he was able to use the variance-mean ratio as a measure of pattern. If the mean is greater than the variance ($\bar{X} > V = <1$) the distribution is called regular. In cases where the variance is larger than the mean ($\bar{X} < V = >1$) the pattern is labelled clustered. Where the mean and variance are equal ($\bar{X} = V = 1$) the distribution is thought to be uniform. Since the variance-mean ratio has a known sampling distribution, the statistical significance of any departure from unity may be tested. In a further test of his conceptualization of the settlement

process Hudson fit three different probability distributions to his data sets: (1) the regular Poisson distribution to cases where the distribution ratio yielded regular or random results ($R \leq 1$), (2) the negative binomial distribution for units with clustered tendencies ($R > 1$), and (3) the Poisson distribution to all areal units.

Hudson tested three formal hypotheses against his empirical data. Hypothesis number 1 stated that during competition, with its concomitant short-term effect of lowering settlement density (farm abandonment), the settlement pattern would become more regular. Hypothesis number 2 proposed that increased clustering would be a sign of increased density. Hypothesis number 3 stated that with long term competition, areas once supporting denser farming populations would undergo farm abandonment, increase in farm size, and increasing regularity in settlement distribution (if most of the land stayed under cultivation). In the eleven cases where H_1 could reasonably be tested it was accepted ten times. There were not enough increases in density to make inferences for H_2 . Hypothesis 3 was accepted because in most instances more units were found to display regularity over time.

Hudson concluded that:²⁵

As density increases [in an area] through a continued diffusion of settlements, competition for space becomes increasingly important. The pattern changes from clustered to a highly regular arrangement as weak individuals are forced out and the average size of holdings increase.

Weaver argued that a fourth stage could be added to the model, a period of population decline, that would be brought about by the age selectivity of the emigration movement started in stage three and greatly intensified by the ever increasing urban transformation of

the nation's economy and society. This last stage, it is argued, displays a tendency toward re-clustering of dispersed rural settlements, as men regroup for convenience and companionship. The hypothesis was tested that at the county level in a selected Kansas sample rural settlement patterns have become progressively more clustered over the period 1950 - 1970, a time of continuing heavy out-migration. Using the nearest neighbor index, symbolically:

$$R = \frac{\bar{r}_A}{\bar{r}_E} , \quad (21)$$

and an F test of variance, it was found that all study area counties experienced additional aggregation between 1950 and 1970, and that in two-thirds of the cases the change toward increased clustering was statistically significant when $\alpha = .05$.²⁶

For the present review it may be tentatively concluded that rural settlement patterns, in areas such as Kansas, can be expected to approximate something approaching clusteredness. Considering this notion and the nature of population sheds around urban places, it would be very useful to the planner if it could be shown that these two distributions are spatially coincident.

B. Economic Location Theories

Historically, two opposing bodies of theory have been developed in an attempt to explain the location of economic activities. One, commonly referred to as "least-cost" theory, posits that the prime factor in determining the location of industry is the areally differential

cost of assembling the several factors of production. This approach has been thoroughly developed in the economics literature and has proven most useful in predicting the actions of the individual firm engaged in primary or secondary activities.²⁷ The other viewpoint, founded on the spatial variation of consumer demand across the cultural landscape, is often called the "demand model" of economic location.²⁸ Pursued steadfastly by geographers, following the conceptualization of Christaller and Lösch, this method of viewing economic location typically concentrates on the explanation of the generalized economic landscape. High points and valleys in the economic topography are related to the variable cost of delivering goods and services to the consumer, with peaks in the activity surface closely associated with the location of the market. For the early stages of industrial evolution, at least, this approach accounts most successfully for the occurrence of tertiary activities such as servicing and retailing, enterprises involving a high labor input. Both of these systems, especially if the least-cost model is viewed in its most general form, depend heavily on variations in transportation costs to explain the situation of productive activities. As in most cases, both of these basically deterministic theoretical orientations rest upon a measure of empirical validity. They both have proven useful in organizing research by location scientists, and thus the failure to date, despite the efforts of Greenhut, Isard and Smith, to integrate successfully these two basic notions into a comprehensive theory of location is particularly unfortunate.²⁹

The demand model. McCarty and Lindberg point out that the demand

orientation hypothesis, as indicated above, has proven more successful in explaining the location and distribution of some activities than others.³⁰ It has been most efficient in dealing with activities containing a large service component; especially those which typically are relatively more specialized and perishable in the sense that they must be produced to a greater or lesser degree in the presence of the prospective consumer. Among the industries most readily grouped in this category are wholesale and retail trade, professional services, and transportation, communication, and public utilities.³¹

An extensive amount of empirical evidence seems to confirm that the locational affinities between retailing and servicing activities and the areal distribution of the demand for them are particularly strong. Although mass production and advances in transport technology are allowing ever increasing standardization and wider distribution of commodities (often in substitution for services), the attraction of the market is undeniable. If one incorporates the notions of internal economies of the firm (more fully developed in least-cost theory) as distortion factors in this production-demand association, a reasonable description of the energizing mechanisms responsible for the location of tertiary activities is provided.

The location of service-based activities seems to be a compromise between the firm's need for a minimum level of income to meet the fixed costs of production (including entrepreneurial profit taking) and the consumer's willingness to pay the cost of transport (in time-distance or pecuniary terms) involved in delivering the service to him.³² These two notions have been identified above by the rubrics "threshold

demand" and "range of a good," respectively.

Central place theory, the parent of the demand theory of location, is an elaboration of Christaller's efforts to synthesize these two elements in his classic work, Central Places in Southern Germany.³³ "One of Christaller's fundamental assumptions was that some power limit of numbers of consumers was required before a given type of function could come into existence."³⁴ This point is of central importance to the would be planner of rural regional land use development. Christaller's network of central places was produced by the location of activities within market areas of sufficient size to meet the minimum threshold of demand, while staying within the range which customers would be willing to travel to obtain the particular good or service. The range of different commodities has been found to vary directly with their purchase price and inversely with their frequency of use.³⁵ Agglomeration economies and fractionalization of consumer transport cost have tended to bring about aggregation of services at these centralized points.

In relatively densely populated areas the locational demands of threshold size and range of goods overlap rather widely, facilitating the solution of location problems and encouraging a center's growth. In sparsely populated regions there is much less flexibility, and thus the possible range of functions which can be supported is severely limited.³⁶ Because of this, the growth of small centers is limited. Berry has shown that while there is a direct relationship between the size of a central place and the size of its hinterland, an upward shift in tributary area size requirements takes place with lessening population

density.³⁷ The number of functions available in a center varies directly with the size of the place (or, if you will, the size of its market area),³⁸ with only functions requiring relatively small internal economies of operation locating in small towns because of the low available threshold population.³⁹ In relation to this fact Haggett notes that:⁴⁰

Isard has shown that the regular (i. e., equal-area) pattern of hexagons suggested by Christaller and Lösch are unlikely to occur in practice. Because of the high density of population at the central core postulated by Losch, the size of the market area here is likely to be smaller, while away from the market it is likely to be larger.

Rather ironically, the low order, frequently used commodities available in smaller towns are just the ones for which the range of customer willingness to travel is the most limited.⁴¹

. . . as one encounters decreasing population density the amount of area necessary to meet threshold size requirements may result in a travel need that is in excess of customer willingness. Several alternatives appear in such a situation. Sellers may engage in multi-line operations, obtaining in this fashion a greater volume of business from a limited number of customers and also making it possible for consumers to serve several needs with one trip. Another alternative is for buyers to submit to higher prices per unit so that a large seller mark-up compensates for a smaller volume. The final alternative is for consumers to perform the services themselves.

Bunge has emphasized the need to recognize rural consumers as major contributors in supporting the activities of small towns,⁴² thus making the implications of these alternatives important to the regional planner. Chisholm generalized the problems of such sparsely populated areas to "collecting" services at the consumers' places of residence, and Haggett extended the argument to the provision of all delivered

services to such areas, including "electricity supplies, water and sewerage, telephone and postal services and roads and transport services."⁴³ Obviously, rural depopulation in already sparsely settled areas compounds the problem even more.

In demand oriented location theory a great deal of emphasis is placed on the nature of the spatial distribution of demand over a market area. Differences are also emphasized between regions with varying levels of population density. A basic tenet of economic theory is the law of downward sloping demand. As the price of goods or services rises, the quantity purchased drops.⁴⁴ The price of a given item, when spatial variables are being considered, is a function of the item's production costs and the price of transporting it to the consumer. Thus demand for a particular service may be represented as

$$q = f(p + t_i) \quad , \quad (22)$$

where q = demand, p = production costs, and t_i = the cost of transport to any i th point. Smith has pointed out that the assumption of "infinitely inelastic demand. . . is. . . poorly suited to the analysis of spatial economics as well as being patently unrealistic."⁴⁵ While the Löschian demand cone, equating the demand curve as a function of distance,⁴⁶ is useful, it must be modified in empirical application by consideration of the variation of population density over space and the variable elasticity of demand with differing locations and population densities.⁴⁷ Lösch himself recognized the influence of both these factors when he postulated that "the number of persons living at a certain distance from a factory increases in the same proportion

as the distance [decreases]" and that "the elasticity of the individual demand in respect to transport costs. . . rises with distance . . .," but he did not incorporate these notions into his formal analysis.⁴⁸ As a result of these last two considerations, Losch reasoned that in the real world, "the regional demand [for goods and services] is smaller, and generally also more elastic, than local demand."⁴⁹

Smith would rework Losch's formulation of total market demand to read:⁵⁰

$$D = b \cdot 2\pi \int_0^r f(p + t) t \cdot dt, \quad (23)$$

with b fluctuating over the market area as found in the real world, which recognizes that the density of population is higher in some parts of the market area and that sales will increase with density.⁵¹

Richardson succinctly summarizes the inter-relationships involved within the areal market by stating that for consumer goods industries the size of the population within a commodity's market area and transportation costs are two primary variables:⁵¹

But. . . the distribution of the population within the market area must also be taken into account. Therefore we must not only allow for the total population to which the firm has access but also estimate the influence of different population clusters within the market area by weighting them with distance, since nearer consumers will pay higher prices because of transport costs.

By way of summary then, the availability of goods and services in an areal market is dependent upon meeting the necessary threshold of the firm, given the existence of an adequate number of consumers within the range of the commodity produced. The two variables coming in to play here are the distance decay function of demand caused by transport costs and the density of settlement within the area in

question. Greater price-elasticity of demand is related to total transport cost and, according to Smith and Richardson, the density of population. Population density is normally visualized as dropping off with distance away from a central place, but whatever the pattern, the distribution of settlement clusters within the market area is of notable importance in determining transport cost. Small places, especially with sparsely settled market areas, are only capable of maintaining a severely limited range of economic activities, and these activities are of the type which typically have a relatively short range; while the sparsely settled market area displays particularly price-elastic demand. With such a delicately balanced situation, rural depopulation can easily drop demand below the necessary threshold level, theoretically denying the good or service to the remaining population and eroding the center's economic base.

The least-cost model. Although Christaller, Lösch, Berry and others have dealt with the relationship between consumer demand and economic activities, Weber founded the modern analysis of location in 1909 with consideration of the spatial costs of assembling the factors of production.⁵³ According to Friedrich, Weber's translator, Weber identified four stages of "natural" tendencies in the distribution of economic forces:⁵⁴

1. The farming population will be distributed rather evenly around the historical centers of culture and population (Thunen's belts).
2. All industries which remain so oriented under the influence of costs of transportation (*i. e.*, industries which use more "pure" materials or ubiquities than weight-losing materials) will be evenly distributed upon this foundation.

3. Industries which show considerable weight losses during the process of production will be attracted to the deposits of raw materials and fuels.
4. Industries with high labor costs per ton of products will be concentrated at the favorable international labor markets.

Using Launhardt's locational triangle, Weber attempted to measure the locational effects of inter-regional factors (such as raw material costs, transport costs, and labor costs) and intra-regional factors (*i. e.*, agglomeration economies) on the distribution of basically secondary industrial activities. After making three major simplifying assumptions: (1) location of raw materials known, (2) consumer markets given, and (3) unlimited immobile labor with fixed wages; Weber tried to specify the "optimum" location of industry, based on the minimization of transport cost (calculated by weight of material shipped). Material costs were subsumed under transport cost, and labor costs and agglomeration economies were handled as skewing factors from the minimum transport cost location.

Considering a case with multiple material inputs and a single market, Weber suggested that the possible locations are (1) at a material source, (2) at a market, or (3) some intermediate point. Employing an analogue model derived from Varignon's frame, Weber determined the optimum least-cost location in any given instance based on the "pulling power" of the several corners of the locational polygon.⁵⁵ Graphically, a least-cost solution to the problem could be found by inscribing a series of "equal-transport-cost lines" (isodapanes) around the material supply and consuming points, and determining the spot at which total transport costs would be minimized. Recently an algebraic solution of

Weber's model has been formulated in which⁵⁶

$$Z = \sum_{j=1}^m (w_j d_{ij}) + w_c d_{ic} , \quad (24)$$

where Z = the minimum transport point.

By way of a short cut, Weber introduced the material index,

$$MI = \frac{\text{Weight of localized materials}}{\text{Weight of finished product}} . \quad (25)$$

If in any given instance $MI \Rightarrow 1$ Weber concluded that the industry in question would be attracted to the sources of raw materials, but if $MI = < 1$ the industry would be attracted to locate at the market. If the material index is unity, any of the three hypothetical locations may be chosen.⁵⁷

To introduce the labor factor Weber devised the "index of labor cost," the average cost of labor needed to produce one unit weight of the good in question. Weber argued that industries with a labor index of more than unity would tend to be labor oriented. In a graphic solution to the location problem, Weber felt that whenever a "cheap labor" location were situated within the "critical isodapane" (a total transport cost isoline which equals the savings to be reaped at a cheap labor point), the industry in question would locate at the labor source.

In dealing with economies of scale, Weber felt that firms with high labor coefficients and the capability of using a high proportion of localized material would tend to agglomerate.⁵⁸ More specifically:⁵⁹

A plant locates in an agglomeration if the savings at this location offset the concomitant increase in transport costs. The agglomeration is located in order to minimize the sum of the additional costs incurred by all the firms located there. If the agglomeration comprises n firms and if the j th firm requires d_{2j} ton-miles at the agglomeration and d_{1j} ton-miles at its minimum transport

cost site, then the agglomeration is located in order to minimize

$$C = \sum_{j=1}^n (d_{2j} - d_{1j}). \quad (26)$$

Although Weber's assumptions are largely unrealistic and his model is quite simple, the Weberian construct remains the core of classical optimizing location theory.⁶⁰ In relation to the discussion presented in the last chapter, Weber's model becomes environmentally deterministic only in cases where $\underline{MI} = > 1$. Otherwise Weber's optimum location is determined by cultural variables, namely transport and labor costs.

Several more recent commentators, including Palander, Hoover, Greenhut and Isard, have refined Weber's work.⁶¹ Palander introduced the consideration of market areas within the Weberian framework, although he assumed demand to be perfectly inelastic. Unlike Weber, Palander considered transport in terms of costs rather than weight, and he analyzed the effects of such realities as variable freight rates. Through this latter factor he concluded that location at one of the corners of the locational polygon (resource point or market) is much more likely than Weber thought, largely because of terminal costs.⁶² Hoover agrees with Palander's conclusions, and stresses the importance of the declining cost of transport with distance. He concludes that the only situations in which intermediate locations are likely are break-of-bulk points.⁶³ This, of course, coincides with the Harris and Ullman model of city formation and growth, based on industrial multiplier effects at transshipment sites. Hoover, like Palander,

identifies agglomeration economies as a part of production costs, calculating optimum location in terms of total revenue rather than least cost.

Weber, Palander and Hoover all tend to undervalue the importance of concentration economies, as shown by Hotelling in his classical linear formulation.⁶⁴ Greenhut emphasized the locational-interdependence of firms, and has done his computations in the metric of total profit, thus incorporating both the cost and revenue curves. Greenhut argues that only in the case of perishable materials or when freight costs are much higher for the raw material than the finished product will firms tend to locate at the material site—"Otherwise the transport factor may be expected to favor a location near the market."⁶⁵ (emphasis added) Finally, Greenhut mentions another factor which will be discussed further below, purely personal, non-economic variables. Because of his failure to incorporate this factor into his formal analysis, however, Greenhut's theory remains tied to optimizing economic man; in other words, it remains deterministic.

Isard, using the principle of substitution, has attempted to use this time honored economic framework to build a more general theory of location. In this effort he places his locational polygons inside Thünen's agricultural concentric zones, and ties this together in a hierarchial Loschian landscape. The amount of substitution possible by a given industry—and thus its location—depends on its technology and its resultant factor orientation. Isard has recently attempted to modify the deterministic character of his model by the introduction

of a game theory approach, emphasizing the identification of potential agglomeration areas called "joint action spaces."⁶⁶

In summary, it should be noted that classical least-cost location theory has undergone significant refinement and elaboration. Even so, Weber's original notions tend to be upheld; with the exception of the ideas of facile along-the-route location and his underemphasis of agglomeration economies. As suggested in Chapter II, the optimum location for most contemporary secondary activity seems to be within large metropolitan areas, except for industries with low-skill labor orientations or important localized raw material inputs. Because of this, the many multi-variate association tests of empirical data conducted by various regional scientists have found a high degree of correlation between industrial activities and the market. It seems defensible to suggest that the L schian demand model yields an even better "fit" to observed economic patterns in the real world.

Behavioral location models. Brief mention must be made of several recent efforts to develop an operational model of economic location which incorporates sub-optimal behavior.⁶⁷

Most notable among these is, perhaps, the work of Pred.⁶⁸ After criticizing traditional theory, and pointing out that real world deviations from what might be expected in theoretical terms are due to random behavior, Pred attempts to construct a behavioral matrix to help explain sub-optimal behavior. On the ordinate he hypothesizes a continuum of information available to decision-makers, and along the abscissa he spreads their ability to utilize that knowledge. All decision-making situations can be gauged on this two dimensional

scale; with large amounts of high quality knowledge which can be well employed (upper left-hand corner) grading into poor information and limited ability to use it (lower right-hand corner).

Pred then attempts to connect different cells in his matrix to hypothetical locational surfaces, showing that locational choices near some optimum point can be purposive or random, but that they are more likely to come from the upper left-hand corner of the matrix.⁶⁹ The problem, of course, is that Pred's model is solely processual, not spatial in geographic terms. It gives insight into the locational process, but not into actual location—which is a profound problem in a would be theory of location.⁷⁰

Smith, building on Rawstron's "spatial margins to profitability,"⁷¹ attempts to identify such areas in any real world situation as the zones around optimal locations which fall within the bounds of an area where the total revenue curve exceeds the total curve cost. Smith argues that "within the margin [between the optimum location and the point where $TC > TR$] the firm is free to locate anywhere, providing profit maximization is not required."⁷² If one conceptualizes Smith's spatial margins as the boundaries of Pred's hypothesized locational diagrams, it might be possible to locate the Pred construct in empirical terms. In any case, any given individual that locates stochastically or purposively within such margins reaps the benefits of the location.

This view comes close to the possibilistic man/land argument posed in the last chapter. Spatial margins of feasibility and environmental limitations are similar notions. Unfortunately, like

environmental possibilism, the spatial margins view gives no indication of probable human decisions, it only gives mute evaluation of their successful outcome. If one attempts to formulate a probabilistic model of economic location in contemporary industrial society, no better option is available than recourse to classical theory.

III. SUMMARY

Although this review has touched in the most cursory fashion on but a few aspects of human location theory, it seems to offer several grounding generalizations which might act as principles for regional land use planning. Urban settlement is organized into a nested hierarchy, with settlement density falling off away from central cities. At the same time, rural population in areas such as Kansas is undergoing an agglomeration of dispersed settlement patterns as an outcome of the urbanization process. This place specific loss and re-ordering of consumers may have a fortuitous effect on some central places, but many others will lose their necessary threshold populations and decline. Manufacturing activities, also heavily attracted by market factors, will typically only be found in non-metropolitan locations when their most profitable factor mix includes an important cheap labor component.

While these observations may not seem encouraging, it is argued here that a positive rationalization of non-metropolitan land use and settlement patterns can and will—eventually—be made within these constraints. In the next chapter a model regional land use policy

plan is built around these ideas and the ones developed in Chapter III. It is suggested that by selectively locating land uses within their spatial margins of feasibility economic development can be encouraged without sacrificing environmental quality.

NOTES FOR CHAPTER IV

¹ For a recent discussion of the dichotomy between man/land and locational inquiry see Edward J. Taaffe, "The Spatial View in Context," Annals of the Association of American Geographers, Vol. 64 (March 1974), No. 1, pp. 1-16.

² See Chapter II, notes nos. 2 and 3.

³ This view would seem to concur with Friedman's appraisal; see, John Friedmann, Urbanization, Planning and National Development (Beverly Hills, Calif.: Sage Publications, 1973), Chap. 3, note 5. For Alonso's discussion see, "Location Theory," in John Friedmann and William Alonso (eds.) Regional Development and Planning: A Reader (Cambridge, Mass.: M. I. T. Press, 1964), pp. 78-106.

⁴ No extensive citation of references is provided here. The reader should refer to J. Brian McLoughlin, Urban and Regional Planning: A Systems Approach (New York: Praeger, 1969), pp. 71-4. See also notes 28 and 29 below.

⁵ Several articles in these traditions are offered in Lowdon Wingo, Jr. (ed.) Cities and Space: The Future of Urban Land (Baltimore: The Johns Hopkins Press, 1963).

⁶ Peter Haggett, Locational Analysis in Human Geography (London: Edward Arnold Publishers, Ltd., 1965); by the same author, Geography: A Modern Synthesis (New York: Harper and Row, 1972); and William Bunge, Theoretical Geography, Lund Studies in Geography, Ser. C. General and Mathematical Geography, No. 1 (Lund, Sweden: C. W. K. Gleerup, 1966).

⁷ Reviews of urban and agricultural land use models are presented by: B. J. Garner, "Models of Urban Geography and Settlement Location," in Richard J. Chorley and Peter Haggett (eds.) Models in Geography (London: Methuen and Co., Ltd., 1967), pp. 335-54; Michael J. Webber, Impact of Uncertainty on Location (Cambridge, Mass.: M. I. T. Press, 1972), pp. 49-70; Michael Chisholm, Rural Settlement and Land Use: An Essay in Location (Chicago: Aldine Pub. Co., 1970), esp. pp. 11-42; Michael Hurst, A Geography of Economic Behavior: An Introduction (North Scituate, Mass.: Duxbury Press, 1972), pp. 106-25; William Alonso, Location and Land Use: Toward a General Theory of Land Rent (Cambridge, Mass.: Harvard University Press, 1964); and Edgar M. Hoover, An Introduction to Regional Economics (New York: Alfred A. Knopf, 1971), pp. 93-117.

⁸ See for instance Friedmann, Urbanization, Planning and National Development; and Friedmann and Alonso, Regional Development and Planning, pp. 78-186 and 321-82.

⁹ More extensive reviews and bibliographies are available in Ibid.; Garner, "Models," pp. 303-35; and many standard urban geography texts such as Brian J. L. Berry and Frank E. Horton, Geographic Perspectives on Urban Systems (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1970), esp. Chapters 3, 5, and 7. A relatively extensive review of rural settlement theory is available at Kansas State University in Clyde Weaver, "Rural Depopulation in Kansas: A Conceptual Inquiry into the Nature of Changing Rural Settlement Patterns on the American Plains," (Unpublished M. A. Thesis, Department of Geography, Kansas State University, 1973) pp. 18-42.

¹⁰ Garner, "Models," pp. 304-5.

¹¹ See for instance Berry and Horton, Geographic Perspectives, pp. 106-68.

¹² Chauncy D. Harris and Edward L. Ullman, "The Nature of Cities," Annals of the American Academy of Political and Social Science, Vol. 242 (1945), pp. 7-17. Administrative and ceremonial centers are conceptualized here as special cases of the service delivery function and military centers are thought to be largely "footloose."

¹³ Garner, "Models," p. 306.

¹⁴ Leslie J. King, "A Quantitative Expression of the Pattern of Urban Settlement in Selected Areas of the United States," Tijdschrift voor Economische en Sociale Geographie, Vol. 53 (January 1962), No. 1, pp. 1-8.

¹⁵ King's R statistics ranged from .70 to 1.38 in a largely predictable pattern. King's sample included a central Kansas case in which R = 1.33 ("approaching uniformity"), while the current author calculated a statistic of 1.46 for all incorporated cities in the nine-county Kansas study area dealt with here in Chapter VI; see Kansas Ozarks Project Staff, Preliminary Land Use Element, Southeast Kansas Planning Region, Technical Report No. 2, Center for Regional and Community Planning, K. S. U. (Topeka, Ks.: Kansas Department of Economic Development, June 1973), pp. 43 and 49.

¹⁶ For an exhaustive bibliography of studies covering many theoretical and empirical central place notions see B. J. L. Berry and Allan A. Pred, Central Place Studies: A Bibliography of Theory and Applications, 2nd Revised Printing (Philadelphia: Regional Science Association, 1965); and Berry's own discussions of central place and demand oriented location theory are available in Geography of Market Centers and Retail Distribution, Foundations of Economic Geography Series (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1967).

- 17 Ibid., p. 42.
- 18 Ibid.
- 19 See Berry for notation and supporting equations in Ibid., pp. 122-3.
- 20 Ibid., p. 120.
- 21 Berry, Geography of Market Centers, pp. 136-9.
- 22 Since colonial times the commercial nature of American agricultural development has prevented the development of settled places which act mainly as rural residential areas, lacking any type of tertiary economic functions. This situation may be changing at present, as smaller hamlets and villages lose their central place functions due to lack of minimum threshold population. A residual agricultural community remains in some such spots for primarily residential purposes, fulfilling its retail buying needs by commuting to larger settlements. On the former point refer to Aime Vincent Perpillou, Human Geography, Trans. by E. D. Laborde (New York: John Wiley & Sons, Inc., 1966), pp. 432-3.
- 23 See, Weaver, "Rural Depopulation," Chapter III for a precise definition of these terms.
- 24 John C. Hudson, "A Location Theory for Rural Settlement," Annals of the Association of American Geographers, Vol. 59 (June 1969), No. 2, pp. 365-81.
- 25 Ibid., p. 380.
- 26 See Weaver, "Rural Depopulation," esp. pp. 61-74.
- 27 For a more detailed review of least-cost location theory see: Alonso, "Location Theory;" Hoover, Regional Economics, pp. 9-90; Harry W. Richardson, Regional Economics (New York: Praeger, 1969), pp. 42-100; Webber, Uncertainty, pp. 10-22 and 39-48; Peter E. Lloyd and Peter Dicken, Location in Space (New York: Harper and Row, 1972), 57-135; Hurst, Economic Behavior, pp. 164-92; Ian Hamilton, "Models of Industrial Location," in Chorley and Haggett, Models in Geography, esp. pp. 369-89; and David M. Smith, Industrial Location (New York: John Wiley & Sons, Inc., 1971), esp. pp. 112-30 and 137-273.
- 28 For more detailed reviews of demand location theory see: Berry, Geography of Market Centers, esp. pp. 59-139; Harold H. McCarty and James B. Lindberg, A Preface to Economic Geography (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1966), pp. 87-175; Smith, Industrial Location, pp. 130-7; Hurst, Economic Behavior, pp. 224-65; Lloyd and Dicken, Location, pp. 9-56; and Webber, Uncertainty, pp. 23-38.

- 29 Friedmann, Urbanization, Planning, and National Development, pp. 41-2.
- 30 McCarty and Lindberg, Preface, esp. Chapters 6 and 7.
- 31 Ibid., p. 110, Table 6-a.
- 32 Whether the customer comes to the service, as in the case of most retailing, medical services, or educational services, or whether the service is delivered to the customer, as with public utilities and communication services is dependent upon (1) the purpose of the service (e. g., to electrify the person's home), and (2) the amount of equipment necessary to provide the service (e. g., the hardware involved in education facilities). In either case the principles involved are the same.
- 33 Walter Christaller, Die Zentralen Orte in Süddeutschland (Jena: G. Fischer, 1935).
- 34 Bunge, Theoretical Geography, p. 145.
- 35 McCarty and Lindberg, Preface, p. 120.
- 36 Ibid.
- 37 Berry, "Cities as Systems," Figure 1a.
- 38 H. A. Stafford, "The Functional Base of Small Towns," Economic Geography, Vol. 39 (1963), pp. 165-75.
- 39 McCarty and Lindberg, Preface, p. 138, Figure 7-1.
- 40 Haggett, Locational Analysis, p. 53.
- 41 McCarty and Lindberg, Preface, pp. 120-1.
- 42 Bunge, Theoretical Geography, p. 146.
- 43 Haggett, Locational Analysis, p. 100.
- 44 Paul A. Samuelson, Economics: An Introductory Analysis (New York: McGraw-Hill Books Co., Inc., 1958), p. 445.
- 45 Smith, Industrial Location, p. 238.
- 46 August Losch, "The Nature of Economic Regions," Southern Economic Journal, Vol. 29 (August 1963), p. 74.
- 47 Richardson, Regional Economics, p. 72.

48 August Lösch, The Economics of Location, Trans. by William Woglom (New York: John Wiley and Sons, Inc., 1967), p. 146; also Richardson, Regional Economics, p. 22.

49 Ibid., pp. 142-3.

50 Smith, Industrial Location, p. 241; and for the original notation see Losch, Location, p. 107.

51 Ibid., p. 242.

52 Richardson, Regional Economics, pp. 72-3.

53 Alfred Weber, Theory of the Location of Industry, Trans. by Carl J. Friedrich (Chicago: University of Chicago Press, 1929).

54 Ibid., p. xxxi.

55 Ibid., p. 54.

56 See, Webber, Uncertainty, p. 13 for an explanation and definition of the notation.

57 Weber, Location of Industry, pp. 59-61.

58 Ibid., pp. 124-72.

59 Webber, Uncertainty, pp. 14-5.

60 Smith, Industrial Location, pp. 118-9.

61 See, Ibid., pp. 119-58.

62 Ibid., p. 123.

63 Ibid., p. 128.

64 Ibid., pp. 138-40.

65 Ibid., p. 144.

66 Ibid., p. 155.

67 Lloyd and Dicken, Location in Space, pp. 136-60 review this literature; and Webber, Uncertainty, pp. 88-282 attempts to build an operational model of locational decision-making considering uncertainties in relationship to competitors, nature and technology.

68 Allan Pred, Behavior and Location: Foundations for a Geographic and Dynamic Location Theory, Parts 1 and 2, Lund Studies in Geography, Ser. B. Nos. 27 and 28 (Lund, Sweden: C.W.K. Gleerup, 1969).

⁶⁹ Ibid., Part I, p. 92, Figure 11.

⁷⁰ Smith, Industrial Location, p. 107.

⁷¹ Ibid., p. 103.

⁷² Ibid., p. 185 (emphasis in the original). See the graphic illustration on p. 186.

CHAPTER V

A MODEL NON-METROPOLITAN REGIONAL LAND USE POLICY PLAN

. . . policies will tend to be more selective and efficient in accomplishing their objectives to the extent they are based on a solid theoretical understanding of the relevant phenomena.

-Friedmann, 1973

I. INTRODUCTION

Attempts to apply theoretical knowledge about various subsystems of the phenomenal world in the formulation of planning policy have been rare to date. Although interest has been on the rise concerning the utility of largely psychological models of man/environment relations to physical design, it would appear that only embryonic trends can be identified in the application of man/land models to land use policy development.¹ Human location theory has been employed more widely for planning purposes, but here again the impact on urban planning in general, and land use planning in particular, has been minimal. A quick review of the Journal of the American Institute of Planners, the Papers of the Regional Science Association, and selected book-length publications will show that location theory applications are primarily limited to regional economic development planning and urban land use work.² Major contributors to this theoretically oriented effort include Friedmann, Alonso, Isard, Tinbergen, Bøventer,

Reiner, Darwent, Harvey, Smith and Berry;³ with perhaps the major conceptual integration being provided by Friedmann.⁴

There would appear to be a near void, in the American literature at least, of theoretical applications to regional scale land use planning.⁵ The necessity of coordinating local land use plans with regional development strategies (the latter sometimes having theoretical input) has become all but a litany in the literature—although a rarity in practice. But given the newness of land use planning at the supra-urban level, and its continuing politically controversial nature, it is probably not surprising that an accepted methodological orientation has yet to emerge.

Urban planners and lawyers are attempting to extend the traditional idiographic city planning model to larger scale land use control efforts. Landscape architects are proselytizing for the McHargian school of "regional analysis," with its commendable emphasis on detailed graphic manipulation of selected empirical data—but a relative poverty of conceptual content. Various physical scientists have taken the field with an array of conservation techniques which will undoubtedly prove useful in physical land management, but which all but skirt the overriding issue of purposive urbanization in a socio-economic framework. The large scale modellers have yet to appear in any number with expanded versions of their operational urban routines, although proponents of remote sensing and satellite imagery are filling the empiricist role. So far, regional planners have been represented by the "administrative faction;" a group which deals primarily in policy formulation, but policy formulation based on the

exigencies of the established governmental decision-making process.

All of the aforementioned groups have a distinct role to play in the evolution of areawide land use planning.⁶ What is emphasized here, however, is the fact that to date theoretically organized knowledge of the functional dynamics of society acting within the cultural landscape has been left basically unconsidered in the attempt to establish a workable, effective paradigm for regional land use policy planning. In this chapter one possible first approximation of a model regional land use policy plan is sketched in, drawing on the high points of the literature reviews presented in the last two chapters.

II. SELECTED SOCIAL SCIENCE THEORY AND REGIONAL LAND USE PLANNING

Neither the literature on man/land relationships nor the available models of human location provide an integrated, systematic theory of how, why and where man interacts with the land. Rather, both of these collections of nomothetic generalizations offer a group of alternative, sometimes competing, models which partially explain their respective phenomenal subject areas.

Man/land theory is distinctly less elaborated than location theory; never really moving beyond the stage of verbal conceptualizations. It is for this reason, and because of the all-important position assigned to environmental concerns in contemporary legislation, that disproportionate coverage has been devoted to its discussion in the present paper, in an attempt to discover the kind of generalizations which are much more readily available in the human location theory literature.

Many recent authors have chosen to isolate the principle components of man/land relations through the use of some type of symbolic notation. But as with the symbolizations suggested in Chapter III, the terms of these equations remain by and large unquantifiable. Without the ability to specify relationships in a truly precise fashion, rigorous testing of man/land hypotheses against careful empirical observations is impossible, and thus the explanatory and predictive power of such constructs is questionable.

Like man/land theory, human location theory is more properly an assemblage of loosely related models. Fortunately in this instance, the important variables involved are more easily reducible to surrogates which may be expressed in agreed upon metrics. It might be argued that the possibility for this rigor is in fact a function of asking a rather different kind of question: a question more aimed toward "how" than "why." However, location theory, applied selectively, does seem to be capable of explaining and predicting human actions with a reasonably high degree of accuracy.

Both bodies of theoretical knowledge contain several major dichotomies. They include constructs which are at least superficially mutually exclusive. A rough analogy might be drawn between the environmental determinism/cultural determinism split in the man-environment literature and the least-cost/demand oriented division in economic location theory. While causality is more segmented in the economic situation, both literatures look more to nature in their respective former schools and more toward man in the latter cases to explain objective reality. This comparison should not be extended too far,

however.

Another more defensible comparison can be made between the opposing deterministic and possibilistic models developed in both fields. In each example, a traditional deterministic paradigm has been more recently challenged by possibilistic constructs. In both cases the possibilist has had to fall back on empirically generated probabilistic generalizations to gain any degree of explanatory capability. In so doing, he has taken recourse to the same kinds of observations which spawned the older deterministic models. Neo-determinism has gained wider acceptability in instances when it can be stated in some type of fairly complicated systems terms. In such instances, its predestination seems to result from systemic interrelations rather than teleological assumptions.

Given the above reservations, it still seems reasonable to argue that using social science theory as a basis for planning decisions is preferable to more intuitive techniques. Even given the relatively crude state of most social theory, it offers the planner a better perspective for the selection of alternative strategies and a higher degree of professional defensibility than any other available basis for action. As Dyckman has argued, the planner must have theoretical support to defend his intervention in the affairs of society.⁷

If one were to attempt to pick the high points of man/land models and human location theory as a guide to land use policy formulation, what would these major emphases be? Perhaps a running sketch of the two prior discussions would be useful in selecting criteria for effective land use policy planning.

A. Man and the Environment

Models of man's relationship to the natural environment were organized into several categories: (1) environmental determinism, (2) environmental possibilism, (3) landscape modification, (4) cultural determinism, (5) biological ecology, (6) human ecology, (7) probabilism, (8) cognitive behavioralism, and (9) cultural assessment of resources. Each of these taxonomic clusters offers particular insights, but in many cases these viewpoints are complementary.

In a land use context, traditional environmental determinism would suggest that human organization of the cultural landscape is primarily an adaptive process, dictated by the natural environment. As documented in Chapter III, this hypothesis was historically carried to excessive lengths, and more objective observation of the areally differentiated humanized landscape tends to discredit this position. It is perhaps useful though to suggest that in narrowly defined cases, especially where nature is particularly severe or capricious, man may be unwilling—even if he is able—to pay the human, environmental and pecuniary cost of occupance. Examples of such instances might include certain varieties (and in particular cases almost any sedentary occupance) or urban or agricultural land use of floodplains, wetlands, aquifer recharge zones, water deficient areas, areas of extreme local relief, places with tendencies toward severe wind or water erosion or radical earth movement, zones with very unstable seismic characteristics, and areas subjected to frequently violent climatic conditions.

Environmental possibilism argues that within the mute limitations

of these and other types of habitats, man can utilize the land in any way he wills; given the technological capability. When human innovations go beyond the bounds of the possible they will fail. Man may well become unwilling to pay the cost of particular uses in given situations before environmental opportunities have been fully exploited or environmental limitations have been reached. This is, in fact, what is represented in most current environmental problems. In most cases, society is unwilling to pay the perceived physical or monetary price of continued expansion of some traditional land uses. The collective willingness to pay the necessary social overhead costs of water purification, soil and water conservation, mineral recycling, renewable resource maintenance, and floodplain occupancy is the real question in point. Social values such as fee simple private property rights, profit motive, and distrust of collective social guidance through government are more immediate barriers to a satisfactory solution of contemporary land use problems than rapidly approaching environmental limitations. It is the lack of an adequate social guidance system to apply currently available technological procedures which makes continued population and economic growth, in the United States at least, an environmental problem.

Cultural determinism, and in some ways environmental behavioralism as well, would extend the above line of argument yet a step further. The cultural determinist would argue that cultural development and choice (i. e., technology and social values) are the crux of the matter. Man can use the land as he sees fit. Land uses can be developed and located at will, within the parameters and constraints of society and

its organization of space. In some of the extreme cases of environmental dysfunction prevalent in contemporary urban-industrial society one can find both necessary and sufficient empirical grounds to invalidate this argument. Deep plow farming of the Great Plains seems to be a very unstable, short-lived land use option. Dense residential development in areas dependent on the ground water system for both potable water and waste water disposal seems untenable. Most sedentary occupance in areas of extreme local relief or periodic wetland conditions appear both unsafe and unreasonable. Large scale urban industrialization, above some upper threshold, seems to push biosystem maintenance outside the present range of human willingness to pay. Solid waste "disposal" as a characteristic of large scale urban-industrial land utilization is at best a relatively short-lived pursuit. The list could go on at significantly greater length.

The environmental behavioralists' rejection of objective environmental limitations rightly points up the need for a shift in social values and organization . It does not, however, face up to even possibilistically identified phenomenal constraints on human action. The environment as beheld is indeed filtered through an apperception process of cognition and value-based adaptation. The fact remains, though, that certain land use developments in particular landscape situations can well exceed a society's willingness to pay, and at a further juncture, the physical limitations posed by the given environment. Careful design of industrial buildings can allow productive economic use of some floodplains, with their typically comparatively less expensive transport possibilities. Floodplain insurance does

spread the periodic costs of natural destructiveness. But residential development in floodplain areas does demand extreme costs in human life, suffering and property—no matter how perceived. Residential development in wetland areas surrounding lakes and reservoirs does cause serious seasonal loss to property, water pollution, and, frequently, aesthetic ruination. Development of urban and most agricultural land uses in areas of high local relief does cause sheet erosion, mass land movements, loss of human life, and extensive property damage. The human reaction to such environmental circumstances may well vary with social conditioning and environmental cognition, but beyond the limits of environmental tolerance the differentiation of human perceptions seems spurious.

Environmental probabilism attempts to indicate the most likely course of development in man/land relationships, given human perception, social values, technological development, the present base point for development, environmental opportunities, and environmental limitations. Prediction of future land use patterns would be predicated on the analyst's best empirically grounded (or intuitive) estimate of these several factors. Divorced from generalizations concerning the empirical situation, probabilism sheds little light on the question of normative land use development.

Landscape modification, biological ecology and human ecology all point to man's role as a change agent on the natural landscape. Landscape modification, in its many "pro" and "con" forms, underlines that man transforms the natural habitat into a humanized environment, and that human land use patterns typically simplify natural diversity,

substituting human organizational complexity for natural complexity. Over simplification of the natural habitat and over concentration of human uses over widespread areas have historically frequently led to environmental dysfunction and deterioration. Biological ecology elaborates on the systematic complexity of the natural environment, and argues that human redirection of energy flows within a natural ecosystem usually amounts to simplification of natural complexity and with it the loss of systems stability. Human ecology tends to demonstrate that stability in resource processes (human land utilization) is not necessarily dependent upon maintenance of natural systems complexity, but may rather be based upon carefully adapted complex social systems. A self-maintaining social re-sculpting of the natural habitat, even to the point of habitat replacement, can, in certain situations, create a stable humanized environment.

Cultural assessment of resources, as presented by Zimmerman and Firey, suggests that stability in land utilization processes is dependent upon the development of resources that are both socially adoptable and naturally possible, and the maintenance of social ambivalence toward land use practices which are either profitable and socially expected or unprofitable and socially expected. Resource development must be achieved through resource congeries which include profitable but unexpected land use processes which are culturally adoptable and within the limits of the natural environment. Resource conservation results from the reintroduction of social ambivalence, and the consequent narrowing of the set of culturally adoptable land use processes.

B. Location of Human Activities

Human location theory injects spatial dimensions into both the notion of environmental opportunities and limitations and the idea of cultural adoptability. Rural and urban settlement theory suggests where, in a relative sense, hierarchical concentrations of human land use can be expected, in terms of the cultural landscape. Demand oriented location theory predicts the outlines of the economic components of the cultural landscape. It is especially useful in identifying the relative locations of services and market oriented manufacturing activity. Least-cost location theory provides a framework for estimating the situation of secondary industrial activities. Transport cost and localized material availability are important factors identified, but agglomeration economies and labor availability are today being pointed up as paramount considerations in the location of many manufacturing operations.

Settlement theories emphasize that human activities are spatially organized in such a fashion as to minimize the friction of distance, and thus tend to agglomerate land use development at focal points in a hierarchical manner. Urban settlement theory identifies the skeleton of the cultural landscape as the nested central place hierarchy, with transport and resource exploitation centers complicating the urban system's regional morphology. Cities exchange goods and services with a complementary hinterland as well as other cities not affected by intervening opportunities. Land use intensity, population density, and land values fall off away from urban core areas in a predictable fashion. The market area of a given city is described reasonably

well by a potential formulation which gauges the combined effects of market demand and the distance decay function.

Rural settlement theory, dealing with the current period of continuing nationwide urbanization, suggests that as depopulation becomes advanced there is a tendency toward settlement clustering. Rural dwellings no longer cover the cultural landscape in a uniform pattern, but rather are tending to group in more attractive areas. Sometimes this tendency takes the form of residential occupancy of defunct low order service centers, "sidewalk farming." Elsewhere it may mean gravitation toward more accessible hinterland zones. It seems reasonable to postulate that these zones may be centered on urban nodes, and are becoming more nearly contiguous with the tributary areas (with predictable population density gradients) of larger central places.

Demand oriented location theory elaborates on these concepts, and attempts to identify the relative location of specific basic and residentiary urban economic activities within the central place system. The friction of distance limits the range of goods and services in relation to consumer demand, and the minimum threshold demand necessary for a service to meet the individual firm's minimum scale requirements can be located within empirically discernable spatial margins of feasibility--the boundaries of any given market area. The elasticity of demand varies directly as a function of distance, with lower order goods affected more adversely than higher order central place functions. This latter factor, along with clustering dispersed populations and the replacement of services with uniform manufactured

items, weights present culturally defined opportunities strongly in favor of commercial land use concentrations in larger central places and multi-functional urban centers.

Least-cost theory of manufacturing location underscores the above generalizations. Industrial land uses are most probable at the market, material exploitation points, or break-of-bulk locations. Economies of scale tend to weight the contemporary location polygon rather heavily in favor of larger market areas, as do most labor considerations. Many external economies can be maintained in suburban industrial park locations, while avoiding the diseconomies of congestion which typify older urban core areas. Thus, only those industries with profit maximizing factor mixes which require highly localized materials or large amounts of semi-skilled labor will be particularly attracted to non-metropolitan locations.

Behavioralist modifications of the least-cost model attempt to explain sub-optimal deviations from this expected norm. They suggest that both rational and irrational industrial location decisions may produce successful and unsuccessful situations, but that ultimately culturally adoptable manufacturing sites fall within the same kind of spatial margins of feasibility characteristic of central place market areas.

III. A PLANNING STRATEGY

Two paramount aims have been identified in contemporary regional land use legislation: (1) protection of the natural environment, and (2) promotion of economic development. The general method of

implementation put forward in current statutory discussions is the purposive location of large scale land developments, developments of regional impact, and developments in critical environmental areas. A fourth generic type of land use development warranting regional attention is suggested here, land use problems of areawide occurrence. Given the two bodies of generalizations drawn from the social science literature discussed here, what kind of strategy might be adopted around which to formulate a regional land use policy plan?

Odum and Wuenscher and Starrett have suggested that ecologically balanced land occupance might be based upon a landscape compartmentalization strategy.⁸ As argued in Chapter III, such a model can easily become environmentally deterministic, but if various land use activities are located with reference to human spatial organizational tendencies as well as environmental limitations this proclivity is suppressed. A compartmentalized regional landscape offers the advantages of encouraging ecosystems stability in some areas through maintenance or reintroduction of natural systems complexity and in other places by concentration of intensive human land uses in a carefully constructed interaction system based on social complexity. Random and unnecessary concentrations of human activity are minimized. And at the same time, natural agglomerative tendencies of the hierarchical cultural landscape are used as the functional energizing mechanism (principium medium in the terminology of Friedmann and Mannheim⁹) to encourage the desired transition. The friction of distance can be minimized while unstable simplification of natural systems is inhibited.

How does one locate the various land use zones within a compartmentalized region? The principles of human location theory and the empirically observed trends in non-metropolitan settlement evolution would seem to provide a generalized answer. Residential land uses should be encouraged to group in such a manner as to develop whatever scale economies may be available in non-metropolitan areas. Service activities, meaning commercial land use, should be aggregated to take advantage of concentrated threshold populations—augmented by fractionalization of distance costs through multi-purpose trips. Secondary industry should only be encouraged in localities offering reasonable chances of economic success; based on rough identification of the margins of feasibility, use of localized resources, and labor intensive specializations. External economies should be emphasized to the greatest extent possible through the concentration of manufacturing activities in adequately developed industrial parks of some minimum scale. This would not only improve economic viability, but also protect the cultural and natural environments from land use conflicts and landscape deterioration caused from insufficient infrastructure and treatment facilities.

These suggestions are of course rather dated in economic development planning. Friedmann and others have suggested the implementation of a growth pole strategy, within the framework of a core/periphery central place system, to encourage the development of basic economic activities and activate hoped for "trickle-down" effects.¹⁰ The innovative features presented here are: (1) the use of Friedmann's core/periphery strategy to identify zones within a compartmentalized,

ecologically balanced landscape, and (2) the application of this compartmental core/periphery model explicitly to regional land use planning. In the identification of growth centers, special attention is given to Berry's observation that there are three types of urban functional linkages within the central place hierarchy: links between metropolitan centers, flows between higher order centers and smaller nodes in their spheres of influence, and spatial interaction between lower order urban places and their respective tributary areas. The infusion of growth industries into these different generic situations requires strategies suited to the particular economic base.¹¹ The conceptualization of Smith's spatial margins of profitability is accomplished here as the spatial dimension of Firey's set of culturally adoptable resource processes.

Because substate planning regions are not typically a separate level of government in the United States, and thus have no legal implementation powers (taxation and police power), it is unrealistic to suggest that regional land use planning should be based on a traditional zoning system. States, counties and cities can control land use through zoning because of their constitutional status. Without the improbable evolution of regional government, however, any land use plan is unworkable which divides a region's land area into use districts which must be established through a zoning ordinance. The land use policy plan presented here attempts to achieve compartmentalization of the regional landscape through the encouragement of regional and local decisions which systematically work toward this end.

These policy statements are suggestive of spatial implications, but no attempt is made to tie them to the areally static definitions of fixed districts.

Friedmann defines policy planning as "a style of allocative planning occurring under conditions of power that are weakly centralized and whose predominant method of control is a restructuring of the decision environment for others."¹² The policies formulated in this paper are assumed to be intended for use by a regional planning body, most likely a regional planning commission. The commission is assumed to be constituted in such fashion as to follow the Department of Housing and Urban Development's membership guidelines; two-thirds elected officials representing 75 percent of the potential jurisdictional area's population. It is also assumed to be certified as the areawide planning organization (APO) and areawide planning jurisdiction (APJ). Furthermore, the hypothetical body acts as the regional level A-95 clearinghouse, and has an adequately funded professional-level planning staff with relatively highly developed local technical assistance capabilities. The format used for the policies themselves is taken from Beal.¹³ Three levels of goal oriented policy statements are devised, which are arranged hierarchically and increase in specificity in descending order. First level policies are designated by roman numerals, Second level policies by upper case letters, and Third level policies by arabic numbers. The policy plan is set out in the form of an outline.

Beal suggests that first level policies can be visualized as the destination or objective to be achieved, that second level policies

can be thought of as the route which leads to the objective, and that third level policies should be conceptualized as the means of transportation used to reach the goal. He argues that policy planning is a necessary and effective part of the planning process because:¹⁴

1. The essential and uncluttered character of the policy statements facilitates public understanding and public participation in the planning program.
2. The policy statements permit and encourage intimate involvement in the planning process by elected officials.
3. The policies plan serves as a coordinative device, bringing together under a single framework the diverse agencies [read "functions"] that may have an impact on development. In this respect it is particularly useful in multijurisdictional areas.
4. The policies plan provides an element of stability and consistency in the planning program in that it will not be made obsolete by changing conditions. [and]
5. The policies plan can be useful as a guide to legislative bodies responsible for adopting land use controls, to boards and commissions authorized to administer the controls, and to the courts which must judge the reasonableness of the legislation and the fairness of its administration.

IV. A MODEL NON-METROPOLITAN REGIONAL LAND USE POLICY PLAN

The following policy plan presents one alternative course of action which might help integrate land use development and control efforts in such a way as to protect and upgrade the physical environment while promoting feasible regional economic development. Unlike the preceding theoretical discussions, this policy plan purposely includes an admixture of substantive and administrative principles, combined in a fashion meant to help bridge the traditionally perceived gap between planning and implementation.

The regional planning commission's overriding goal is to encourage

full utilization of the region's land resources while minimizing unnecessary human environmental impact. This is to be accomplished through the functional rationalization of areawide land use; by means of compartmentalization of land use and settlement patterns, spatial integration of nodal land use clusters, upgrading regional land use processes, and initiation of an effective continuing regional land use planning process. In order to accomplish this goal the following policies are set out:

I. Compartmentalize the regional landscape to gain operating scale efficiencies, promote human or natural systems complexity, and areally minimize human environmental impact.

A. Encourage the development of secondary industrial land uses (manufacturing) in locations within the spatial margins of feasibility of industries with high regional multipliers and factor mixes which create a locational affinity to the area.

1. Reserve land for industrial development only in areas with local resource endowments, ready access to metropolitan markets, or special labor advantages.
2. Locate new manufacturing activities in organized industrial parks with adequate infrastructure improvements and good access to interregional circulation facilities.
3. Amortize existing nonconforming secondary industrial land uses in urban cores, especially when these uses are noxious and/or conflict with adjoining land

development.

4. Identify and encourage industrial land uses which would have the highest potential multiplier effects within the region and would experience the best comparative cost advantages.

B. Promote development of land for tertiary industrial pursuits (services) so as to fractionalize consumer cost inputs, discourage excessive duplication, and provide an urban-economic base for small centers with potentially viable market areas.

1. Concentrate tertiary land uses in the core areas of existing urban centers.
2. Discourage the development of outlying shopping centers except in larger urban centers.
3. Amortize strip commercial developments on the periphery of urban areas and especially at cross-roads and inter-urban locations.
4. Promote central business district store front renovation.
5. Approve necessary areally specific shopping center development only as planned unit developments, with appropriate infrastructure improvements and acceptable landscaping.

C. Facilitate creation of large scale recreational areas, open spaces and associated service developments which aid in economic development while maintaining natural systems integrity and historical regional character.

1. Develop public recreational land uses and open space areas in the vicinity of fragile environmental areas,

areas of special aesthetic interest, and natural water impoundments and multipurpose reservoirs.

2. Avoid commercial land uses in recreational and open space areas, and prohibit private residential development in fragile environments such as wetlands.
 3. Prohibit the use of motorized vehicles in other than designated circulation corridors.
 4. Develop adequate seasonal commercial land use districts in existing settled places, easily accessible to recreational and open space areas.
 5. Encourage the reutilization of existing capital stock in well located settled places for recreational and cultural purposes, preserving authentic "local color."
 6. Form a public regional land development corporation for the acquisition of carefully selected "abandoned" communities (with adequate circulation connections to regional and extra-regional population nodes) for redevelopment as historic seasonal or year around cultural and recreation sites.
- D. Encourage the trend toward residential-place sidewalk farming and dispersed rural settlement clustering, in order to create amenable social communities and viable market areas, areally limit public expenditures, and improve the areally differentiated tax base in places needing infrastructure improvement.
1. Subsidize the development of urban-type infrastructure

and services in rural residential communities from general government revenues and general obligation bonds.

2. Establish large lot zoning districts (for other than agricultural purposes) in areas of dispersed rural settlement.
3. Approve larger scale and more intensive residential rural land uses only in areas with adequate infrastructure improvements (especially water and sewer treatment facilities) preferably through the medium of planned unit development.
4. Encourage the intensification of rural residential land uses in the immediate hinterlands of existing urban centers by the provision of special tax incentives (lower than usual mill levies) and the upgrading of feasible urban-type infrastructure.

E. Help create and maintain viable urban communities by encouraging logical, staged development of residential land through prioritized use and reuse of vacant and dilapidated core area land parcels and careful guidance of peripheral transformations.

1. Promote the development of vacant urban land for residential uses, where appropriate, through the exercise of land use controls and short term local tax incentives.
2. Encourage the redevelopment of dilapidated urban districts for appropriate residential and commercial land uses

through regionally sponsored urban renewal programs, model aesthetic improvement schemes and short term local tax incentives.

3. Stage the incremental subdivision of new land for urban purposes with annually updated, prioritized local capital improvement programs and land use controls.
4. Guide the creation of large scale urban land developments via the use of the planned unit development technique; emphasizing the sequential development of raw peripheral areas and the mandatory provision of essential urban infrastructure improvements.

II. Spatially integrate functional land use clusters so as to enhance place utility, increase inter-area complementarity, decrease the friction of distance, and minimize the land area devoted to transportation facilities.

A. Help provide necessary road facilities between functionally linked land use clusters by the location and development of interregional ties, intra-regional urban connections, and an areally selective network of center-hinterland routes in each operational catchment basin.

1. Link major regional urban centers to high speed, limited access, divided highways to increase time/space connectivity with systemically interdependent higher order extra-regional central places.

2. Develop and maintain adequate (but not duplicatory) two-lane highway connections among regional population centers.
3. Survey, analyze and improve the county road network in evolving rural settlement and recreation areas.

B. Encourage culling down the pecuniary and environmental costs of road system maintenance through abandonment of low use intra-regional and center-hinterland roads, as well as displaced interregional routes; while maintaining ownership of public rights-of-way for other uses.

1. Selectively abandon and close to vehicular traffic sections of the county feeder road network in areas of significantly decreasing rural population density, away from evolving dispersed population clusters.
2. Abandon and close to vehicular traffic any duplicatory or unnecessary intra-regional circulation facilities.
3. Integrate functionally useful displaced interregional highways into the regional highway net, and encourage the abandonment of redundant routes.
4. Encourage the development of abandoned transport right-of-way for other appropriate public uses, especially linear recreation facilities like foot trails, bicycle paths, and horseback trails.
5. Form a public regional land development corporation for the acquisition of development rights on selected abandoned circulation routes.

C.Reduce route placement impact by careful avoidance of fragile environmental areas and severe restriction of roadside commercial and residential development.

1. Eliminate all but irreplaceable circulation facilities in wetland areas and other similar fragile environments.
2. Discourage new construction of circulation routes in fragile environmental areas and locations requiring extensive road cuts.
3. Encourage the amortization of strip commercial land land developments and large scale string residential roadside land uses, while discouraging the extension of such use areas through available control measures.

D.Attract and develop other ground-based transportation facilities, such as railroads and water services, as seems feasible; based on evaluation of the region's situation on the national landscape, its industrial structure, and its natural site characteristics.

1. Attempt to maintain rail freight lines connecting higher order regional urban places to nearby metropolitan market centers.
2. Encourage and cooperate in the abandonment of economically unfeasible branch lines, and promote dedication of such rights-of-way to the appropriate minor civil division for possible redevelopment.

3. Promote the development of water links to surrounding higher order population nodes, where environmentally feasible and economically viable.

E. Encourage only the location and development of public regional airports which afford sufficient scale economies to provide scheduled airline service and are located conveniently to (but at a safe distance from) major regional centers; thus minimizing environmental impact and protecting land for primary industrial uses (agriculture).

1. Determine the realistic regional need for scheduled air service, and identify the aggregate least transport cost location(s) for airport development.
2. Promote development of the minimum number of regional airports which can fulfill projected service demands.
3. Help select airport sites which approximate the identified least transport cost location(s), are convenient to major population nodes (while maintaining an adequate spatial margin of safety), and avoid wetland areas and zones with high local relief.

F. Locate infrastructure improvements, especially large scale developments of regional impact, so as to encourage landscape compartmentalization through selective improvement of spatial accessibility, while avoiding fragile environmental areas.

1. Encourage location of major public facilities in existing population centers.

2. Encourage the adoption and annual updating of local capital improvement programs, based on municipal land use plans.
3. Guide large scale private infrastructure developments through promotion of contemporary land use control techniques.

III. Upgrade regional land use processes so as to broaden the local definition of resources, conserve identified land resources, and functionally minimize human impact through the elimination of unnecessary deterioration of natural systems because of over-concentration (pollution) or over-use (dysfunctional environmental degradation) of non-urban and built-up areas.

A. Expand the region's resource base through broadening its present resource congeries, by development and adoption of culturally acceptable land use processes which geographically lie within their estimated spatial margins of feasibility.

1. Encourage the development of vertically linked secondary industrial activities (manufacturing) based on the careful exploitation and processing of localized land-based resources.
2. Investigate opportunities for more extensive utilization of regional materials in the construction of public facilities and private developments.
3. Reutilize well-situated derelict land (e. g., strip mined areas) for tree cropping, truck gardening, and

specialized animal husbandry.

4. Promote the development of high value specialty agricultural land uses in the vicinity of regional population concentrations, and in locations with ready accessibility to interregional circulation facilities; through the promulgation of purposive model land use codes and land value assessment guidelines.

B. Gradually transform the region's broadened land use processes system into a resource complex, with its intrinsic conservationist tendencies, by creation of social ambivalence toward expected profitable and unprofitable land uses.

1. In cooperation with state supported universities, develop "land ethic" educational programs for integration into regional public school curriculums and use in extension and continuing education adult training programs.
2. Help to instill a sense of "regionalism" in the body politic through an active, meaningful citizen participation program involving all dimensions of the Commission's affairs.
3. Establish a network of citizens' advisory working groups, dealing with appropriate aspects of areawide land planning and management, which involve a representative cross-section of the regional community.
4. Develop a continuing series of lay-oriented land use "action programs" designed to create a high level of public awareness concerning land use issues of regional significance.
5. Initiate an informational program aimed at identifying and

increasing the visibility of regional landmarks, historical sites, scenic attractions, and unique natural and humanized landscapes.

6. Develop a close rapport with traditional rural conservation and agricultural improvement groups and agencies, so as to benefit from their support, expertise and influence, as appropriate.

C. Stop the disturbance of natural and humanized landscapes, the deterioration of both human and natural systems, and the exhaustion of nonrenewable sources, because of indiscriminate, afunctional solid waste disposal, through development of carefully designed recycling and disposal systems.

1. Draw up and promote a county "throw away" packaging ordinance.
2. Establish and maintain a quasi-public, cooperative regional metal salvage service, charged primarily with the collection and self-supporting disposal of abandoned durable consumer goods such as automobiles and farm equipment. (This "regional agency" would make salvaged items available at cost to participating private salvage yards which meet regional environmental and aesthetic standards.)
3. Encourage the strict enforcement and upgrading of existing state and local sanitary land fill statutes and ordinances.
4. Organize a construction materials recycling system designed to clear the regional landscape of abandoned structures, and make available useable salvage at cost to low income individuals. (A standard payment to owners of such properties, plus the incentive of lowered property tax, would

help popularize this operation).

D. Minimize both organic (human and animal) and inorganic water pollution by the spacing of isolated dwellings and small-scale primary and secondary industrial operations (farming, animal husbandry and manufacturing), and the encouragement of strict minimum treatment standards in areas of intense land use development and larger scale or noxious operations.

1. Develop and promote regional standards for water quality in conjunction with conservation, recreational, residential, agricultural, and secondary and tertiary industrial land uses.
2. Provide technical assistance for the upgrading of regional urban waste water treatment facilities.
3. Prepare and initiate a demonstration program comparing alternative means for non-urban residential waste water disposal in different relative circumstances.
4. Help design model ordinances covering rural residential and agricultural organic wastes, requiring treatment of all "sewage"--with special emphasis on controlling feedlot runoff.
5. Encourage regionally based research into the feasibility of profitable recycling of water born organic wastes into local industrial activities.
6. Develop and disseminate recommendations for the specification of residential densities in various regional non-urban environmental contexts.

7. Carry on continuing investigations and monitoring of primary and secondary industrial effects on ground water quality and availability, and publish periodic evaluations and recommendations for public and private action.

E. Strictly limit all land use development (except for primarily panoramic or conservationist open space) in critical environmental areas such as floodplains, shorelines, coastal areas and other wetlands, areas of high local relief, and zones of crust instability and tendencies toward severe erosion.

1. Operationally define "fragile environment" in the particular regional setting.
2. Develop criteria for identification and location of land areas with higher than normal perceived environmental limitations.
3. Write and promote a model strategy for the feasible development and protection of fragile environments through local planning commissions.
4. Research and publish recommendations for alternative regional open space/conservation belts, focusing on perceived areas characterized by potential environmental limitations.

F. Prevent unnecessary land disturbance, defoliation and development through areally differentiated, but universal, public control.

1. Formulate and promote the adoption of a regionwide

environmental impact statement procedure, to be fulfilled before issuance of local building permits, for large scale land development projects in all use categories. (This same impact evaluation should be required as part of the application procedure for all regional A-95 reviews).

2. Promulgate a strict regional non-urban sign ordinance, and provide guidelines for its enforcement in the margin along route easements.
3. Use all reasonable means to promote progressive land use planning and control by municipalities.
4. Encourage the identification and abandonment of marginal agricultural lands, and the creation of a privately owned "regional land preserve" (through county tax incentives), for integration with the publicly controlled open space belt system.
5. Investigate the feasibility of regionally sponsored forestation programs, functionally linked with the "regional land preserve" effort, to act as a further incentive for private participation, encourage the development of new regional resources, and offer potential public supervision of staged forest harvesting.

G. Require the feasible and adequate re-development of landscape areas disturbed by primary industrial practices (e. g., mineral exploitation and renewable resource harvesting).

1. Assist in the identification and location of all regional

landscapes suffering severe derangement from primary industrial utilization.

2. Develop regional strategies for the environmental and economic revitalization of deranged landscapes.
3. Conduct demonstration programs to emphasize the feasibility and test the cost effectiveness of suggested renovation techniques.
4. Cooperate with existing forestry and pastureage conservation programs.
5. Encourage strict enforcement and upgrading of current statutory requirements for revitalization of disturbed landscapes.

IV. Develop legal implementation procedures capable of bringing the above measures to fruition, emphasizing model regional land development codes, technical assistance to localities, public education and participation programs, and strict use of A-95 review power and other forms of funds allocation.

A. Develop a regional land use planning data bank affording easy access to up-to-date areally specific information concerning various aspects of the cultural landscape (capable of areally continuous generalization and representation) and important natural land capability features. Maintain current graphic and tabular printouts of the more pertinent variables.

1. Encourage state participation in pertinent federal and private remote sensing programs.
2. Promote continuing periodic regional analyses of strategic

socio-economic variables, in cooperation with state supported universities, on a statewide basis by planning region.

3. Support the development of a statewide land use information system containing current land cover, socio-economic, and soils and geological data; providing for annual reports to each substate planning region, composed of adequate graphic and tabular material to allow accurate interpretation of the changing regional landscape.

B. Provide a very carefully developed model regional land development code, integrating contemporary zoning, subdivision, urban renewal and annexation procedures (as provided by state enabling legislation), which may be adopted by participating local jurisdictions.

1. Formulate and promote a unified model regional land development code for consideration and potential adoption by participating minor civil divisions. Such a model ordinance should include provision for all of the implementation measures suggested in the proceeding sections, and should emphasize: amortization of nonconforming industrial land uses in urban core and unserved peripheral areas, incentives for the development and redevelopment of vacant and derelict urban land, widely applicable planned unit development procedures, industrial park development guidelines, amortization of strip commercial developments along the approaches to urban centers and at random locations across

the countryside, criteria for the identification of large-scale land developments of regional impact and land use problems of regionwide occurrence, normative location of major public facilities and infrastructure, airport zoning, large-lot rural zoning, alternative mandatory waste water treatment procedures for rural subdivisions, solid waste recycling, strict limitations on land development in "critical" environmental areas, floodplain zoning, and the coordination of city/county land development criteria.

2. Develop and apply simulation techniques to pre-test the possible impact of the proposed land development code on regional land use patterns.
 3. Monitor and review changes in the regional landscape brought about by application of the suggested model land development code, to assure that it does indeed act as a catalyst to landscape compartmentalization.
 4. Amend, as necessary, the model land development code, based on empirical experience gained through regional applications.
- C. Develop model capital improvement programming techniques which can help municipalities locate, stage and finance necessary infrastructure improvements.
1. Formulate a model capital improvement program (in the HUD ("Overall Program Design" format) geared to the needs of regional communities, and designed to assign highest priorities to: (1) the implacement of new urban infrastructure

in a contiguous fashion in conformity with local development plans, and (2) the provision of major public facilities of regional impact in locations readily accessible to important regional population clusters.

2. Promote the adoption of the model capital improvement program through demonstration programs in selected urban places (on different rungs of the central place hierarchy) and counties.
3. Prepare a manual containing guidelines to facilitate the adoption and use of the model capital improvement program by municipalities, and establish procedures for the derivation of annual capital budgets and systematic yearly update of the capital program.

D. Establish and maintain the highest possible local technical assistance capabilities; to be made available as readily as administratively feasible, for both advising and actual technical tasks such as pre-planning surveys, comprehensive plan preparation, and land development code formulation.

1. Continuously upgrade and maintain staff capabilities in skill areas relevant to local jurisdictional problems; emphasizing the employment of only professionally trained staff and staff attendance of professional in-service training programs.
2. Initiate and maintain an informative newsletter for wide distribution within the region which includes current

technical information.

3. Conscientiously endeavor to provide competent technical advisory service to participating minor civil divisions, on a prioritized basis, in matters concerning land use surveying, local socio-economic analysis, land capability determination, land use planning, plan implementation, and regional, state and federal program requirements.
4. Take an active role in the preparation of local land use planning documents. This service should be provided on request, for remuneration of expenses, on a prioritized basis.

E. Establish and maintain active communication with appropriate state and local agencies, in order to gain maximum input into higher level land use decision-making, receive the greatest benefit from available funding programs, keep technical advisory assistance up-to-date, and gain maximum effectiveness from A-95 clearinghouse and other funds distribution functions.

1. Establish and maintain a favorable working relationship with the state land use planning agency, community affairs department, planning agency, highway department, parks and recreation department, geological survey, and pertinent state university departments and institutes.
2. Maintain periodic contact with the appropriate Federal Regional Council, and the region's federal and state-level elected officials.
3. Exercise A-95 review and comment authority in a strict,

objective manner; ensuring that all projects receiving favorable evaluations are in conformity with the intent of this regional land use policy plan. Special attention should be given to the development and consistent application of prioritized criteria for infrastructure, public facilities development, and large-scale quasi-public and private land use development.

4. Make available any regionally controlled funding for technical or hardware expenditures on a prioritized basis which furthers the policies set out in the above sections of this plan.

F. Make full use of high-level citizen participation programs, to establish dialogues which ensure the appropriate mixing of processed and personal knowledge through mutual learning, and to encourage societal learning on matters related to the regional landscape and its guided transformation.

1. Initiate the formation of flexible citizen working groups to provide assistance and advice to the regional planning commission on land use matters.
2. Periodically plumb regional opinion on land use issues by way of properly executed survey research techniques.
3. Conduct frequent public forums and hearings on topics of concern to successful areawide land use guidance; above the requirements of state enabling legislation.
4. Administer all regional planning commission affairs in an open, professional manner, to encourage voluntary citizen

input and to establish a climate of respect and trust
between the regional commission and its constituency.

NOTES FOR CHAPTER V

¹ Examples of recent emphases in this area are given in Preiser, Environmental Design, Vol. II, pp. 98-260; and Robert W. Kates and J. F. Wohlwill (eds.) "Man's Response to the Physical Environment," Special Issue, The Journal of Social Issues, Vol. XXII (October 1966), No. 4.

² The author came to this conclusion after a relatively careful review of these two journals from their inception through April 1974.

³ A lengthy review here of individual publications seems largely redundant and probably unnecessary. Many of the more important sources are cited in Smith, Industrial Location, pp. 519-41. Further references can of course be found in the respective indices of the Journal of the American Institute of Planners and Papers of the Regional Science Association. Friedmann's latest book, Urbanization, Planning, and National Development, is a veritable mine of references on this topic.

⁴ See especially Friedmann in Ibid. and Regional Development and Planning.

⁵ One major exception is the planning application by Friedmann described in Urbanization, Planning, and National Development, pp. 187-226.

⁶ This statement is not made by way of polite disclaimer. See the author's discussion of this point in Papers of the Kansas USDA Inter-agency Land Use Training Schools (Manhattan, Ks.: Cooperative Extension Service, Kansas State University, Dec. 1973), pp. 1-7.

⁷ John W. Dyckman, "The Practical Uses of Planning Theory," Journal of the American Institute of Planners, Vol. 35 (Sept. 1969), No. 5, p. 299. Although Dyckman was referring of course to rational decision-making theory, the "planning theory" of the mainstream urban planner.

⁸ Odum, "Ecosystem Development," and James E. Wuenscher and James M. Starrett, Landscape Compartmentalization: An Ecological Approach to Land Use Planning, Report 89, North Carolina Water Resource Research Institute (Raleigh, N. C.: North Carolina State University, 1974).

⁹ See John Friedmann, Retracking America (Garden City, N. Y.: Anchor Press, 1973), pp. 31-40.

¹⁰ See: Friedmann, Urbanization, Planning, and National Development; _____, Regional Development Policy—A Case Study of Venezuela (Cambridge, Mass.: MIT Press, 1966); _____, "Cities in Social Transformation," in Friedmann and Alonso, Regional Development and Planning, pp. 343-60; _____ and Alonso, Ibid., pp. 1-13; _____ and John Miller,

"The Urban Field," Journal of the American Institute of Planners, Vol. 31 (Nov. 1965), No. 4; pp. 312-9; Bryan J. L. Berry, Growth Centers in the American Urban System (Cambridge, Mass.: Ballenger, 1973), pp. xiii-10; Harold M. Mayer and Clyde F. Kohn (eds.), Section 4. The Economic Base of Cities, in Readings in Urban Geography (Chicago: University of Chicago Press, 1959), pp. 85-126; D. F. Darwent, "Growth Poles and Growth Centers in Regional Planning--A Review," Environment and Planning, Vol. 1 (1969), No. 1, pp. 5-31; Smith, Industrial Location, pp. 441-510; the North Tiebout debate in Friedmann and Alonso, Regional Development and Planning, pp. 240-65; and Francois Perroux, "Economic Space: Theory and Applications," in Ibid., pp. 21-36.

¹¹ Berry, Growth Centers, p. 8.

¹² Friedmann, Retracking America, p. 246.

¹³ Franklyn H. Beal, "Defining Development Objectives," included as Chapter 12 in Goodman and Freund (eds.), Principles and Practice of Urban Planning, esp. 335-8.

¹⁴ Ibid., p. 332.

CHAPTER VI

SKETCHES OF AN EMPIRICAL APPLICATION

. . . it is fully recognized that a general theory of location and space-economy is of little direct use in treating concrete problems or reality. Such a theory must be supplemented by techniques of regional analysis which are operational—techniques which yield estimates of basic magnitudes for the space-economy and for each region of a system. These magnitudes are requisite for both the proper understanding of social problems and policy formulation.

-Isard, 1960

I. INTRODUCTION.

The model land use policy plan presented in Chapter V takes into account a wide range of both substantive and administrative issues revolving around the socio-economic/environmental rationalization of regional land use patterns. In order to lend operational credence to these recommended policy positions, it is useful to suggest and demonstrate how they might be applied in an empirical situation.

The formulation of a fully developed regional land use plan element based on the recommended policies is beyond the scope of this study, both in terms of time requisites and prohibitively extensive, yet specific, data requirements. What is offered here are a few brief sketches meant to illustrate how one might reasonably operationalize some of the spatial and environmental principles incorporated in the model plan.

The region chosen for use in this example is the jurisdictional area of the Southeast Kansas Regional Planning Commission (SEKRPC), a nine

county A.P.J. on the Kansas-Missouri-Oklahoma border which was one of the first organized non-metropolitan planning commission in the state. SEKRPC has been in operation for approximately four years, has a professionally trained planning director, and a series of planning documents.

For the purpose of the present chapter it is assumed that the planning commission and its staff are completely familiar with contemporary methods of planning implementation and administration, and are competent to devise, disseminate and administer model land use standards, regulations, codes, plans, strategies, programs and projects. Attention here is placed primarily on the suggestion of analytic methods for the application of selected conceptualizations introduced in earlier pages to substantive land use location and environmental enhancement problems in Southeast Kansas. This approach should demonstrate how the land use policies contemplated in the model could be used as a guide for more routine public decision-making. In part, it also provides an introduction of theoretically based analytic rigor into the planning process.

Four first level policies were suggested in general form in Chapter V: (1) Compartmentalization of the regional landscape, (2) Spatial integration of functional land use clusters, (3) Improvement of regional land use processes, and (4) Development of legal implementation procedures capable of guiding the realization of these substantive transformations. In keeping with the spirit and purposes of the current paper, the first three tactical groupings will be used in this last chapter to interpret empirical information from Southeast Kansas.

II. A TERSE DESCRIPTION OF THE SEKRPC LANDSCAPE

A comparatively large amount of descriptive material is available dealing with the Southeast Kansas Planning Region. No endeavor to capsule that information is provided here. Rather, the notable characteristics of its socio-economic hierarchy—the parameters of its patterns—and highlights of the physical habitat are skimmed in narrative, graphic and tabular form for the sake of orientation. More exhaustive information may be obtained in the several Kansas State University, Center for Regional and Community Planning reports prepared with financial assistance from the Ozarks Regional Commission (Title V).¹

A. The Socio-Economic Landscape

The SEKRPC region covers approximately 5,000 square miles in the southeastern corner of Kansas (see Map 6-1). This area includes nine counties and 67 incorporated municipalities, representing roughly nine percent of the state's 1970 population and seven percent of its land area. Given the nature of the original survey system employed in this part of the United States and the contemporary political necessity of following state and minor civil division boundaries, the region's shape is nearly square, with the eastern and southern border counties accounting for two-thirds of the area's population (see Map 6-2). Inhabitants of the region are divided almost evenly, according to Census Bureau definitions, between urban and rural. This trait proved steady during the most recent censal period. In 1960 urban residents comprised 56 percent of the region's population. This measure increased only one percentage point in

the next decade. A slight proportional gain in city dwelling residents was, in fact, brought about by a relatively slower rate of decline in urban as opposed to rural inhabitants: -4.2 percent compared to -5.5 percent between 1960 and 1970.² As is typical in most of non-metropolitan America, highly age selective emigration of economically and biologically productive people, along with the resultant decrease in birth rates, tend to explain this loss. Of an estimated 8,700 migrants over the decade of the sixties, 97 percent were out-movers and 75 percent of this latter group were in an age range between 15 and 39 by 1970.³ The average dependency ratio for the nine counties was 92.8 in 1970, over ten percent higher than the state as a whole. The lowest dependency rates were recorded in the southern and eastern border counties.⁴

The 1970 population of Southeast Kansas by age cohort and sex is shown in Table 6-1. The concave shape of the region's population pyramid is apparent. Over 42 percent of the SEKRPC population falls within the nonproductive age cohorts (optimistically defined as 0-14 and 265).⁵ The region's total 1970 population was approximately 192,000, representing a population unit about the size of an "average" Kansas SMSA.

Tables 6-2 and 6-3 present cohort survival population projections for Southeast Kansas for the years 1980 and 1990.⁶ These forecasts were prepared by the Population Research Laboratory, Kansas State University, using the following assumptions: (1) mortality and migration patterns by age group would follow the trend established between 1960 and 1970, (2) mortality rates for the 75+ age cohort would approximate those

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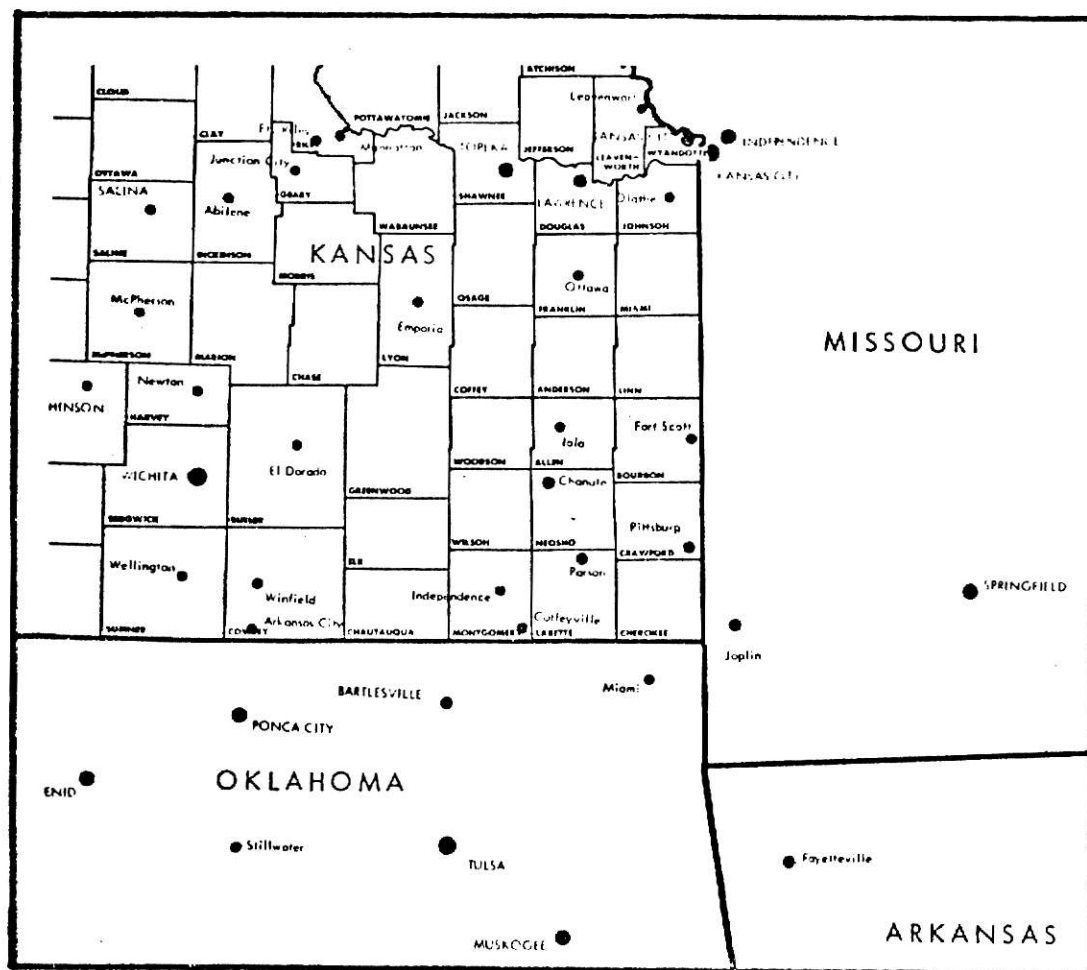


FIGURE 6-1
SOUTHEAST KANSAS AS PART OF
THE MID-PLAINS

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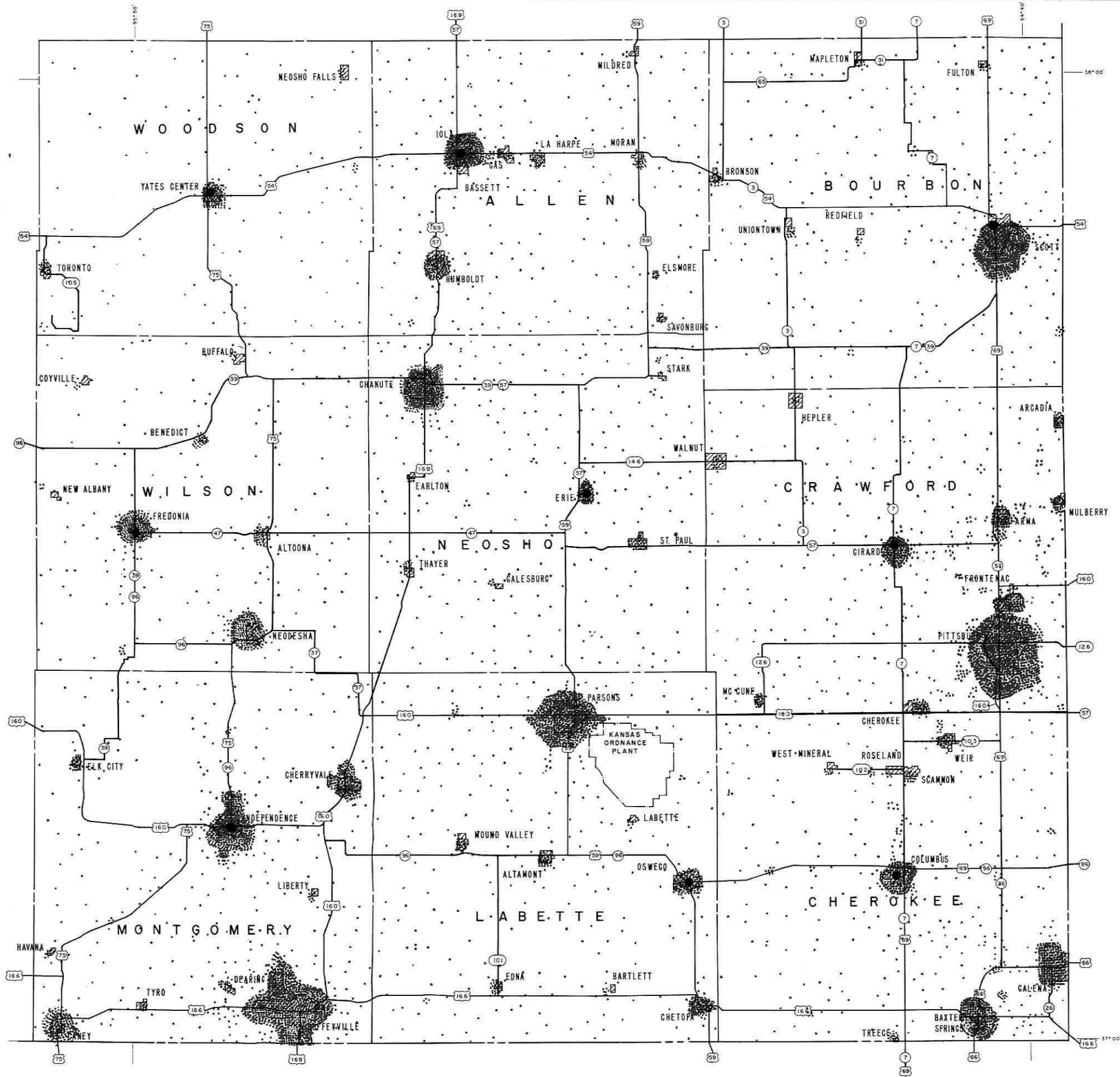
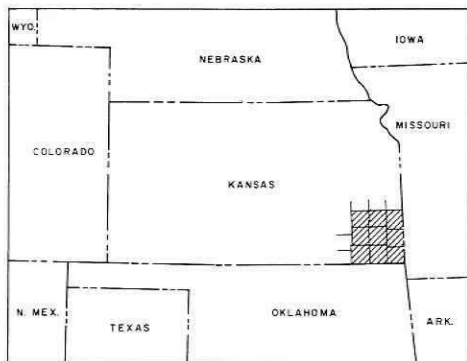
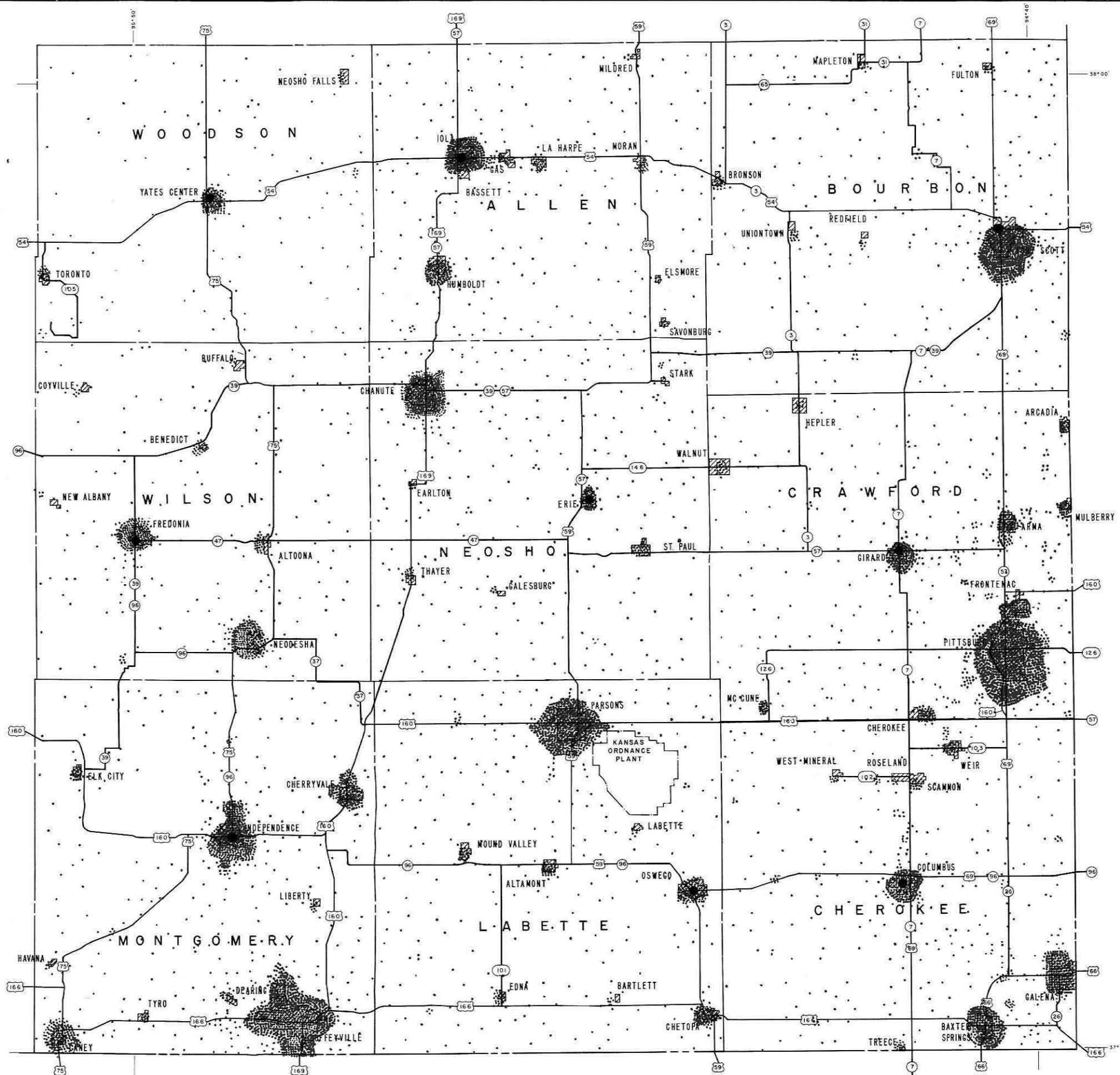
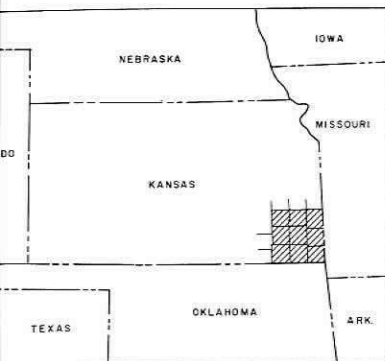


FIGURE 1
POPULATION
DISTRIBUTION
IN THE
STUDY AREA
FOR
RESOURCE CONSERVATION



LEGEND

- STATE BOUNDARY
- COUNTY BOUNDARY
- COUNTY SEAT
- INCORPORATED TOWN
- U.S. HIGHWAY
- STATE HIGHWAY
- 20 PEOPLE

FIGURE 6-2
POPULATION DISTRIBUTION
SEE-KAN
RESOURCE CONSERVATION AND DEVELOPMENT PROJECT
KANSAS

SCALE 1/500,000
SCALE 5 0 5 10 MILES

END

OF

OVERSIZE

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recorded in 1959-60-61, and (3) birth rates would conform to Census Bureau Series E. Projections, with the sex ratio at birth equivalent to the average between 1967 and 1972. Given the linearity of these assumptions, the 1980 projections will probably prove more accurate than those for the latter decade. It is forecast that the region's population will continue to decline by approximately eight percent each decade, and that the dependent age cohorts will represent 41 percent of the total population in both 1980 and 1990.⁷ From these projections it would appear that the Southeast Kansas population will maintain its present structural characteristics over the next sixteen years, while losing about one percent of its residents annually.

Turning to a categorical description of regional employment, Table 6-4 lists the number of workers engaged in various industrial pursuits in 1970, as well as the proportion each category comprised of the total labor force 16 years of age and over.⁸ For the region as a whole, the most important industrial sectors, in terms of absolute numbers employed, were Other Services, Other Retail, Other Manufacturing, Agriculture, Forestry and Fisheries, and Contract Construction.⁹ These employment frequencies are, of course, representative of a non-metropolitan economy, with its emphasis on lower level central place functions, minor manufacturing specialities and primary industrial pursuits. Column C of Table 6-4, A Location Quotient Index, is discussed below.

Referring to Table 6-5, Shift-Share Analysis of the Southeast Kansas Economy, changes in the industrial structure of the SEKRPC economy are analyzed for the two most recent censual periods, 1950-1960 and 1960-1970.¹⁰ As outlined by Berry, shift-share analysis is a simple

TABLE 6-1

1970 POPULATION BY AGE
COHORT FOR SOUTHEAST KANSAS

Age Cohort	Male		Female		Total
	Cohort Population	Percent	Cohort Population	Percent	
0 - 4	6,533	3.40	6,369	3.31	12,902
5 - 9	7,929	4.12	7,533	3.92	15,462
10 - 14	8,873	4.62	8,192	4.26	17,065
15 - 19	8,756	4.55	8,669	4.51	17,425
20 - 24	6,326	3.29	6,466	3.36	12,792
25 - 29	4,918	2.56	4,872	2.53	9,790
30 - 34	3,949	2.05	4,173	2.17	8,122
35 - 39	3,753	1.95	4,398	2.29	8,151
40 - 44	4,622	2.40	5,128	2.67	9,750
45 - 49	5,200	2.71	5,609	2.92	10,809
50 - 54	5,218	2.71	6,051	3.15	11,269
55 - 59	5,421	2.82	6,117	3.18	11,538
60 - 64	5,276	2.74	6,270	3.26	11,546
65 - 69	4,500	2.34	5,698	2.96	10,198
70 - 74	3,766	1.96	5,234	2.72	9,000
75+	7,463	3.88	8,950	4.66	16,413
Totals	92,503	48.12	99,729	51.88	192,232

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Source: Dr. C. Flora, K.S.U. Population Research Laboratory, April, 1974. Prepared from published census materials.

TABLE 6-2

1980 POPULATION PROJECTION BY AGE
COHORT FOR SOUTHEAST KANSAS

Age Cohort	Male		Female		Total
	Cohort Population	Percent	Cohort Population	Percent	
0 - 4	6,602	3.75	6,192	3.52	12,795
5 - 9	7,024	3.99	6,199	3.52	13,223
10 - 14	6,407	3.64	6,096	3.47	12,503
15 - 19	7,565	4.30	7,366	4.19	14,931
20 - 24	6,038	3.43	5,880	3.34	11,919
25 - 29	5,637	3.20	5,674	3.23	11,312
30 - 34	5,777	3.28	5,674	3.23	11,451
35 - 39	4,368	2.48	4,666	2.65	9,034
40 - 44	3,759	2.14	3,990	2.27	7,749
45 - 49	3,524	2.00	4,051	2.30	7,575
50 - 54	4,256	2.42	4,886	2.78	9,143
55 - 59	4,675	2.66	5,355	3.04	10,031
60 - 64	4,619	2.63	5,933	3.37	10,553
65 - 69	4,447	2.53	2,785	1.58	7,233
70 - 74	3,839	2.18	5,488	3.12	9,328
75+	7,149	4.06	9,985	5.68	17,135
Totals	85,693	48.71	90,229	51.29	175,923

Source: Dr. C. Flora, K.S.U. Population Research Laboratory, April, 1974.

TABLE 6-3

1990 POPULATION PROJECTION BY AGE
COHORT FOR SOUTHEAST KANSAS

Age Cohort	Male		Female		Total
	Cohort Population	Percent	Cohort Population	Percent	
0 - 4	5,789	3.61	5,430	3.38	11,220
5 - 9	6,603	4.12	5,828	3.63	12,432
10 - 14	6,475	4.04	5,928	3.69	12,403
15 - 19	6,701	4.18	6,062	3.78	12,764
20 - 24	4,360	2.72	4,736	2.73	8,736
25 - 29	4,871	3.04	4,821	3.00	9,693
30 - 34	5,514	3.44	5,161	3.22	10,675
35 - 39	5,008	3.12	5,434	3.39	10,442
40 - 44	5,500	3.43	5,425	3.38	10,926
45 - 49	4,102	2.56	4,298	2.68	8,401
50 - 54	3,462	2.16	3,802	2.37	7,264
55 - 59	3,169	1.97	3,868	2.41	7,037
60 - 64	3,768	2.35	4,791	2.99	8,560
65 - 69	3,835	2.39	2,439	1.52	6,275
70 - 74	3,362	2.10	5,194	3.24	8,556
75+	6,983	4.35	8,100	5.05	15,084
Totals	79,509	49.55	80,965	50.45	160,475

Source: Dr. C. Flora, K.S.U. Population Research Laboratory, April, 1974.

TABLE 6-4
EMPLOYMENT BY INDUSTRY
1970

	(A) SEKRPC	(B) Emp./capita	(C) L.Q.I. (State)
1. Agri., For., & Fish	6,091	.032	.942
2. Mining	918	.005	1.000
3. Contract Construction	4,080	.022	.957
4. Food&Kindred Prod.	1,153	.006	.858
5. Textile-Mill Prod.	1,549	.009	3.000
6. Lumber & Wood Prod.	544	.003	1.500
7. Printing & Pub.	1,430	.008	1.000
8. Chem. & Allied Prod.	816	.005	1.250
9. Machinery	2,065	.011	1.100
10. Transportation	1,353	.008	.534
11. Other Manufacturing	6,898	.037	1.850
12. Railroads	1,516	.008	1.000
13. Trucking & Warehousing	1,114	.006	1.000
14. Other Transp.	525	.003	.750
15. Communications	608	.004	.800
16. Utilities	1,374	.008	1.143
17. Whlsle. Trade	2,026	.011	.647
18. Food & Dairy Prod.	1,867	.010	1.000
19. Eat & Drink Estab.	2,219	.012	1.000
20. Other Retail	7,800	.041	.912
21. Fin., Ins., & Real Est.	3,015	.016	.889
22. Private Households	1,005	.006	1.000
23. Bus. & Repair Service	1,530	.008	.800
24. Entertainment & Recre.	388	.002	.667
25. Other Services	14,453	.076	.874
26. Public Admin.	2,683	.014	.737
27. Total	69,020	.363	
	190,299		

Source: U. S. Census of Pop. 1970, PC (1)-C 18 Kans.

analytic technique which relates shifts in areal industrial structure to the three main components of growth:¹¹

- (1) that part attributable to national growth;
- (2) that part attributable to the difference between rates of growth of the mix of industries in the region and the national rate of growth of all industries; and
- (3) that part due to differences between the rates of growth of the industries within any particular region and the rates of growth of the same industries in other regions.

The relationship between these growth components and total employment change in a given industrial sector may be expressed symbolically as:

$$C_{ij} = NG_{ij} + IM_{ij} + RS_{ij} \quad , \quad (27)$$

where: C_{ij} = the absolute change in employment between two points in time for any industry i in region j ,

NG_{ij} = the national growth component of change for any industry i in region j ,

IM_{ij} = the industrial mix component of change for any industry i in region j , and

RS_{ij} = the comparative regional component of change for any industry i in region j .

The categorization of industrial activities in Table 6-5 is comparable to that used in Table 6-4.¹² Reviewing the five dominant employment sectors identified above, it seems justifiable to make the generalization that employment changes in the 1950-1960 period basically followed the predominant patterns of non-metropolitan out-migration, while during the second decade there was noticeable growth in both secondary and tertiary activities. In the 1960-1970 period, reflecting the fact

that the U.S. economy experienced rapid expansion, the national growth component (Column H) exerted a positive influence on all industrial pursuits in Southeast Kansas. Changes in employment in the five industrial groups in question were related to SEKRPC's industrial mix and the region's share of national growth.

Significant expansion occurred in the Other Services category, reflecting the general trend toward higher levels of consumption in the country at large. Southeast Kansas' lower regional buying power would appear, however, to have stunted growth in this sector, as suggested by the high negative regional share component in Column J. Responding to the same stimuli, a minor upward shift was recorded in Other Retail as well. Other Manufacturing experienced the largest growth of any industrial grouping during the last censal period, although this movement was retarded somewhat by the region's unfavorable industrial mix (Column I), suggesting the typical non-metropolitan reliance on slow growth industries.¹³ This shift toward secondary industrial employment is another sign of the times which might have been predicted on theoretical grounds. The lag associated with SEKRPC's industrial mix is probably of no small theoretical importance and will be discussed again below. Primary economic activities showed significant reductions in employee strength throughout the analysis period. This is, of course, the crux of the post World War II rural-urban migration, and shows up in the shift-share framework partially as a negative industrial mix component. In the last decade, agriculture in Southeast Kansas grew more rapidly than was the case nationally, reflecting the continuing concentration

on farming—albeit mechanized, "big business" farming—in the region.

The relative location of Southeast Kansas on the broader Mid-plains landscape is of paramount importance in explaining the region's current patterns of areal specialization, complementarity and spatial interaction. SEKRPC occupies a peripheral trough on the socio-economic surfaces created by prevailing interactional patterns of "Daily Urban Systems (DUS)" in the Mid-plains (refer back to Map 6-1).¹⁴ The region falls within the sphere of influence of the Springfield, Missouri SMSA (O.B.E. 116), and lies entirely outside of the Springfield labor market.¹⁵ Using the Borchert-Adams-Berry classification system, Berry has recently identified the central place hierarchy in Southeast Kansas.¹⁶ As modified for use in the 1974 Preliminary Economic Development Plan for Kansas, this taxonomy includes six levels: Metropolis, Wholesale-Retail Center, Complete Shopping Center, Partial Shopping Center, Full Convenience Center (town), and Rural Residential Community.¹⁷ Table 6-6, The Southeast Kansas Urban Hierarchy, presents the urban functional classification of SEKRPC communities.¹⁸ By definition, there is no metropolitan center within the region, nor are the two Springfield DUS Wholesale-Retail Centers located in Kansas.

The seven Southeast Kansas Complete Service Centers (*i. e.*: Pittsburg, pop. 20,171; Coffeyville, pop. 15,116; Parsons, pop. 13,015; Independence, pop. 10,349; Chanute, pop. 10,341; Fort Scott, pop. 8,967; and Iola, pop. 6,493) were identified earlier by the Ozarks Regional Commission as economic "growth centers."¹⁹ Employment figures by industry for 1970 are available in published form for the five growth

TABLE 6-5

SHIFT-SHARE ANALYSIS OF
THE SOUTH-EAST KANSAS ECONOMY

INDUSTRY	COMPONENTS OF EMPLOYMENT CHANGE										
	1950-1960						1960-1970				
	EMPLOYMENT IN			CHANGES RELATED TO			TOTAL CHANGE (G)	CHANGES RELATED TO			TOTAL CHANGE (K)
	1950 (A)	1960 (B)	1970 (C)	NAT. GROWTH (D)	IND. MIX (E)	REG. SHARE (F)		NAT. GROWTH (H)	IND. MIX (I)	REG. SHARE (J)	
1. AGR., FOR., & FISH...	17365	9732	6091	2519	-9159	-993	-7635	1794	-5485	50	-3641
2. MINING.....	2019	1468	913	293	-893	49	-551	271	-382	-439	-550
3. CONTRACT CONSTRUCTION..	4680	4063	4080	679	-193	-1103	-617	749	-319	-412	17
4. FOOD & KINDRED PROD...	1825	1599	1153	265	262	-753	-226	295	-670	-70	-446
5. TEXTILE MILL PROD.....	992	1424	1549	144	7954	-7665	433	262	-1539	1402	125
6. LUMBER & WOOD PROD....	304	272	544	44	-75	-1	-32	50	-72	294	272
7. PRINTING & PUBLISHING..	939	1154	1430	136	178	-99	215	213	-38	102	276
8. CHEM. & ALLIED PROD...	1661	1177	816	157	180	-240	96	217	-48	-530	-361
9. MACHINERY.....	926	2082	2065	134	297	725	1156	384	291	-591	-17
10. TRANSPORTATION.....	394	1151	1653	57	79	621	757	212	-9	-2	102
11. OTHER MANUFACTURING...	4774	3928	6898	693	202	-1741	-846	724	-576	2522	2976
12. RAILROADS.....	4721	2369	1546	685	-2205	-832	-2352	437	-1201	-59	-913
13. TRUCKING & WAREHOUSE..	933	997	1114	135	142	-213	64	184	6	-72	117
14. OTHER TRANSPORTATION..	674	971	525	93	-9	209	297	179	-1040	415	-446
15. COMMUNICATIONS.....	987	970	548	143	227	-388	-17	179	-51	-520	-422
16. UTILITIES.....	1392	1331	1374	202	-1	-262	-61	245	-92	-104	45
17. WHOLESALE TRADE.....	2351	2115	2026	341	-67	-510	-236	390	352	-631	-89
18. FOOD & DAIRY PROD.....	2692	2252	1867	391	-444	-387	-440	415	-68	-732	-389
19. EAT & DRINK ESTABLISH..	2013	2109	2219	292	-163	-33	96	339	284	-363	110
20. OTHER RETAIL.....	7790	7708	7800	1130	225	-1437	-82	1421	111	-1439	92
21. FIN., INS., & REAL EST..	1990	2300	3015	289	513	-492	310	424	393	-101	715
22. PRIVATE HOUSEHOLDS....	2637	1800	1005	237	40	-114	163	332	-1001	-126	-795
23. BUS. & REPAIR SERVICE..	1762	318	1530	256	143	-1843	-1444	59	68	1085	1212
24. ENTERTAINMENT, ETC....	2882	2463	2598	418	-310	-527	-419	454	-2322	1793	-75
25. OTHER SERVICES.....	7855	10554	12453	1140	5192	-3633	2699	1945	7840	-7856	1899
26. PUBLIC ADMINISTRATION..	2814	3342	2683	408	362	-243	528	616	274	-1549	-659
27. TOTAL.....	77791	69649	63990	11286	2477	-21905	-8142	12838	-5431	-8966	-659

Source: M. Jarvin Emerson, "The Future of the Kansas Economy," An unpublished report done for the Kansas Department of Economic Development, April, 1974, p. 2-3.

TABLE 6-6

THE SOUTHEAST KANSAS URBAN HIERARCHY

Community	County	1970 Population	Functional Classification ²
Springfield SMSA	(MO.)	152,929	W R
Joplin	(MO.)	39,256	W R
Pittsburg ³	CR	20,171	C S
Coffeyville	MG	15,116	C S
Parsons	LB	13,015	C S
Independence	MG	10,349	C S
Chanute	NO	10,341	C S
Fort Scott	BB	8,967	C S
Iola	AL	6,493	C S
Baxter Springs	CK	4,489	P S
Galena	CK	3,712	P S
Columbus	CK	3,356	P S
Neodesha	WL	3,295	P S
Fredonia	WL	3,080	P S
Cherryvale	MG	2,609	P S
Cancy	MG	2,192	P S
Girard	CR	2,591	F C
Humboldt	AL	2,249	F C
Frontenac	CR	2,223	F C
Oswego	LB	2,200	F C
Yates Center	WO	1,967	F C
Chetopa	LB	1,596	F C
47 Incorporated Places	-	-	R R

¹ Primary Data Source: B.J.L. Berry, Growth Centers in the American Urban System, Vol. II (Cambridge, Mass.: Ballinger, 1973), pp. 238-9.

² Functional Classification abbreviations: WR = wholesale retail center, CS = complete shopping center, PS = partial shopping center, FC = full convenience center, RR = rural residential center.

³ All SEKRPC counties lie in the periphery of OBE 116, beyond the Springfield labor market.

centers with populations over 10,000. These data were used to calculate "Location Quotient Indices" ("ratios of concentration") comparing per capita employment by industrial sector in the five communities with equivalent parameters for the state (see Table 6-7). The location quotient is essentially an economic base index, suggesting the areal specialization of the communities in question, and thus the exogenous income earning activities in SEKRPC's major population centers. The coefficients presented in Table 6-7 were generated by the formula:

$$LQI = \frac{R_{ij}/RP_j}{S_{ij}/SP_j} \quad ; \quad (28)$$

where: LQI = the location quotient index,

R_{ij} = the number of employees for any given industry i in region j,

RP_j = the population of region j,

S_{ij} = the number of employees for any given industry i in the state containing region j, and

SP_j = the population of the state containing region j.

Except for construction and utilities, industrial sectors with a LQI of more than unity are tentatively classified as basic, making it possible to offer qualified statements about SEKRPC's urban income earning activities.²⁰

The results of this economic base analysis are largely self explanatory and probably do not require redundant narrative description. It is useful though, by way of summary, to refer back to Table 6-4 which gives indices of concentration for the region as a whole in Column C. More employees per capita in Southeast Kansas are engaged in textile

TABLE 6-7

GROWTH CENTER LOCATION
QUOTIENT INDICES
1970

	Pittsburg	Coffeyville	Parsons	Independence	Chanute
1. Agri., For., & Fish	.295	.089	.177	.177	.206
2. Mining	.600	.200	.200	1.600	1.400
3. Contract Construction	.740	.740	.913	.653	.870
4. Food & Kindred Prod.	.715	2.000	.429	.572	.143
5. Textile-Mill Prod.	.667	1.000	5.334	.667	3.000
6. Lumber & Wood Prod.	1.000	1.500	2.500	4.500	1.500
7. Printing & Pub.	1.000	.625	.625	1.500	.875
8. Chem. & Allied Prod.	1.000	2.500	.250	.500	.250
9. Machinery	1.000	1.900	.100	1.600	1.800
10. Transportation & Equipment	.200	1.200	.334	.734	.467
11. Other Manufac- turing	1.150	1.950	2.950	1.450	2.550
12. Railroads	1.500	1.125	2.625	.250	2.125
13. Trucking & Warehousing	1.167	.667	.834	.500	1.167
14. Other Trans- portation	.250	.500	.500	4.750	1.000
15. Communications	1.200	.800	1.200	1.000	1.000
16. Utilities	.715	1.429	1.000	1.429	1.143
17. Wholesale Trade	.765	.647	.471	.647	.883
18. Food & Dairy Prod.	1.200	1.300	.700	1.000	1.500
19. Eat & Drink Estab.	1.917	1.167	1.000	.834	.917
20. Other Retail	1.178	1.245	.778	1.156	1.067
21. Fin., Ins., & Real Estate	.723	.945	.945	1.278	1.167
22. Private Households	.834	1.167	.667	1.500	.834
23. Bus. & Repair Service	.400	1.300	1.000	1.000	1.200
24. Entertainment & Recreation	1.334	.334	1.334	.667	.667
25. Other Services	1.368	.759	1.058	.874	.920
26. Public Admin.	.948	.579	.790	1.158	.685
27. Total					

Source: U. S. Census of Pop. 1970, PC (1) -C18 Kans.

milling, lumber and wood production, chemical production, the manufacture of machinery, the production of Other Manufacturer goods, and the delivery of utilities than is true for the state of Kansas. Mining, printing and publishing, railroads, trucking and warehousing, retail and over-the-counter foods merchandizing, and private household employment are as important here as in other parts of the state. It is notable that agriculture and food and kindred products are less important to the SEKRPC economy than is typical in Kansas. As might be expected from least-cost economic location theory, Southeast Kansas—a declining non-metropolitan, but traditionally "urban" part of eastern Kansas—apparently earns exogenous income through regional specializations based on activities which favor a factor mix of (1) cheap labor and (2) natural resource exploitation. Intra-regional variations in this pattern are suggested on Table 6-7, with agriculture occurring, of course, in the rural sections of the nine counties and "sidewalk" farmers apparently inhabiting the smaller settled places.

SEKRPC's regional complementarity would appear to be with the larger population centers outside of its immediate daily urban system. But its present comparative regional advantage is relatively unimpressive. M. Jarvin Emerson observes that:²¹

Region 02's [SEKRPC's] growth is negatively correlated to any growth in Regions 01 and 04 [Kansas City-Lawrence-Topeka and Wichita-Hutchinson]. The region's distance from Wichita and Kansas City is enough to make locations in either Regions 01 or 04 more desirable for manufacturing facilities. Further, the transportation system is not desirable from a marketing standpoint. Major interstates bypass the region, but flank it in Regions 01 and 04 making these regions more desirable site locations. The rail system is again not optimal; the rail system is on a north-south, east-west layout. The major national markets lie to the northeast or southwest. Thus, any shipment to major

market areas must be switched to a major northeast-southwest line which runs through Regions 01 and 04. The rail lines going out of the region, except north, are direct routes to areas of poor market potential. In essence then, increase in manufacturing employment will be limited in this area until the majority of sites in Regions 01 and 04 are utilized. The region is close enough to both Kansas City and Wichita to have its level of trade limited by these metropolitan areas. But again, the region is distant enough to make it dependent on its own capital for local growth.

In other words, the demand theory of economic location would also predict a poor comparative advantage for Southeast Kansas.

Emerson has recently projected categorical industrial employment in Kansas planning regions by use of the Kansas input-output model. The 1980 and 1990 forecasts for Southeast Kansas are compared roughly to 1970 employment figures on Table 6-8.²² Because of a possible lack of strict comparability between the industrial categories used by the Census Bureau and Emerson, only directional indications of change (no rates) are presented. Emerson predicts that primary industrial activities (agriculture and mining) will continue to decline, along with such linked processing activities as food, chemicals, and petroleum production. Contract construction, a function of population size, family formation and general economic growth, will continue to lose workers. Demand oriented pursuits such as wholesale and retail trade and utilities will also follow the population decline.

New employment opportunities will be opened up in labor intensive, relatively low-skill areas such as machinery, transportation equipment, and Other Manufacturing, as well as the growing tertiary and quaternary service sectors where changing levels of consumer demand and increasing transfer payments will be the energizing mechanisms for growth.

TABLE 6-8
EMPLOYMENT PROJECTIONS BY INDUSTRY
FOR SOUTHEAST KANSAS¹

Industrial Sector	Number of Persons Employed			Direction Of Change
	(A) 1970 ²	(B) 1980 ³	(C) 1990 ³	
1. Agriculture	6091	5839	5119	-
2. Mining	918	832	459	-
3. Contract Construction	4080	1642	1588	-
4. Food&Kindred Products	1153	1205	1102	-
5. Printing & Publishing	1430	1378	1393	-
6. Chemicals&Allied Prod.	816	685	613	-
7. Petroleum,Rubber,etc.	NA	405	371	-
8. Machinery&Fabr.Metal	2065	3412	3625	+
9. Transportation Eq.Mfg.	1353	2213	3091	+
10. Other Manufacturing	NA	5372	5461	+
11. Trans.,Ins.&Real Est.	6778	5776	5548	-
12. Utilities	1374	765	664	-
13. Wholesale Trade	2026	1727	1640	-
14. Retail Trade	11,886	10,556	9682	-
15. Service	NA	9161	10,356	+
16. Government	NA	14,292	17,389	+

¹ 1970 industrial categories may not be strictly comparable with projected groupings.

² 1970 Census of Population.

³ Data Source: M. J. Emerson, The Future of the Kansas Economy (unpublished report prepared for the KDED with financial assistance from the ORC, April, 1974), p. 5-20.

The picture of Southeast Kansas which emerges from the analyses discussed above is that of a declining, semi-urban, natural resource exploitation area in the process of a slow transition to filtered-down, low-skill secondary industrial pursuits. This is accompanied by the general nationwide trends toward increases in the size of the service and government sectors of the economy, structural changes more closely related to the impact of national urban-oriented cultural preferences than to the attributes of the individual region in question.

B. The Physical Environment

The most pertinent features of the physical environment for regional land use planning are perhaps physiography, soil type and water availability. The former two variables are primarily "givens," determined almost exclusively—in the short run on a regionwide basis at least—by nonhuman processes. They remain static within any reasonable time dimension. Water availability, on the other hand, is the outcome of both natural circumstances and human intervention.

Map 6-3 gives a visual representation of the naturally grass covered rolling and broken plains found in Southeast Kansas. The physical landscape is punctuated by wooded stream valleys and uplands. Elevation, other than local relief, is not an important consideration in this area, the total variation throughout the nine counties being only approximately 300 feet. Any operational definition of "fragile" environments in Southeast Kansas would be framed in the parameters of soil type, surface water characteristics and groundwater level.

The three major river systems in the region are the Neosho,

Verdigris and Marais des Cynes, shown on 6-3--the last running unnamed across the northeastern corner of the map. No major natural water impoundments are found in the area. Two existing artificial reservoirs are located in the western tier of counties, Toronto Reservoir in Woodson County and Elk City Reservoir in Montgomery County. Wetland areas are confined to the river valleys of these streams, the perimeters of the two multi-purpose reservoirs, and other small water bodies and zones of poor local drainage. Access to water for rural consumption has been largely universalized by the organization of rural water districts throughout the region, except in the two northwestern counties of Woodson and Allen.

Perhaps the single most critical intra-regionally differentiated factor is soil type and its associated drainage characteristics and water table. Map 6-4 shows the areal extent of major soil associations in the region, and Table 6-9 presents an evaluation of land use planning characteristics of the principle soil types in each association. No general description of regional soil patterns is attempted here. The information contained in these last two displays is utilized in the particular problem situations laid out below in the fourth section of this chapter.

C. Current Regional Land Use Patterns

Present regional land use patterns are suggested in Map 6-5, and a descriptive analysis of the most recent actual regional land use survey is given in Table 6-10. The last row of the table shows the regional concentration of various land use categories in comparison with the

state of Kansas by means of a benchmark index, LUCI.²³ While this coefficient has the same shortcomings as any similar type of ratio, it does give a useful indication of course-grained regional trends. Urban and built-up areas, as well as pasture land and wooded areas, are the most localized land uses in the nine county area. Not surprisingly, cropland and range are much less highly represented here than is the case in most of Kansas. Small water areas are comparatively abundant.

These general land utilization patterns would seem intuitively to correlate relatively highly with the historical regional economic base (*i. e.*, resource exploitation and processing—especially minerals and forest resources) and the region's topography and relatively heavy precipitation (25-42" of convectional rainfall between March and October). The more uniform, better watered counties along the southern and eastern borders tend to have more arable land, more farms, more woodlands, more mineral deposits (except gas and oil), and, apparently as a consequence, more urban land.

III. A FEW SKETCHES OF POLICY IMPLEMENTATION

Given this particular regional background as a setting, the following substantive suggestions might be made for implementation of the model regional land use policy plan recommended in Chapter V.

1. Secondary industrial land uses. Industrial activities should be encouraged in the region's seven Complete Service Centers (*i. e.*, Pittsburg, Coffeyville, Parsons, Independence, Chanute, Fort Scott and Iola), through the establishment of adequately serviced industrial parks. The

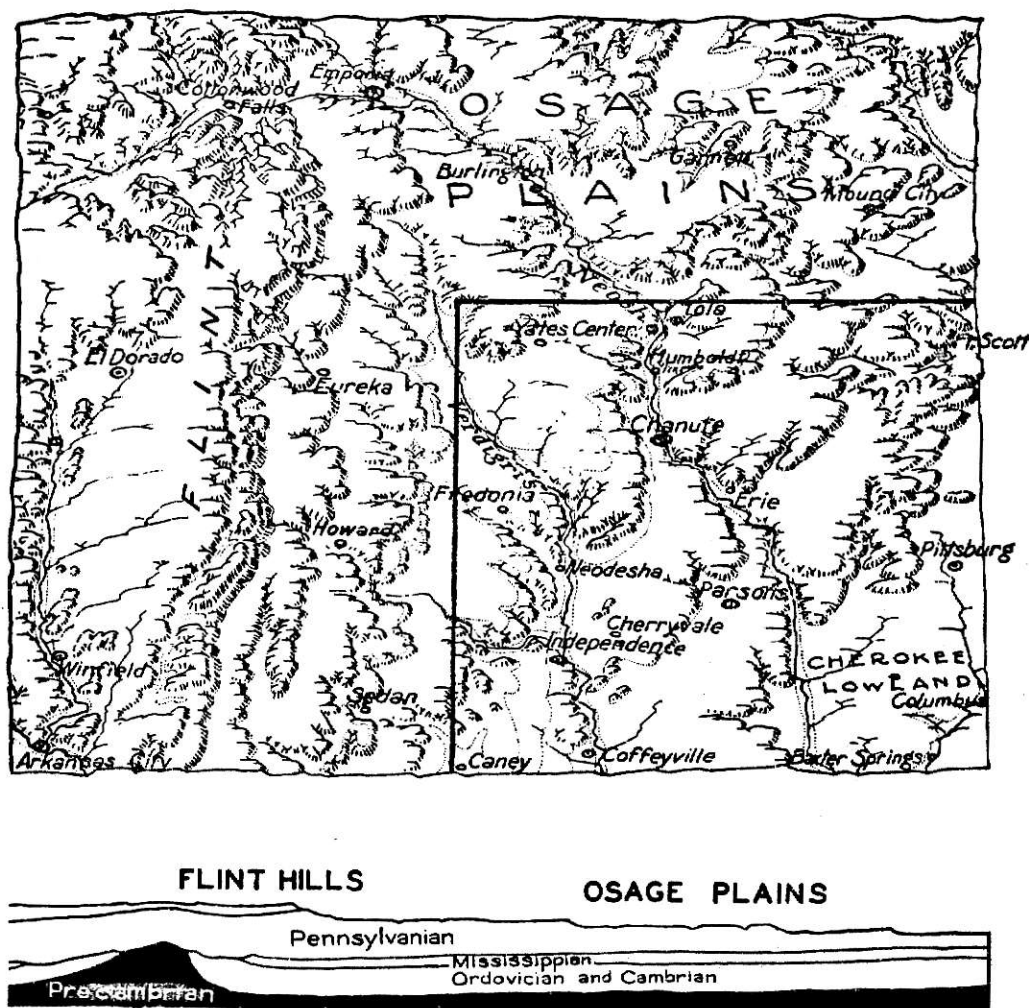
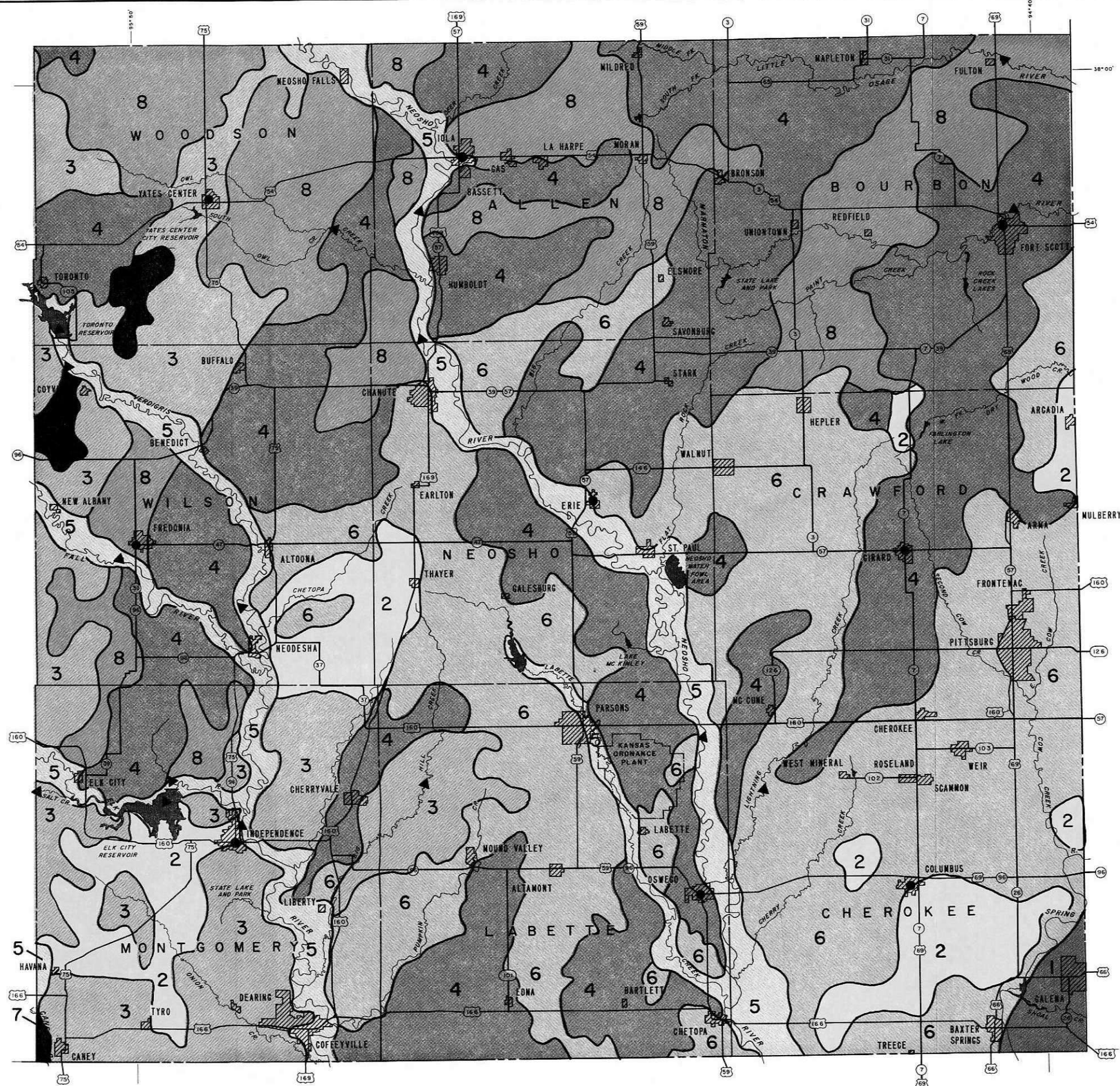
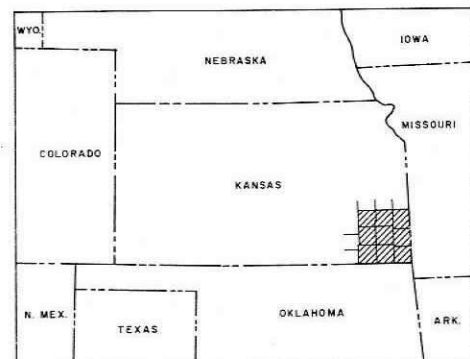


FIGURE 6-3

A VISUAL REPRESENTATION OF THE
PHYSIOGRAPHY OF SOUTHEAST KANSAS

Source: Raymond C. Moore State Geological Survey, 1930.

**THE FOLLOWING
DOCUMENT(S) IS
OVERSIZED AND
IS BEING FILMED
IN SECTIONS TO
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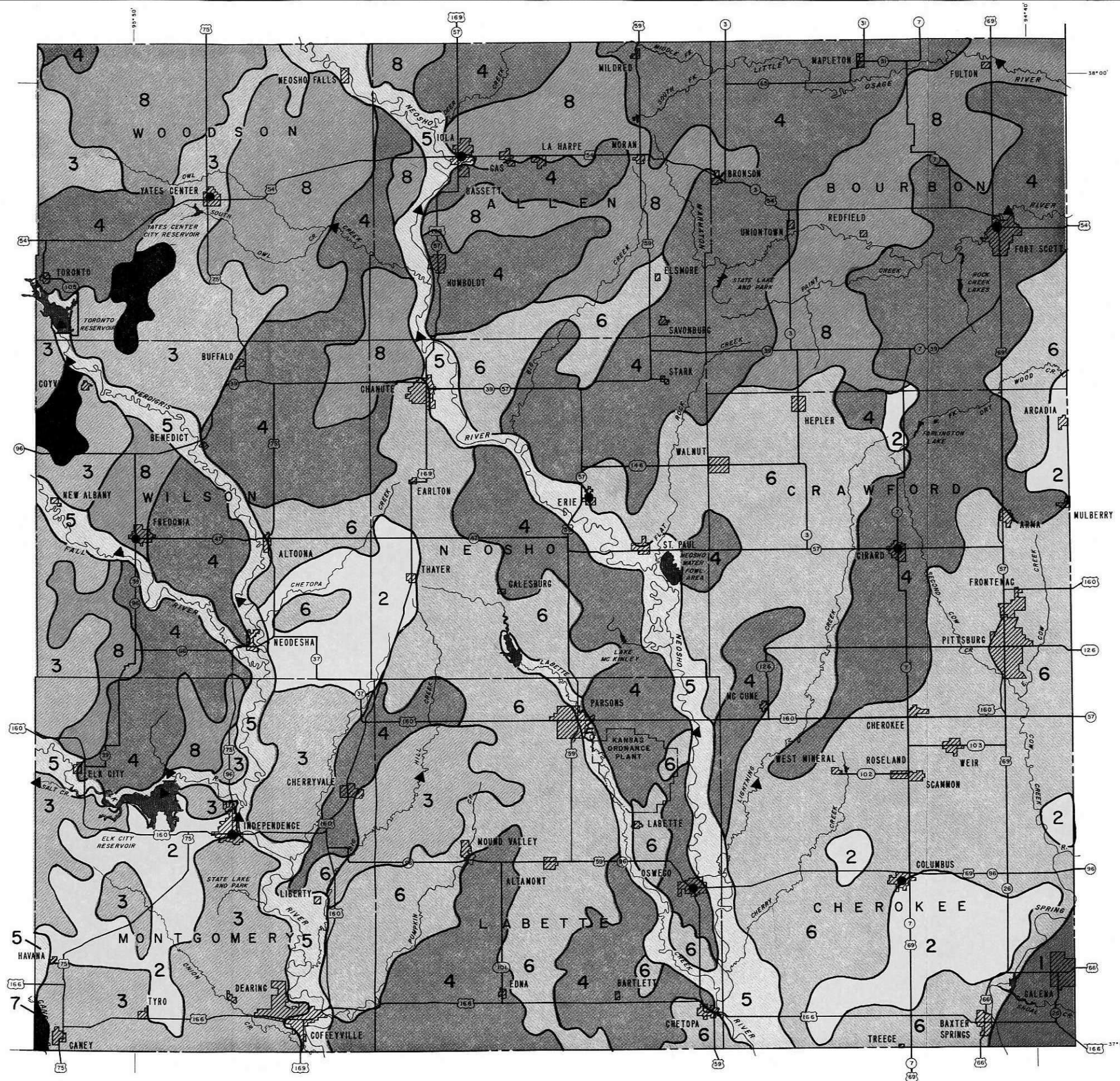
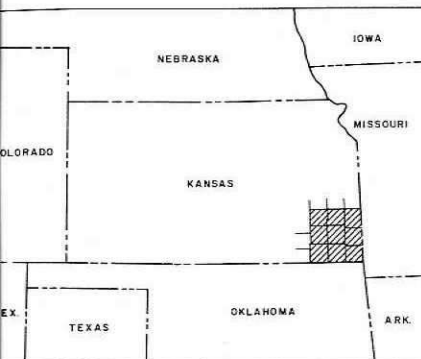
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GENERAL

RESOURCE CONSER

SCALE 5



- LEGEND
- STATE BOUNDARY
 - COUNTY BOUNDARY
 - COUNTY SEAT
 - INCORPORATED TOWN
 - DRAINAGE
 - LAKE
 - U.S. HIGHWAY
 - STATE HIGHWAY
 - STREAM GAGE

GENERAL SOIL ASSOCIATION

- 1** Bodine-Baxter association: Deep, gently sloping and sloping soils with clayey subsoils and deep, rolling, cherty soils; formed in material weathered from cherty limestone. Most of the association is wooded and is used for grazing but some gently sloping areas are used for cropland.
- 2** Dennis-Bates association: Deep and moderately deep, gently sloping and sloping soils with clayey and loamy subsoils; formed in materials weathered from shale and sandstone. Most of this association is used for cropland.
- 3** Eram-Dennis-Bates association: Moderately deep and deep, gently sloping to rolling soils with clayey and loamy subsoils; formed in materials weathered from shale and sandstone. The gently sloping and sloping soils are used mostly for cropland but the rolling areas are used for grazing.
- 4** Lula-Summit-Sagn association: Deep, gently sloping and sloping soils with loamy and clayey subsoils and shallow gently sloping to steep loamy soils; formed in material weathered from limestone and shale. Most of the Lula and Summit soils are used for cropland. The Sagn soils are used for grazing.
- 5** Osage-Verdigris association: Deep, nearly level clayey and loamy soils; formed in alluvium. Most of this association is used for cropland.
- 6** Parsons-Dennis association: Deep, nearly level claypans and gently sloping soils with clayey subsoils; formed in old alluvium and material weathered from shale. Most of this association is used for cropland. Most of the strip-mined areas in Cherokee and Crawford Counties are included in this association.
- 7** Stephenville-Darnell association: Moderately deep, gently sloping soils with loamy subsoils and shallow, rolling, loamy soils; formed in material weathered from sandstone. Most of this association is wooded and is used for grazing.
- 8** Woodson-Kanoma-Dennis association: Deep, nearly level claypans and gently sloping and sloping soils with clayey subsoils; formed in old alluvium and material weathered from shale. Most of this association is used for cropland.

FIGURE 6-4
GENERAL SOIL MAP

SEE-KAN

RESOURCE CONSERVATION AND DEVELOPMENT PROJECT
KANSAS

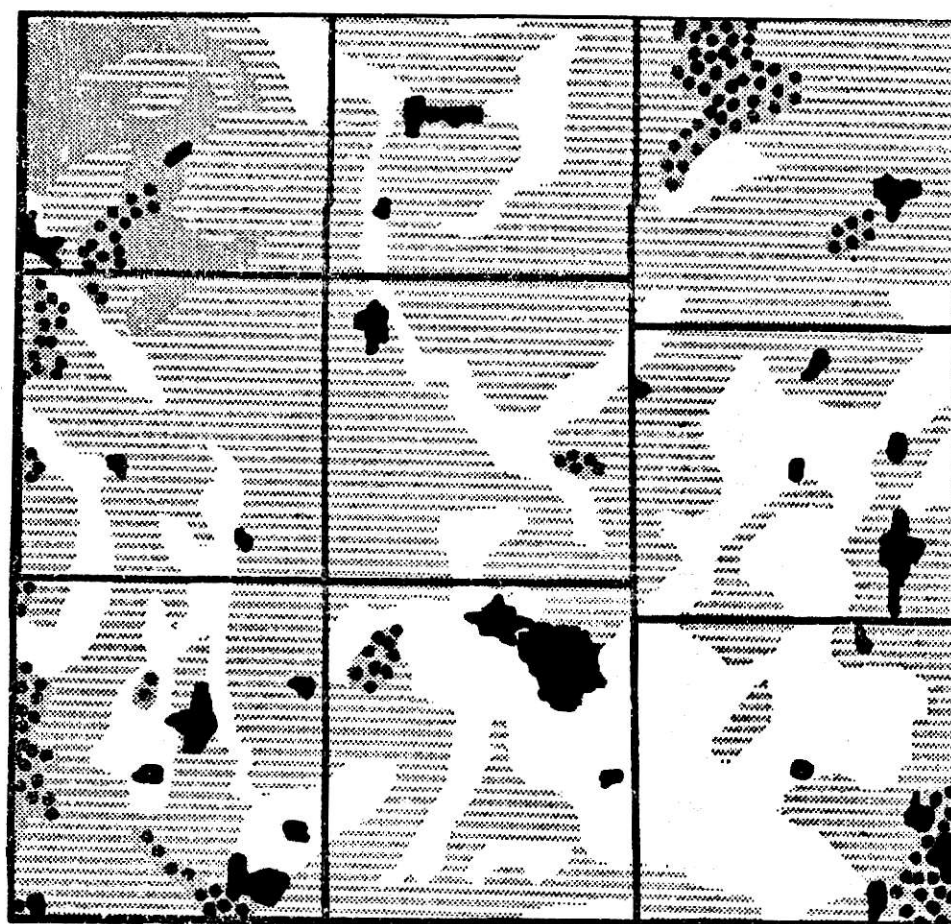
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LEGEND  Mixed Crop and Pasture Land  Predominately Pasture Land
 Woodland  Predominately Cropland  Non-Agricultural Land

FIGURE 6-5

GENERALIZED LAND USE PATTERNS IN SOUTHEAST KANSAS

Source: Kansas Department of Economic Development, Regional Review for Planning in Kansas, May, 1968.

Ozarks Regional Commission has financed projects in Independence, Iola, Parsons and Pittsburg that should contribute to realization of this end.

Emphasis in Pittsburg should be on the provision of sites for machinery production, Other Manufacturing, and trucking and warehousing. In Coffeyville, food and kindred products, textile milling, wood processing, chemicals, machinery, transportation equipment, and Other Manufacturing should be stressed. Parsons should aim toward expansion in textile milling, wood products, and Other Manufacturing. Wood products, printing and publishing, machinery, and Other Manufacturing should be promoted in Independence. Chanute should make provision for industrial park occupancy by textile firms, wood products operations, machinery plants, and Other Manufacturing enterprises. The industrial structure of Fort Scott and Iola is indeterminant.

Expansion of industrial park occupancy in Partial Service Centers such as Baxter Springs and Cherryvale should be induced, but the planning of further site development in such areas is probably unrealistic.

The less desirable industrial developments in the eastern part of Pittsburg, southern Coffeyville, northern Parsons, western Independence, northern Chanute, northwestern Fort Scott, and western Iola should be amortized. Present occupants of such areas should be encouraged to relocate in segregated industrial estate developments.

2. Tertiary industrial land uses. Central business district renewal and outlying shopping center development should be encouraged in the seven SEKRPC Complete Service Centers. CBD renewal should be prompted in Partial Service Centers (i. e.: Baxter Springs, Galena, Columbus,

Neodesha, Fredonia, Cherryvale, and Caney), with careful scrutiny given to shopping center development proposals. Commercial land use development should occur almost exclusively in the central business districts of Full Convenience Centers like Girard, Humboldt, Frontenac, Oswego, Yates Center, and Chetopa. Tertiary land development should be limited to the CBD of the region's rural residential communities, and a regional schedule for amortization unincorporated strip commercial developments should be promulgated by the Southeast Kansas Regional Planning Commission.

3. Regional recreational facilities. Pedestrian oriented outdoor recreation facilities should be expanded upon, outside the flood pool margins, around the Toronto and Elk City Reservoirs. Tourist oriented commercial land uses to service these areas should be limited to Batesville, Toronto, Coyville, Sycamore and Elk City.

The cities of Coyville, New Albany and Mildred might be considered for the extension of cultural/recreation development, with the accent on local color. All three of these communities are largely derelict, in scenic locations, and comparably accessible to major transportation routes.

4. Rural settlement patterns. Using the survey system townships which fall within Woodson County as an example, the following rural settlement proposals might be made. Woodson County contains nine complete townships: (continuously from northwest to southeast) T24S, R14E (30 occupied rural dwellings—O.R.C.—, .84 dwelling unit density per square mile—D.U.D.); T24S, R15E (61 O.R.D., 1.70 D.U.D.); T24S, R16E (45 O.R.D., 1.25 D.U.D.); T25S, R14E (35 O.R.D., .98 D.U.D.); T25S,

R15E (89 O.R.D., 2.48 D.U.D.); T25S, R16E (74 O.R.D., 2.06 D.U.D.); T26S, R14E (102 O.R.D., 2.84 D.U.D.); T26S, R15E (44 O.R.D., 1.23 D.U.D.); T26S, R16E (43 O.R.D., 1.20 D.U.D.).²⁴ The largest city in the county, Yates Center, occupies the northeastern part of the central township (T25S, R15E), and is linked to the interregional transport system by U.S. Highways 54 and 75, which form a cross with its axis on the city and divide the study area into approximate quadrants. Toronto Reservoir is located in the southwestern-most township (T26S, R14E). The average count of occupied rural dwellings per township is 58, or approximately 1.62 per square mile. The density per square mile varies between a low of .84 per square mile in the northwest (T24S, R14E) to highs of 2.84 around Toronto Reservoir (T26S, R14E) and 2.48 around Yates Center (T25S, R15E). Density values higher than the county's mean only occur around the reservoir, in the county seat township, and in the two townships contiguous to Yates Center which straddle major transport routes. This might have been predicted by rural settlement theory.

It could be suggested that dispersed rural dwellings in the Yates Center settlement gradient (*i. e.*: T24S, R15E; T25S, R15E; T25S, R16E) be controlled by zoning regulations setting a maximum settlement density of six units per square mile, while all other townships, except the Toronto Reservoir settlement shed (T26S, R14E), would be allowed only one (newly constructed) rural dwelling per every two miles; older properties amortized as they are abandoned. Settlement densities above these levels, and all settlements in the Toronto area, should be limited to carefully selected planned unit developments. Priority should be given to PUD's in the vicinity of Vernon, Neosho Falls, Piqua, Rose

and Batesville. The sections containing Yates Center City Reservoir (T25S, R15E, s. 15, 16, 21 & 22) should be subject to Toronto-type regulations, as would, of course, the sections containing Woodson County State Lake and Park—included in the Toronto settlement cluster.

5. Development of core area land. A glance at the Southeast Kansas Preliminary Land Use Element cited in note 1 of this chapter will suffice to show convincingly that vacant and derelict core area is widely distributed throughout the region. Little would be gained, from a regional perspective, in demonstrating how one typical community might encourage and stage the development or redevelopment of such areas. It should be pointed out here, however, that regional guidelines should be established for filling-in and rehabilitation of vacant and derelict areas in all communities of the Full Convenience Center designation or larger. Communities ranked as Rural Residential places in the settlement hierarchy should be legally designated and handled by the competent authorities as PUD's.

B. Spatially Integrate Land Use Clusters

1. Provide an adequate road net. Seven U. S. highways presently cross Southeast Kansas, forming a fairly regular grid system which connects the area to major extra-regional urban centers. Unfortunately, none of these routes are modern high-speed, limited-access structures. Equally disadvantageous, from the local perspective at least, is the very limited input local officials have in new corridor location decisions.

TABLE 6-9

SOIL ASSOCIATIONS IN SOUTHEAST KANSAS

Soil Association, Its Approximate Extent, and Names of Its Component Soils Assoc.	Estimated Percent of Predominant Slope	Selected Soil Characteristics Depth to Bedrock (feet)	Additional Features Affecting Use For				Soil Limitations for Sewage Disposal	
			Cropland	Highway Location	Recreation	Dwellings	Septic Tank Filter Field	Sewage Lagoons
1. Bodine-Baxter association (22,200 acres)								
Bodine	60	3-20 5+	Cherty throughout the soil; low avail- able water capacity.	Cherty throughout the soil.	Cherty throughout the soil.	Cherty throughout the soil.	Slight to severe; slope.	Severe; cherty throughout the soil.
Baxter	25	1-5 5+	Well drained; susceptible to water erosion.	Cherty in lower part of soil.	Well drained.	Cherty in lower part of soil.	Severe; moderately slow per- meability.	Moderate; slope; cherty in lower part of soil.
Other soils (series not known)	15	----	-----	-----	-----	-----	-----	-----
2. Dennis-Bates association (190,700 acres)								
Dennis	50	1-4 5+	Moderately well drained; susceptible to water erosion.	High shrink-swell.	Moderately well drained.	High shrink-swell.	Severe; slow permeabil- ity.	Severe; slow Moderate; slope.
Bates	30	1-7 2-3½	Well drained; susceptible to water erosion.	Some lateral seepage.	Well drained.	Some lateral seepage.	Severe; depth to bedrock.	Severe; depth to bedrock.
Other soils (mostly of the Collinsville, Eram & Parsons series.)	20	----	-----	-----	-----	-----	-----	-----
3. Eram-Dennis-Bates association (386,500 acres)								
Eram	50	3-15 2-3½	Moderately well drained; susceptible to water erosion.	High shrink-swell.	Moderately well drained; silty clay loam surface layer.	High shrink-swell.	Severe; slow per- meability.	Severe; depth to bedrock; slope.
Dennis	20	1-4 5+	Moderately well drained; susceptible to water erosion.	High shrink-swell.	Moderately well drained.	High shrink-swell.	Severe; slow per- meability.	Moderate; slope.
Bates	15	1-7 2-3½	Well drained; susceptible to water erosion.	Some lateral seepage.	Well drained.	Some lateral seepage.	Severe; depth to bedrock.	Severe; depth to bedrock.
Other soils (mostly of the Collinsville, Stephenville, & Darnell series.)	15	----	-----	-----	-----	-----	-----	-----

TABLE 6-9, CONTINUED

Soil Association, Its Approximate Extent, and Names of Its Component Soils Assoc.	Estimated Percent of Predominant Depth to Slope Bedrock (percent)	Selected Soil Characteristics (feet)	Additional Features Affecting Use For				Soil Limitations for Sewage Disposal	
			Cropland	Highway Location	Recreation	Dwellings	Septic Tank Filter Field	Sewage Lagoons
4. Lula-Summit-Sogn association (1,105,400 acres)								
Lula	35	1-5 3½-5	Well drained; susceptible to water erosion.	Moderate to high shrink-swell.	Well drained.	Moderate to high shrink-swell.	Severe; depth to bedrock.	Moderate; depth to bedrock.
Summit	25	1-7 5+	Moderately well drained; susceptible to water erosion.	High shrink-swell.	Silty clay loam surface layer; mod- erately well drained.	High shrink-swell.	Severe; very slow permeabili- ty.	Slight to moderate; slope.
Sogn	15	1-12 ½-1½	Rock outcrops.	Rock outcrops.	Rock outcrops.	Rock outcrops.	Severe; depth to bedrock.	Severe; depth to bedrock.
Other soils (mostly of the Clareton & Ringo series.)	25	----	-----	-----	-----	-----	-----	-----
5. Osage-Verdigris association (243,000 acres)								
Osage	45	0-1 5+	Poorly drained; flooding.	Poorly drained; flooding.	Poorly drained; silty clay surface layer.	Poorly drained; flooding; high shrink-swell	Severe; very slow per- meability.	Severe; flooding.
Verdigris	40	0-1 5+	Flooding.	Flooding.	Flooding.	Flooding.	Severe; flooding.	Severe; flooding.
Other soils (mostly of the Hazen, Lightning & Radley series.)	15	----	-----	-----	-----	-----	-----	-----
6. Parsons-Dennis association (913,200 acres)								
Parsons	50	0-1 5+	Somewhat poorly drained.	Somewhat poorly drained; high shrink-swell.	Somewhat poorly drained.	High shrink-swell.	Severe; very slow per- meability.	Slight.
Dennis	25	1-4 5+	Moderately well drained; susceptible to water erosion.	High shrink-swell.	Moderately well drained.	High shrink-swell.	Severe; slow per- meability.	Moderate; slope.
Other soils (mostly of the Bates & Cherokee series & the strip-mined areas.)	25	----	-----	-----	-----	-----	-----	-----

TABLE 6-9, CONTINUED

Soil Association, Its Approximate Extent, and Acres of Its Component Soils	Estimated Percent of Assoc.	Selected Soil Characteristics Predominant Depth to slope bedrock (percent) (feet)	Additional Features Affecting Use For				Soil Limitations for Sewage Disposal		
			Cropland	Highway Location	Recreation	Buildings	Septic Tank Filter Field	Landfills	
7. Stephenville-Darnell Association (20,000 acres)									
Stephenville	65	1-4	2-35	Well drained; susceptible to water erosion.	Some lateral seepage.	Well drained.	Some lateral seepage.	Severe; depth to bedrock.	Severe; depth to bedrock.
Darnell	25	4-12	1-2	Rock outcrops.	Rock outcrops.	Rock outcrops.	Rock outcrops.	Severe; depth to bedrock.	Severe; depth to bedrock.
Other soils (mostly of the Bates A Dennis series.)	10	---	---	---	---	---	---	---	---
8. Woodson-Kenma-Dennis Association (500,800 acres)									
Woodson	35	0-1	5+	Somewhat poorly drained.	Somewhat poorly drained; high shrink-swell.	Somewhat poorly drained.	High shrink-swell.	Severe; very slow permeabil- ity.	Slight.
Kenma	30	1-4	5+	Moderately well to somewhat poorly drained; susceptible to water erosion.	Moderately well to somewhat poorly drained; high shrink-swell.	Moderately well to somewhat poorly drained; silty clay loam surface layer.	High shrink-swell.	Severe; very slow permeabil- ity.	Moderate; slope.
Dennis	20	1-4	5+	Moderately well drained; susceptible to water erosion.	High shrink-swell.	Moderately well drained.	High shrink-swell.	Severe; slow per- meability.	Moderate; slope.
Other soils (mostly of the Bates A Eram series.)	15	---	---	---	---	---	---	---	---

Source: SEP-KAN R.C.&D. Plan, 1972.

Currently, the states of Kansas and Missouri are engaging in a rare act of intergovernmental cooperation in the study of alternative corridors for location of a modern north-south link between the Kansas City SMSA and the Joplin (Mo.) area. It is perhaps imperative for the future economic health of SEKRPC that this route pass as close to the stateline as possible, if not down the present U.S. 69 right-of-way. The time/space convergence between Southeast Kansas and the major Mid-plains metropolitan market that could be produced by such a locational decision would be significant. Given SEKRPC's higher population density than the adjacent non-metropolitan counties to the north, the region's complementarity with Kansas City would probably be more favorably affected.²⁵ The proposed turnpike link between Arkansas City and Joplin would serve to further the same patterns of increased spatial interaction, especially since it would improve SEKRPC's tie with Springfield, the economic center of its daily urban system.

2. Eliminate redundant routes. If the north-south and east-west links mentioned above were in fact built, redundant routes such as U.S. 69 (Kansas City south to the Oklahoma border), U.S. 166 (Arkansas City to the Missouri border), U. S. 59 (junction of U.S. 169 to Parsons), and K7 (junction of K39 to K96) might be considered for downgrading or possible future abandonment.

Using Woodson County once again as an example, the FAS road running through sections 10, 11, and 12 of Township T24S, R14E (30 O.R.D., .84 D.U.D.) could reasonably be abandoned, as could the north-south road dividing sections 26 and 35 from sections 25 and 36. In Township T26S, R14E (102 O.R.D., 2.84 D.U.D.), just east of Toronto Reservoir,

the county road loop encircling Snady Creek in sections 22, 23, 26, and 27 could be abandoned and the right-of-way converted to a hiking trail to enhance the recreational attractiveness of the Toronto-Coyville area.

3. Reduce route impact. If "fragile environment" in Southeast Kansas were broadly defined in operational terms as wetland areas and zones of unstable soils, the Dennis, Eram, Lula, Summit, Osage, Verdigris, Parsons, Woodson and Kenoma soil types should be avoided for road construction whenever feasible (refer back to Table 6-9).

Random strip commercial developments in unincorporated areas should be amortized as they are abandoned and should be replaced (as necessary) by strategically located commercial PUD's.

4. Airport development and public facility location. Major commercial airport development in Southeast Kansas should be limited to expansion and improvement of existing facilities. Estimating regional air service demand, a recent Ozarks Regional Commission analysis of airport service needs in the region generated scores, based on population and local industrial structure, for the region's seven Complete Service Centers.²⁶ On the supply side, five airports of at least a general utility rating (GU) exist in Southeast Kansas currently, with only the Parsons Tri-City Municipal Airport boasting scheduled airline service.²⁷ Table 6-11 shows these indices, plus ratings of currently existing facilities and an index of aggregate travel costs to each location.²⁸

As can be seen from Table 6-11, beside the advantage of already maintaining scheduled airline service, Parsons Tri-City Airport offers

TABLE 6-10

GENERALIZED LAND USE IN SOUTHEAST KANSAS

Category and Acreage										
County	Urban & Built-Up	Cropland	Federal Non-Cropland	Pasture	Range	Forest ²	Small Water Area	Other	Land Area	Percent of Region
Allen	16,980	172,373	0-0	22,692	86,941	15,200	5,230	3,785	323,200	10
Bourbon	19,691	172,868	0-0	42,926	110,325	53,300	3,941	5,909	408,960	12
Cherokee	48,474	214,400	0-0	48,745	14,300	36,600	4,485	8,676	375,680	11
Crawford	31,852	208,000	415	75,434	24,524	33,400	3,217	5,878	382,720	11
Labette	17,075	219,522	9,026	80,653	51,613	29,700	4,163	6,808	418,560	12
Montgomery	43,228	166,796	9,000	14,078	129,153	42,600	5,756	4,749	415,360	12
Neosho	16,221	192,880	0-0	28,520	100,913	26,200	4,330	6,616	375,680	11
Wilson	14,364	163,872	0-0	11,628	135,421	35,000	2,671	4,404	367,360	11
Woodson	12,062	116,469	4,415	23,565	132,548	20,400	4,264	8,837	322,560	10
Region	219,947	1,627,179	22,856	348,241	785,738	292,400	38,057	55,662	3,390,080	
Percent of Region	6.5	48.0	.7	10.3	23.2	8.6	1.1	1.6	100%	
State	1,998,201	29,623,793	529,080	1,450,597	16,523,408	1,323,000	481,987	495,209	52,425,275	
Percent of State	3.8	56.5	1.0	2.8	31.5	2.5	.9	1.0	100%	
Benchmark Index ³	1.71	.85	.70	3.68	.74	3.44	1.23	1.60	—	

¹ Data Source: Kansas Conservation Needs Inventory, Salina, Ks.: Soil Conservation Service, U.S.D.A. 1969. This is the latest region-wide inventory available.

² Does not include 21,800 acres of wooded strips and federally owned woodlands.

³ Benchmark Index = percent region ÷ percent state.

TABLE 6-11
AIRPORT NEEDS AND FACILITIES¹

Complete Service Center	Need Score ²	Current Facility ³	Rating 1970 ⁴	Forecast 1970 Annual Operations ³	Potential Aggregate Travel Cost Index ⁵
Pittsburg	32.2	Atkinson Municipal	GU	17,300	9.8
Coffeyville	27.1	Coffeyville Municipal	GU	10,000	9.0
Parsons	27.0	Tri-City Municipal	MD-TP*	3,000	7.4
Independence	30.3	Independence Municipal	MD-TP	7,760	9.0
Chanute	24.3	MartinJohnson Municipal	GU	7,200	8.2
Fort Scott	15.3	Fort Scott Municipal	B2	4,200	-
Iola	14.5	Iola Municipal	B2	5,400	-

¹ Prepared by author.

² Data Source: Oklahoma Research Foundation, Final Report, O.R.C. Contract DEM 73-28 (NEG)-0, Section II, pp. 33-4.

³ Data Source: Wilson and Co., Kansas Aviation Needs Study, Figure 7.

⁴ B2 = basic utility, stage 2; GU = general utility; MD-TP = medium transport.

⁵ Index = $\frac{1}{7} (D_{ij} \times N_i)^{10^{-2}}$, where D_{ij} = distance from any complete service center i , and N_i = need score in any complete service center i .

* Scheduled passenger service, Frontier Airlines; 1,344 scheduled aircraft departures, 4,234 passengers emplaned, 155 tons cargo origins.

the lowest potential aggregate travel cost. It would thus seem reasonable to develop the Parsons facility as the major regional airport, using Pittsburg Municipal Airport as a secondary facility to serve the most peripheral regional demand (i. e., Fort Scott and Pittsburg).

C. Upgrade Regional Land Use Processes

1. Expand the resource base. The region's resource base could be successfully expanded by adoption of culturally acceptable land use processes which geographically lie within their estimated spatial margins of feasibility and display relatively high multiplier effects. Two examples, utilizing renewable land based resources, would be in the wood products and food processing industries.

Referring back to Table 6-10, it is apparent that Southeast Kansas has a relatively high concentration of woodlands in comparison with the state as a whole. There are approximately 260,000 acres of productive forest land in the region, much of this under stands of hardwoods such as ash, oak, hickory and walnut. The SEE-KAN Resource Conservation and Development Board has argued that production of high quality timber stands could be increased dramatically through forest management and forest product utilization. They go on to suggest that:²⁹

some of the types of industry that might be established include: 1. More primary processing plants, 2. Secondary processing plants such as furniture plants or box, crating and pallet plants, 3. Charcoal plants, 4. Pecan and walnut nut processing plants, [and] 5. Partial board and pulp mill [s]. . .

These recommendations would seem particularly sound. Referring back to Table 6-7, it is apparent that lumber and wood products are a part

of the culturally accepted set of resource processes in Southeast Kansas; five of the region's Complete service centers have higher concentrations of employees in these industries than does the state. Furthermore, since wood and lumber production contribute to the majority of the region's growth centers' economic base, it can be presumed that: (1) these activities are within their spatial margins of feasibility in Southeast Kansas, and (2) increases in forest products industries will display relatively high multiplier effects--thus stimulating the area's economy in an exponential fashion. This type of activity could also contribute to the productive reclamation of derelict strip-mined land which abounds in Crawford, Cherokee and Labette Counties.³⁰

Another similar opportunity may exist in the food processing industry, although it does not display strong localization tendencies in most parts of Southeast Kansas. Strip-mined land in the southeastern corner of the region has provided that area with quite a number of small, deep-water, artificial water impoundments. These are frequently used for recreational fishing. They might also provide the land base for a more remunerative use.

Recently it was suggested at a SEE-KAN R.C.&D. Board meeting that catfish production might be a reasonable venture for low income individuals.³¹ Lag time on such investments is estimated at four to five years, and the rate of return is calculated to be approximately 20-25 percent.³² Canning facilities are currently in operation in Crawford County.

A large return might be realized if comparatively large scale catfish "farming" were undertaken in already existing, flooded strip pits. Food processing is apparently within its profitable spatial margins in Coffeyville (refer back to Table 6-7). Because of this fortuitous juxtaposition, strip pits near a community which seemingly possesses the necessary externalities for successful food processing operations, it might be feasible to raise and process high-return frozen catfish for surrounding urban markets.³³ The potential construction of the limited access traffic routes discussed above, and the probable attendant escalation of time/space convergence (lessening intervening opportunities), might make it feasible to develop quite lucrative market demand situations in Kansas City, Springfield and Wichita.

2. Minimize organic water pollution. The minimization of organic water pollution in rural areas should be attained through three measures: 1) control of isolated rural settlement patterns, 2) requirement of primary wastewater processing in rural subdivisions, and 3) requirement of primary wastewater processing for cattle feedlot operations.

The isolated rural settlement pattern recommendations suggested in Section III.A.4. above should be applied in principle to the region as a whole. Low densities should be encouraged not only in zones of currently sparse settlement, but also in areas which display soil limitations for sewage disposal. Septic tank filter fields should not be allowed in areas characterized by Baxter, Dennis, Bates, Eram, Lula, Summit, Sogen, Osage, Verdigris, Parsons, Stephenville, Darnell, Woodson, or Kenoma soils. Sewage lagoons should be restricted in zones with Bodine,

Bates, Eram, Sogen, Osage, Verdigris, Stephenville, and Darnell soil types.

Recommended isolated rural settlement densities should only be exceeded in carefully regulated situations through the use of planned unit development regulations for the development of rural subdivisions. Such subdivisions should, if possible, be in the identifiable settlement shed of larger regional centers, and, preferably, should be on the periphery of existing Rural Residential Communities.

All such planned unit developments should be required to provide some form of primary wastewater treatment, the alternative method chosen depending on a required cost-benefit analysis. A method for cost-benefit analysis capable of comparing the relative advantages of septic tanks, sewer systems, stabilization ponds (with or without sewer systems), and package water treatment plants (with or without sewer systems) for rural subdivisions has recently been developed in the Department of Regional and Community Planning, Kansas State University.³⁴ The certified results of this type of analysis should be made a statutory step in the PUD plating procedure in SEKRPC counties.

Cattle feedlot operations should be obliged to meet essentially the same criteria as rural subdivisions; the minimum size of feedlots requiring wastewater treatment being determined by local soil type, runoff patterns, and groundwater characteristics.

3. Protect fragile environments. It is difficult to operationally define critical environmental areas by regional level parameters alone; local relief would be a critical factor in the SEKRPC area. Tentatively,

Southeast Kansas might specify that zones subject to severe water erosion, flooding, very high shrink-swell tendencies, and excessively poor drainage should be classified in this category. A glance back to Table 6-9 and Map 6-5 suggests the regional occurrence of such problems. Successful identification of fragile environments and their protection through the establishment of limited-use open space/conservation belts would require a relatively detailed, rigorous, systematic analysis which is not currently available.

IV. SUMMARY

In the last section an attempt has been made to demonstrate empirically how some of the land use policies recommended in Chapter V might be actualized. This narrative has been sketchy at best, often relying on solely intuitive constructs and judgements. It has, in places, though, suggested the usefulness of applying scientific and quasi-scientific methods to materialize frequently abstract policies in a substantive situation.

Although the most recent land use policy and planning assistance act has once again been short-circuited in the U. S. House of Representatives, it still seems likely that some similar measure will be adopted in the immediate future. With this very real pragmatic institutional stimulus for action, as well as the escalating need for an operational redefinition of man's relationship to the physical environment, it is imperative that planners turn their serious attention to the refinement of land use policy models such as the one set out in this paper. The eventual adoption of this type of paradigm for the guidance of area-

wide land utilization processes, and the innovative fabrication of operational definitions, programs and projects for its implementation, should be the next steps in the evolution of American land use planning.

NOTES FOR CHAPTER VI

¹ See especially, Kansas State University, Center for Regional and Community Planning, Technical Reports, 1-6: Preliminary Regional Plan Elements for Southeast Kansas (Topeka, Ks.: Kansas Department of Economic Development, 1973). Minor additions, revisions, updates and corrections can be found in, Lawrence - Leiter and Assoc., Southeast Kansas Plan Update (Topeka, Ks.: Kansas Department of Economic Development, 1974).

² Population characteristics calculated by the author from printed census information.

³ Calculated by the author from data prepared for the Kansas Department of Economic Development by the Population Research Laboratory, Kansas State University, under the direction of Dr. Cornelia Flora. That study is to be included, in part, in a preliminary economic development plan for Kansas, funded by the Ozarks Regional Commission, which has yet to be published and released. Special thanks are extended to the Kansas Department of Economic Development, Prof. Flora, and the Kansas Ozarks Project Office for providing access to this, as yet, unpublished information.

⁴ Data source: Ibid.

⁵ If, rather than following standard Census Bureau employment definitions, the 15-19 age cohort is included within the dependent population, this group comprised over 51 percent of the total in 1970.

⁶ These cohort survival forecasts were prepared for the Kansas Department of Economic Development by the Population Research Laboratory, under the direction of Dr. Cornelia Flora, in conjunction with the project cited in note 3 above.

⁷ Using the definition suggested in note 5 above, these figures would be approximately 50 and 49 percent respectively for 1980 and 1990.

⁸ Calculated by the author from published census information.

⁹ The first three aggregate categories being defined as follows: Other Services - Other personal services, Hospitals, Health services except hospitals, Elementary, secondary and college education, Other education and kindred services, Welfare, religious and nonprofit membership organizations, and Legal, engineering and miscellaneous professional services; Other Retail - all retailing activities excluding food stores and eating and drinking establishments; Other Manufacturing - Metal industries, Other durable goods, and Other nondurable goods (including all industries not specifically listed on Table 6-1).

¹⁰ Table 6-2 was taken from a special report prepared for the Kansas Department of Economic Development by the Kansas Office of

Economic Analysis, under the direction of Dr. M. Jarvin Emerson, and funded by a technical assistance grant by the Ozarks Regional Commission. Special thanks are extended to the Kansas Department of Economic Development, Prof. Emerson, and the Kansas Ozarks Project Office for providing access to this, as yet, unpublished material.

For a discussion of the methodology and theoretical basis of shift-share analysis see, Walter Isard, Methods of Regional Analysis (Cambridge, Mass.: MIT Press, 1960), esp. pp. 259-70; and Brian J. L. Berry and Frank E. Horton, Geographic Perspectives on Urban Systems (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1970), pp. 98-9.

¹¹ Berry and Horton, Urban Systems, p. 98.

¹² Five differences are found in employment counts for 1970 between these two tables. A thirty employee addition to row 12, Railroads, and a 60 employee deletion from row 15, Communications, would appear to be errors in Table 6-2. The uncompensated for remainder between these two errors (i. e., -30) is reflected in row 27, Total. The 2,000 employee shift between rows 24 and 25 on the two tables is due to adjustments in Table 6-2, required for comparability among census reporting categories over the study period. Special thanks are extended to Prof. M. Jarvin Emerson for his help in clarifying these discrepancies.

¹³ See Berry's reshaping of traditional regional growth theory based on the concept of the "filtering-down" of slow growth industries to non-metropolitan regions as an energizing mechanism; Berry, Growth Centers, esp. pp. 6-40.

¹⁴ Building on the conceptualization of C. A. Doxiadis, Berry has defined "Daily Urban System" (DUS) as an areal accounting unit delineated by the actual 1960 commuting field around an "economic center" which displays primary influence over a multi-county area. See, Ibid., pp. 10-17.

¹⁵ Ibid., Vol. II, pp. 238-9.

¹⁶ Ibid., Vol. I, pp. 59-63; and Vol. II, pp. 238-9.

¹⁷ Kansas State University, Center for Regional and Community Planning, Preliminary Economic Development Plan for Kansas, Vol. III (Topeka, Ks.: Kansas Department of Economic Development, in press).

¹⁸ Primary data source for Table 6-4 is Berry, Growth Centers, Vol. II, pp. 238-9.

¹⁹ Kansas State University, Center for Regional and Community Planning, Economic Development Plan for Southeast Kansas (Topeka, Ks.: Kansas Department of Economic Development, 1972). This undifferentiated "growth center" designation does not recognize the three functional spatial dimensions of urban interdependence suggested by Berry. A more

realistic growth center classification system, based on cognizance of the hierarchical interdependencies of the space economy, is suggested in the, as yet, unpublished Preliminary Economic Development Plan for Kansas. This framework includes: Primary urban-industrial growth centers, with a history of, or potential for, widespread regional impact; Secondary growth centers, with potential for industrial or service oriented development; Service centers, to insure an acceptable life style for the state's non-urban population; and Natural and amenity resource centers, to provide a basis for natural resource and recreational development. The seven designated SEKRPC growth centers would appear to fall into this second category, Secondary growth centers—or perhaps, in some cases, the third grouping.

Recognizing the limitations of the currently adopted strategy, these growth centers are accepted here for the sake of expediency, handled as Secondary growth centers within the Springfield DUS. For the successful operationalization of the regional land use policy plan presented in Chapter V, it would be essential to select a set of Natural and amenity resource centers for development.

²⁰ There are several technical and conceptual difficulties which limit the usefulness of economic base analyses of this type. First, job count is not sensitive to variations in wage levels. Second, employment does not reflect differences in productivity. Third, such measures of economic activity as employment cannot show the effects of unearned income, e. g.: land rents and government transfer payments. And fourth, there are several heroic assumptions involved in identifying the basic and residentiary components of a city's economy, including: (a) consumption habits are assumed to be uniform in both the subject and benchmark economies (and, thus, unity is a proper breakpoint for the location quotient), (b) local consumption is assumed to be served first from local production, and (c) productivity is assumed to be uniform in both the subject and benchmark economies.

²¹ Emerson, The Future of the Kansas Economy, pp. 6-8 - 6-11.

²² Data source for projections: Ibid., p. 5-20.

²³

$$LUCI = \frac{R_{ij}/R_{tj}}{S_{ij}/S_{tj}} ;$$

where: LUCI = the land use concentration index,
 R_{ij} = the amount of land under any given use i in region j ,
 R_{tj} = the total land area t in region j ,
 S_{ij} = the amount of land under any given use i in the state containing region j , and
 S_{tj} = the total land area t in the state containing region j .

²⁴ Dwelling counts calculated by the author from the most recent Woodson County general highway map, prepared by the State Highway Commission of Kansas, Department of Planning and Development, 1971.

²⁵ Miami and Linn Counties, the first two nonmetro counties on the hypothetical Kansas-based north-south route, would record a potential index of 3.78 with Johnson and Wyandotte Counties, while Bourbon and Drawford Counties score 3.97. Calculated by the author using Smith's potential formulation:

$$I_{ij} = \frac{P_i P_j}{D_{ij}} \times (10^{-8}).$$

²⁶ For a description of the methodology employed see, Oklahoma Foundation for Research and Development Utilization, Inc., Final Report, O.R.C. Contract DEM 73-28 (NEG)-0, Section I (Little Rock, Ark.: Ozarks Regional Commission, 1974), pp. 9 and 27. The scores for SEKRPC are found in Section II, pp. 33-4.

²⁷ Wilson and Company, Kansas Aviation Needs Study, Kansas Planning for Development Report No. 24 (Topeka, Ks.: State Printer, 1969), Figure 7.

²⁸ Aggregate travel cost index calculated by author:

$$\sum_{i=1}^7 (D_{ij} \times N_i) 10^{-2} ;$$

where: D_{ij} = the linear distance between any Complete service center i and airport j , and
 N_i = the air service need at any Complete service center i .

²⁹ SEE - KAN R.C.&D. Plan, 1972, p. 80.

³⁰ See for instance, W. A. Geyer and G. G. Naughton, "Growth and Management of Black Walnut (*Juglans nigra* L.) on Strip-Mined Lands in Southeast Kansas," Transactions of the Kansas Academy of Science, Vol. 73 (July 1971), No. 4, pp. 491-501; _____ and Nelson F. Rogers, "Spoils Change and Tree Growth on Coal-Mined Spoils in Kansas," Journal of Soil and Water Conservation, Vol. 27 (1972), No. 3, pp. 114-16; _____, "Re-foresting Kansas Coal Spoils," Circular 399 (Manhattan, Ks.: Kansas State University, Agriculture Experiment Station, Dec. 1971); and _____, "Timber Growth on Graded and Ungraded Strip-mine Spoil Banks in Southeast Kansas," Transactions of the Kansas Academy of Science, Vol. 74 (Dec. 1972), Nos. 3-4, pp. 318-24.

³¹ Minutes of the SEE-KAN Resource Conservation and Development Board Meeting, Erie, Kansas, April 15, 1974.

³² Ibid.

³³ Frozen catfish currently retails for over \$2.50 per pound in Manhattan, Kansas, for example.

³⁴ See, Gurupur Pundalika Pai, "Examination of Domestic Wastewater Treatment Alternatives for Small Communities: A Case Study," (unpublished Master's Non-Thesis Project, Kansas State University, Department of Regional and Community Planning, 1974).

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REGIONAL LAND USE POLICY PLANNING:
A MODEL AND EMPIRICAL APPLICATION

by

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AN ABSTRACT OF A MASTER'S THESIS

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MASTER OF REGIONAL AND COMMUNITY PLANNING

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Land use planning has been an institutionalized part of the American societal guidance system since the closing decades of the nineteenth century. Traditionally, the land use planning process has been vested in minor civil divisions through state enabling legislation, and its primary statutory tools have been the comprehensive plan, the zoning ordinance, and subdivision regulations. More recently the efficacy, and hence the legitimacy, of solely local land use guidance has come into question.

The principle reasons for this reevaluation seem to stem from growing public concern over the degradation of the natural environment and the systematic dismantling of historic socio-economic structures in metropolitan hinterlands. Both of these trends are apparently related to continued hierarchical urban growth and inadequate social guidance mechanisms. Contemporary federal and state legislation suggest that a more effective method of developing and safeguarding the nation's land resources might be centered around a regional approach to land use planning which emphasized the formulation of areawide land use policies. No systematic basis is provided, however, for the formation and elaboration of such policies. The purpose of this paper is to formulate a conceptually sound model (non-metropolitan) regional land use policy plan, and to demonstrate how a few selected aspects of the model plan could be implemented in an empirical situation.

A brief review is presented which summarizes the evolution of the land use planning process. It is then argued that to be effective planning activities must be founded upon a firm theoretical base. Formative contributions to urban planning theory are touched upon, and it

is suggested that this literature reveals an elemental confusion between normative methodology and theory building. The argument is set forth that planning theory in any functional situation should be composed of the theoretical models, developed primarily in the social sciences, which deal with that particular subset of objective phenomena. In the case of regional land use planning, the theories of man/land relationships and the location of human activities provide the necessary conceptual underpinning.

Model's of man's relationship to the physical environment and selected elements of settlement and economic location theory are discussed in some detail. The principle components of these constructs are then summarized. Based on the perceived convergence of several parallel theoretical processes, a landscape compartmentalization strategy is chosen as the energizing mechanism for the model land use policy plan.

Four policy clusters are then developed, three of which deal primarily with substantive land use issues and a fourth which is basically concerned with administrative devices. Functionally synthesizing pertinent elements of theory, it is recommended that: (1) regional land use and settlement patterns be compartmentalized as a first step toward rationalization, (2) nodal land use clusters be spatially integrated to reduce the friction of distance and encourage areal specialization, and (3) regional land use processes be upgraded to expand the area's land use congeries. In the last policy cluster the outline of an appropriate planning administration and implementation procedure is set out.

In order to demonstrate how the model policy plan might be applied

in an empirical situation, brief sketches of policy implementation in the jurisdictional area of the Southeast Kansas Regional Planning Commission are presented. Attention is centered on the region's space economy. Although brief and highly intuitive, this final section suggests that the model land use policy plan may provide one alternative focus for the nation's non-metropolitan land use guidance system. More rigorous simulations of the model would seem to be in order.