

AN ANNOTATED BIBLIOGRAPHY OF SELECTED LITERATURE:
A DEVELOPMENTAL APPROACH TO A SYSTEMS STUDY FOR
ENVIRONMENTAL DESIGN AND PLANNING

by

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A THESIS

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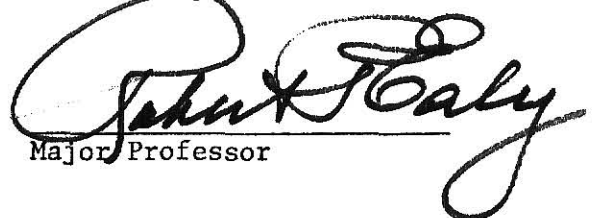
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TABLE OF CONTENTS

175

1.0	INTRODUCTION	1
1.1	Background	2
1.2	Objectives	5
1.3	Explanation and Use	6
2.0	LITERATURE REVIEW	12
3.0	ISSUES ON LAND AND ITS ENVIRONMENT, RESOURCE MANAGEMENT, AND USE	19
3.1	Environmental Issues	20
3.2	Resource Management Issues	27
3.3	Land Use Issues	31
3.3.1	Land Use in General	31
3.3.2	Specific Land Uses	37
3.3.2.1	Urban Lands	37
3.3.2.2	Rural Lands	40
3.3.2.3	Recreational Lands	43
3.3.2.4	Wilderness/Natural Areas	53
3.3.2.5	Wildlife Areas	58
4.0	NATURAL RESOURCE DATA	60
4.1	Resource Interrelationships	61
4.2	Soil	67
4.3	Vegetation	78
4.4	Wildlife	87
4.5	Geology	90
4.6	Water	92
4.7	Climate	97
5.0	ENVIRONMENTAL MANAGEMENT, PLANNING, AND DESIGN	99
5.1	Information Systems	100
5.1.1	Classification Methods	100
5.1.2	Inventory Methods	105
5.1.3	Interpretation Methods	113
5.1.3.1	Ground Surveys	113
5.1.3.2	Aerial Photography and Remote Sensing	125
5.1.3.3	Computer Analysis	131
5.2	Analysis Systems	135
5.2.1	Natural Resource Data	135
5.2.2	Behavioral Data	143
5.2.3	Socio-Economic Data	147

TABLE OF CONTENTS (Continued)

5.3	Resource Management Systems	150
5.3.1	Natural Resource Management	150
5.3.2	Wilderness Management	154
5.3.3	Recreational Management	157
5.4	Environmental Planning and Design Systems: General	
	Reference	161
5.4.1	General	161
5.4.2	Selected Land Use	168
5.4.3	Recreation	171
5.4.4	Selected Elements	177
5.5	Environmental Planning and Design Systems: Case	
	Studies	183
5.4.1	General	183
5.4.2	Urban/Suburban Planning and Design	185
5.4.3	Recreational Planning and Design	192
APPENDIX:	Major Index Sources	195

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1.0 INTRODUCTION

1.1 BACKGROUND

The initial thrust of the thesis research was the review of literature pertaining to the following three areas: outdoor recreation and other major land uses; soil interpretation as an integrative factor in studying natural resources; and, information and analysis systems which aid in site selection, site analysis, and site design. As the author's background in each of these areas did not prove to be too delimiting, the method of research was rather inductive. Instead of focusing attention on a single common denominator, the author's interest and attention began to expand in each of the three areas of study.

Outdoor recreation, as a land use, may be studied or approached from numerous directions: programming, administration, economics, site requirements, therapeutics, and interpretation are only a few. When attempting to focus upon outdoor recreation as land uses; complications do arise. Such complications may include competing land uses, concomitant needs for specific resources, competition within the various recreation services, and differential assessment of land use as open space and as recreation. With a very limited knowledge of outdoor recreation, one might not be reluctant to take the narrow approach and isolate a specific facet such as land use or site selection. However, just as the researcher is unable to isolate a single virus until the virus can be identified and defined amid its culture, it would not be possible to isolate recreation as a land use until its requirements, social values and social costs could be identified and defined amid our culture. This study would, therefore, require a substantive background into other land uses so that recreation as a land use could be viewed in proper perspective.

An inductive approach was again used in studying soils as an integrative approach to the study of natural resources and their relationships to land use. As in the study of a particular land use such as recreation, pedology may also be approached from many directions. Even if a person were able to concentrate on a single angle of approach, he would still have to contend with such mitigating factors as multiple soil classification systems, varying methods of analyzing soil properties, contradictory and/or competing systems for soil interpretation, to name only a few. It is common knowledge that soils are a valuable indicator of the existence and characteristics of other natural resources. It is also a recurring practice to rely too heavily upon limited soil interpretation for purposes of planning and site selection. This is a myopic approach; as the planner or designer cannot see beyond the soil suitabilities or soil boundaries of the Soil Survey. It is imperative that soils be understood in the context wherein they are found. Relationships between soils and other natural resources must be drawn and understood. A soil suitability, just as the isolated virus, must be identified and defined amid a "culture" of environmental factors.

The method used in studying information, analysis, and design systems was not at all unlike the approaches to land use and natural resources. In fact, the margin for error in limiting an approach to this area of study is potentially greater than that of narrowing an approach to a single resource or land use. Countless numbers of very costly errors have been made with only the best intentions of applying someone else's system to meet one's own needs. It is rather commonplace for an individual or an agency to adopt a foreign system without thorough regard for its expressed purpose. Unfortunately, either the system or the research will often result in failure. Whether a system is

manual or automated or both, it is very simply a method for carrying out a function to achieve a specific goal. Planning and design systems are dependent upon many factors, e.g., data gathering, analytical techniques, economics, personnel, existing systems, time, technology, and most importantly, the system's objectives. Initially, it is necessary for the systems analyst to identify and define the existing system to which he would apply his research. Following this rather extensive systems analysis, he would then identify and define a system that would satisfy his objectives and remain within the bounds that practicality demands.

The reasons for taking a broad stroke approach into the preceeding areas of study are best enumerated in the following phenomena which seem to pervade all areas of research:

- 1) Frequent ineptitude in accepting methods and data about which one lacks "expertise."
- 2) Importance of studying those areas related to ones specialty or field.

Essentially, one must maintain a sense of skepticism in researching data and methods employed in a field other than his own; however, such research should certainly be encouraged.

1.2 OBJECTIVES

A general objective was established prior to the literature search. The objective was simply to better understand how harmony might exist between the use of land and the inherent land tolerance. Consequently, it required an intensified study of natural resource tolerances to various land uses, requirements of specific land uses for certain natural resources, and finally, various methods or systems used for information gathering, analysis, management, and planning of our natural resources and land uses so that harmony might exist.

The remaining and primary objective is to provide students and professionals in Landscape Architecture and related fields a means to identify selected literature concerning their use of the land.

I plan to accomplish this objective in the following manner.

1. Provide an annotated bibliography of selected literature concerning the following:
 - a. Major land-use issues with a particular emphasis on agricultural, residential, and recreational land uses.
 - b. Natural resources with special emphasis on soils and their integration with other resources.
 - c. Information systems, analyses, methods, and planning and design approaches applicable to the planning and design professions.
2. Provide a summary of the literature reviewed by discussing the historical development of the philosophy, literature, and technology represented in this thesis.
3. To organize the annotated bibliography in such a manner as to provide simple and logical access to the appropriate literature.

1.3 EXPLANATION AND USE

There are three facets of this annotated bibliography which need to be discussed: 1) the manner in which the literature is organized, 2) the nature of the contents, and 3) its intended use.

Two organizational structures are used. The bibliography as a whole is organized by predominant topics. The work is divided into three sections: 1) selected literature pertaining to land-use and environmental uses, 2) selected literature concerning the study of natural resources, and 3) selected literature on systems and methods for environmental planning and design. These three sections should be considered as three phases, each fulfilling a requisite for the following phase. The first phase provides a general understanding, a vocabulary, and a motivation needed for further study. The second phase provides necessary tools, both educational and technical. Finally, the study culminates in the application of this new-found knowledge to environmental design and planning. A second organizational structure was applied within each subdivision of the bibliography. Because of the wide diversity of related topics in each subdivision, it was necessary to arrange the annotations in chronological order. This sequential approach has certain favorable spin-offs. It permits the reader to follow the historical development of a topical area as well as to follow a trend in an author's thinking when more than one of the author's works appear in a subdivision.

The contents of this annotated bibliography cover a wide range of topics. As previously discussed in the background section, it is imperative that recreational land use and soil science be studied in context with other land uses and natural resources. The coverage of recreation and soil science

is rather complete insofar as their relationships to planning and design are concerned. However, a more discriminating approach was necessary in the selection of literature on other land uses and natural resources. If the topic of the literature was not recreation or soil science but the subject matter explicitly related to these two primary topics, then the article was selected. Literature selected which had no explicit relationships to the two primary topics was usually the better (more appropriate) literature that the author was able to obtain.

It is imperative that the user understand that no single source is entirely inclusive of information pertaining to its topical area, for gradations of content occur from single page papers to comprehensive texts. Correlatively, no single source is purely exclusive of information relating to another topical area. Unfortunately, the author was unable to provide a keyword cross reference index. Therefore, the user must be aware that information to one topical area may be contained under related topical areas. Such a search is not necessarily time consuming. The titles of sources are generally descriptive of the contents therein, therefore, it is usually only necessary for the user to peruse through the titles in his search for relevant literature.

This bibliography is designed to fulfill two basic functions. It may be used by an individual in search of literature pertaining to a single or random topics. It may also be used from beginning to end in a holistic approach to the review of literature pertaining to a project or paper.

When searching for individual topics, the manner of use is rather straightforward. The user should first review those sections of the bibliography concerning general topical areas. Secondly, the user should concentrate on

specific topical areas which would be included by inclusive of the user's area of interest. Finally, the user should review those sections relating indirectly to the user's area of interest.

The greatest advantage in using this annotated bibliography is in its holistic organizational structure. As the designer and planner are used to taking a systems approach in their use of the design process, they should feel comfortable in using this bibliography. For example, let us assume an individual is given the task of planning for future open space for a watershed area recently incorporated by a growing community. Were this individual to use a systems approach to such a study, the following steps would be recommended (Figure 1):

- 1) Review the literature concerning background information pertaining to specific and related land issues.
- 2) Review the literature pertaining to urban, rural, recreation and wildlife land uses.
- 3) Review the literature pertaining to natural resource data to insure the individual has an adequate background in that area.
- 4) Determine which, if any, resources may be controlling factors within the watershed. For example, if the watershed has a relatively low relief and sporadic but highly intense rainfall, then the peak flow will be high and wide floodplains may exist. Water might then be considered a control factor and could be used as an integrative factor in comprehending the interrelationships of all resources within the watershed. Varying circumstances will yield various resources as primary, secondary, or equivalent factors.

**THIS BOOK
CONTAINS
NUMEROUS PAGES
WITH DIAGRAMS
THAT ARE CROOKED
COMPARED TO THE
REST OF THE
INFORMATION ON
THE PAGE.**

**THIS IS AS
RECEIVED FROM
CUSTOMER.**

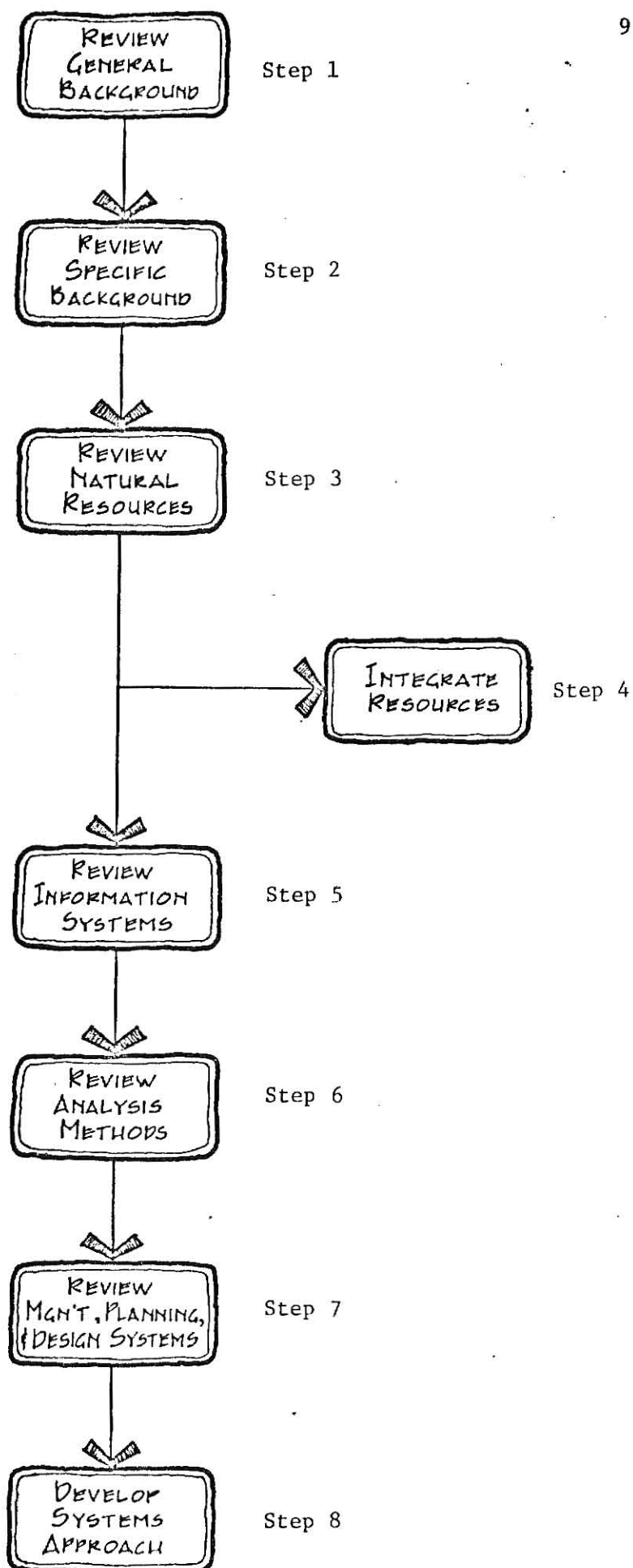


Figure 1.

- 5) Review the literature pertaining to information systems to gain insight into methods of classification, inventory, and interpretation which may be applicable to the watershed study. Consideration must necessarily be given to the individual's background, available data, economics, etc.
- 6) Review the literature pertaining to methods of analysis. The individual must again be aware of limiting factors mentioned in step 5. It is important to understand the data to be made available in step 5.
- 7) Review the literature pertaining to management, planning, and design systems. It is important that an individual realize that as situations vary, so do methods and approaches. Previous systems used in management and planning must be understood within the context whereby they were applied. Understanding this, the individual may study other systems and gain insight and knowledge which can be used in developing one's own systems approach.
- 8) The individual should now be aware of the following: a) various ecosystems of the watershed area, b) various cultural influences pertaining to the area, and c) various issues, strategies, and systems for watershed management and open-space planning. The individual should now be prepared to complete a systems approach for the planning of future open-space for the watershed area. This will naturally be a holistic approach. First, the individual understands the interrelationships of the natural factors. Secondly, all phases of planning are considered as correlative links, each

method within each phase considered in light of the other methods and phases within the overall systems plan.

- 9) Following the development of a systems approach, the individual then proceeds with the plan itself. Each phase of this plan, from the initial resource inventory to the final draft of the plan, should proceed with minimal difficulty. Not only will the plan be a success, but the individual will have learned a great deal throughout the course of this process.

2.0 LITERATURE REVIEW

To summarize the literature presented in this thesis would require a text of encyclopedic proportions. However, a brief discussion of the historical development and future trends found within this literature is appropriate. As might be expected, there are divergent opinions expoused by many prominent scholars on the historical, present, and future status of our natural resources. Many scholars believe that history will repeat itself and therefore they apply cyclic trends to their prognostications. On the other hand, a few scholars would have us believe that this method of prediction is no longer appropriate. The world is just too small and moving too fast. Finally, a great many scholars find a midpoint between these optimistic and fatalistic approaches. Their methods require a thorough analysis of recent trends and applications of their results into the near future. In this essay I will attempt to capture the essence of the writings of a few of the writers whose works appear in this annotated bibliography. This review will not address the myriad of trends and projections represented in the literature. Many of these trends and projections will no doubt come to pass and it is very important that we recognize them. However, more critical to the planner and designer, is the ability to cope with the many fundamental changes that seem to be pervading our present society. Such changes are not particularly prevalent in any one section of our society; for their impact is equally distributed upon our socio-economic, political, and environmental structure.

That literature which is directly thematic of this bibliography can be characterized and placed in perspective by understanding a single phenomenon -- the American conservation movement. The characteristics of this movement involve social attitudes, environmental crises, educational development, and many other facets which directly relate to the character of the American

people. First it is necessary to understand the conservation movement as a continuum and then, secondly, to focus upon a single facet of this movement -- the emergence of an ecological awareness.

"The history of the United States is fundamentally a history of rapid exploitation of immensely valuable natural resources. The possession and exploitation of these resources have given most of the distinctive traits to American character, economic development, and even political and social institutions. Whatever preeminence the United States may have among the nations of the world, in industrial activity, efficiency and enterprise, in standards of comfort in living, in wealth, and even in social and educational institutions as are dependent upon great wealth, must be attributed to the possession of these great natural resources; and the maintenance of our preeminence in these respects is dependent upon a wise and economical use of remaining resources. Thus the question of conservation is one of the most important questions before the American people."

John Ise (15, p. 3)

Conservation, preservation, and environmental awareness are as one, a land ethic. Horace Quick in a paper entitled "Population Ecology in Relation to Natural Resources" (19, p. 120) states that the land ethic in America is eroding. As he equates this land ethic with private ownership, he naturally views the flooding of people from rural to urban areas as demeaning to traditional values for the worth of land. Quick further states that land belonging to the public, belongs to no one and hence effaces the land ethic. There are others who believe that land is becoming America's prime commodity, and who therefore believe that private ownership of vast acreages of lands also represents a degradation of a land ethic. It is therefore necessary to view the land and its natural resources in perspective so that we may better understand our present position in regards to our value for the land and its resources.

One of the better studies conducted on America's conservation movement was by Hickey in an article entitled "Some Historical Phases in Wildlife

Conservation" (142, p. 164). In this article Hickey attempts to draw parallels between the various conservation movements in America. Although the analogies may not be entirely accurate in a historical sense, certain basic truths perhaps emerge from his summary (Table 1) that are quite interesting. Hickey believes that the separate resource conservation movements have three primary phases, and in each phase there are common intermediate stages characterizing the thinking in all fields. Phase one is the "Awareness Phase," and is comprised of the following stages: 1) crisis recognition, and 2) singling out the "culprits." The second phase is described as the "Action Level." Hickey separates this phase into the following nine stages, some of which may actually precede certain conservation movements: "Prohibition", "Atonement," "Monasticism," "Education," "Let's Control It," "Subsidies," "Public Ownership," "Free Enterprise," and "Science Our Savior."

The development of ecological thinking represents Hickey's third phase. This phase is singled out to emphasize its importance to all disciplines of study and to put into perspective the literature which abounds in these disciplines. Practically every discipline imaginable, has employed a systems or ecological approach to its study. Certain basic tenets which are apart of many disciplines are ecological in principle: cause and effect, conservation of energy, natural order, hierarchial states, diversity and complexity breeding stability, etc. As more disciplines continue searching for additional niches in both a professional and educational sense, the more they will realize their common interests with other disciplines and understand the necessity for cohabitation as they occupy their niches.

It is readily discernable that the recent environmental, energy, and food crises indicate that there remains much to be concerned about in matters

Table 1. An outline of conservation ideas. (continued on next page)

Goals	Ideas	Wildlife	Forests	Soils
AWARENESS LEVEL	Wolf! Wolf! (Fear motive)	Plains bison	Lumber famine	Dust Bowl
		Passenger pigeon	Forest fires	Salinification
Culprits (Personal devils)		Labrador duck	Chestnut blight	Laterization
		Eskimo curlew	Oak wilt	
PERSONAL LEVEL (Heaven)	Prohibition (Thou shalt not--)	Game hogs	Lumber barons	Sharecroppers
		Predators	Careless smokers	Tenant farmers
Atonement (Artificial offsets)		Clean farming	Insect pests	Weather
		Sell game	Overcut	Overgraze
Monasticism (Sanctuary for virtue)		Overkill	Leave a fire	Overcrop
		Restocking with exotic species	Reforestation	Fallowing
Wait 'til next year! (Education)		Game refuges	CCC work in the 1930's	Rotation
		Bird sanctuaries	Public parks	Fertilization
ECONOMIC LEVEL (Prosperity for all)	Let's control it! (Man the conquerer)	Conservation courses in schools, 4-H clubs, books, magazines, lectures, E Day, teach-ins, University extension, public tele-	Nature preserves Primitive areas	National monuments
It's simple! (Subsidy or bribes)		Govt' predator and rodent control	Fire protection	Shelter belts
		Bounties	Insecticides	Strip-cropping
Our Uncle is rich! (Public ownership)		Forest crop laws	Fungicides	Terracing
			State seedling plants for sale	USDA programs
It pays! (Profit motive)		National, state, and county grounds	Reclamation services for all	ACP payments
Research pays too! (Science our savior)		Commercial shoot- ing preserves	Tree nurseries	Soil bank
ECOLOGICAL AND ETHICAL LEVELS (Harmony)		Tourists need to get away from it all--for 2 weeks.	Timber farms	Reclamation services for all
		Underutilization	New plywoods	Drainage districts
		Habitat control	Hybrid poplars	New synthetic fertilizers
		The purpose of science is to conquer nature.		
		Ecosystems or communities are the end results of millions of years of evolution. They function like superorganisms with rates of growth and metabolism, and their carrying capacities are limited by their geological histories, their climates,		
		Prosperity has an equity in the present.		

Table 1. (concluded)

Waters	Landscapes	Atmosphere	Energy	Food
Floods	Tobacco Road	Emphysema	Shutdowns of industries	Overpopulation
Open sewers	Urban sprawl	Black lung	Econ. recession	Famines
Droughts	Chettos	Suffocation	No vacations	Mental retardation of children
Deserts	Envir. quality	Ice Age	Arab shicks	Drought
Industries	Billboards	Industries	Fast drivers	Grain speculators
Cities	Litterbugs	Cities	Cadillacs	Land "developers"
SCS	Auto dumps	Autos		
Overpump	Erect billboards	Create smog	Drive fast, waste light, overheat	(Eat domestic mammal meat???)
Pollute	Trespass, dump	Burn trash	Wear heavy under-wear; burn wood; use VWs	Vegetarianism
Sevage plants	Landscaping	Air conditioning equipment	Condominiums in the South	Family gardens
Harbor dredging	Exotic-species plantings	Personal rural retreats		Organic gardens
City reservoirs	Wilderness areas			
vision, congressional hearings, presidential commissions				
Levee systems	Rural zoning	Antismog and scrubber devices	Fuel rationing	New Lands of USSR
Drainage ditches	Highway scenic lookouts		New speed laws	Destruction of rain forests
Matching funds for sewage plants	Public refuse cans; scenic easements		Daylight sav. time	Price supports
Public dams	Superhighways	Nationalized mass transportation	Low license fees for VWs; cut public firewood	Irrigation and reclamation
Public landings	Public camp grounds		Federal mass transit; nationalized oil industry	Collective farms
Private dams	Tourism; ski resorts	Mountain resorts	Nuclear power	Agrarian reform in Latin America
Lake resorts			Alaskan pipe line	Family farms
		Tourists can be sold almost anything.		
Seeding rain clouds	New horticultural varieties	Solar energy plants	In situ mining of tar sands; gasification of coal	Corporation farms
The purpose of science is to control the land.				
and available solar energy. It is the purpose of science to understand these mechanisms and to help man adjust to the resources he has available on the planet on which he has evolved.				
The Golden Rule applies to the land as well as to people.				

Hickey, Joseph J., Some Historical Phases in Wildlife Conservation. Wildlife Society Bulletin: Vol. 2, No. 4, 1974, pp. 164-170.

involving our land and natural resources. And so long as there is active concern, all is not lost. Clepper relates to a work entitled "Democracy in America" written in 1831 by a French nobleman, Alexis de Torqueville (15, p. 10). The book portrays the American people as free peoples, who by forming associations for common causes, rid society of its evils and difficulties. George Sternlieb, in his book "Future Land Use" (Center for Urban Policy Research: Rutgers, 1975, p. 366), paraphrases Arnold Toynbee's paradigm of challenge and response. Societies and civilizations grow as they are aroused by the challenge. "If they cannot rise to the challenge, then decline ultimately is inevitable."

The suggested decay of our land ethic does not appear to be directly a matter of public land holding or private land hoarding, rather it is a matter of individual concern for the use of land and natural resources. This land of ours is everyone's heritage, and as long as there is a common interest in preserving this heritage there will remain a land ethic. Planners and designers are obligated to insure that such a heritage is characterized in their work. It is a matter of understanding and coping with public concern as well as maintaining a sensitivity to the tolerances of our land and natural resources.

3.0 ISSUES ON LAND AND ITS ENVIRONMENT, RESOURCE MANAGEMENT, AND USE

3.1 ENVIRONMENTAL ISSUES

- 1 Wagar, J. A.
1968. Solving Conflicts Between Outdoor Recreation and Environmental Quality. Proceedings of the Western Resources Conference, pp. 175-179.

Wagar describes the ultimate cause of deteriorating quality in our outdoor recreation resources as growing numbers seeking more of everything; hence the continuing saga of mans exploitation of his resources. The author specifically discusses on-site impacts, off-site impacts, environmental quality, and public participation. Most on-site impact is a result of materials added to or removed from the site or changes within an environment. Off-site impact is primarily social, that is, outdoor recreation is largely a middle- and upper middle-class pursuit. Wagar summarizes by saying that the monitoring of these impacts is possible; however, the qualitative implications of these impacts cannot be measured. Therefore public participation is necessary in making decisions concerning conflicting values.

- 2 Whyte, W. H.
1968. The Last Landscape. Doubleday and Company, Inc.: Garden City, N.Y., 1968, 428 p.

Whyte develops a rationale for fervent need to quickly halt our urban sprawl. If you are interested in open space, planned development, new towns, greenbelts and greenspace, then you should read Whyte's book. Whyte does not propose a "comprehensive plan" to save the world from urban sprawl, but he does educate the reader on reasons and methods for alternative planning. As Whyte says, "Our options are expiring." When this was written in 1968, some may have said that time is the best cure. It is 1976, and time has only served as a catalyst. Technology is growing

at an exponential rate, but the nation's concern for an enriched environment is wistfully swaying to laissez faire.

- 3 Commoner, B.
1971. The Closing Circle. Alfred A. Knoph, Inc.: New York, 1971,
343 p.

Commoner quotes "pogo", "We have met the enemy and he is us." The author writes of the environmental crisis and its indelible link to the social systems of which it is a part. In one of the last paragraphs of his book, Commoner prophetically states, "But none of us -- singly or sitting in committee -- can possibly blueprint a specific 'plan' for resolving the environmental crisis." "To pretend otherwise is only to evade the real meaning of the environmental crisis: that the world is being carried to the brink of ecological disaster not by a singular fault, which some clever scheme can correct, but by the phalanx of powerful economic, political, and social forces that constitute the march of history. Anyone who proposes to cure the environmental crisis undertakes thereby to change the course of history." This is a highly recommended book.

- 4 Detwyler, T. R.
1971. Man's Impact on the Environment. McGraw-Hill, Inc., 1971,
731 p.

This text is an anthology of readings organized by Detwyler into the following sections: 1) general environmental study; 2) basic causes of our environmental crisis; 3) the altered atmosphere; 4) the altered hydrosphere; 5) the altered lithosphere; 6) the altered biosphere; 7) vegetative destruction; 8) extinction; 9) hybridization; and 10) trends. This is a very interesting work; and although the reader is not exposed to all of man's propensities to create havoc, enough is said that man's nature to consume and destroy is well defined.

- 5 Smith, H. C.
1972. Environmental Tolerances and Visitor Preferences for Some Forest Recreation Habitats in British Columbia. The Forestry Chronicle: Vol. 48, No. 5, June 1972.

Smith reports on the state of recreation management and design as well as the current user attitudes in outdoor recreation areas. Because British Columbia is in a relatively high moisture area, recreation sites are easier to maintain and less susceptible to deterioration. However, he also attributes short seasons, good design, good user control, and adequate scheduled care and maintenance for their lack of facility deterioration. Smith stresses the need for increased recreation awareness and education for forest managers, for too often they are unaware of public needs and interests in outdoor recreation.

- 6 Moss, H.
1973. Ecology Legislation. Urban Land: Vol. 32, No. 5, May 1973, pp. 16-19.

This is a very enlightening article, for although it may read as a testimonial, it is an objective look at the environmental movement and its effect upon development. Moss, himself a realator/developer, explores recent land use legislation in several states. The author elaborates on the 1972 Florida Land Management and Resources Act, and discusses its implications on land development. This is an informative and somewhat reassuring article.

- 7 Roberts, J. A.
1973. Just What is an Environmental Impact Statement? Urban Land: Vol. 32, No. 5, May 1973, pp. 10-15.

Roberts' objective is to provide an adequate working answer to the title of the article. The author begins with a brief explanation of an

environmental impact statement (EIS). He then gives necessary background on the legislation which requires the writing of an EIS. Finally, Roberts offers a draft of an EIS in outline form and a flow chart which explains the development process for the EIS. Perhaps the most valuable information in the article is Roberts' concluding comments on the usefulness of the EIS for the following planning stages of development: 1) site selection; 2) prepurchase planning; 3) project planning; and 4) market strategy planning. This is a brief but informative article.

- 8 Andrews, R. N. L., Flamm, B. R., and Jordan, J. J.
1973. Environmental Impact Assessment. Journal of Soil and Water Conservation: Vol. 29, No. 6, Sept. 1973.

This is actually a collection of three separate papers all of which discuss a particular aspect of environmental impact assessment. Andrews discusses the effect of impact assessment on the approach to planning analysis, believing that the requirement for providing alternative proposals will allow for informed choices by decision makers. Flamm elaborates on the environmental impact statement, discussing its organization and content, Jordan stresses the implementation of the EIS, emphasizing the need for its integration with the actual planning process. This is a very informative and beneficial article -- very worthwhile reading.

- 9 Nielsen, G. A., Jezeski, J., Emerson, C., Myrick, D., Reuss, J., Stuart, D., and Williams, A.
1973. Environmental Impact Assessment: The Gallatin Canyon--Big Sky Study. Journal of Soil and Water Conservation: Vol. 29, No. 6, Sept. 1973, pp. 203-210.

In the summer of 1970, 29 Montana State University scientists began an environmental study of the Gallatin Canyon area. Three phases of

study were carried out. Since Big Sky development began in 1970, the situation for before-after study was ideal. Phase one was to determine "baselines" from which change could be monitored. Phase two was to assess the impact of a specific second home recreational development. And phase three (in progress at the time of publication) was to assess the changes in baseline data to develop guidelines for future management decision making.

- 10 Mull, H. R.
1973. Estimating Noise Exposure for Site Selection and Exterior Wall Design. Journal of Audio Engineering Society, Vol. 21, No. 9, Nov. 1973, pp. 726-728.

Mull summarizes that with the exception of those areas near airports and rail lines, urban noise is attributed to vehicular traffic. On through streets, noise levels are a function of the numbers and types of vehicles passing the site. The author further states that any significant decrease in noise level would have to be accompanied by a substantial decrease in numbers and/or types of vehicles. This study may be useful to those interested in urban, suburban, and park design.

- 11 Linford, A. B.
1974. Plants, Animals, and Man. Journal of Soil and Water Conservation: Vol. 29, No. 1, Jan. 1974, pp. 46-48.

Linford presents his presidential address at the 28th annual meeting of the Soil Conservation Society of America. Quoting and paraphrasing such men as Coleridge, Marsh, Haeckel, Commoner, Dubos, and Darwin, the author constructs a case for man and his creative nature in relationship to the creative and destructive powers of nature. He defends the monocultural agricultural practices and the use of DDT. He is a believer

that man in his wisdom will improve nature. One might ask how man can improve on something about which he understands very little.

- 12 Bruchell, R. W. and Listokin, D.
1975. The Environmental Impact Handbook. The Center for Urban Policy Research, Rutgers University: New Brunswick, 1975, 231 p.

Slightly more than one-half of this text is devoted to the contents and development of the Environmental Impact Statement as described by the National Environmental Policy Act of 1969. Topics such as format, interpretation, review process, guidelines and recommended procedures are discussed. Appendix A, B, and C provide valuable additional information. Appendix A lists published resources, organizations, and terms which concern the EIS. Appendix B discusses the EIS in the courts. And Appendix C specifies problem areas involved in the development and use of the EIS. This should be a valuable reference to the landscape designer and planner.

- 13 Duncan, J. W., Whitlatch, J. B., and Hagely, J. R.
1975. The Quest for Quality in Urban Design. Research Outlook: Vol. 7, No. 1, pp. 11-15.

Topics of this brief but informative article include: the need for better urban design, where designers went astray, principles of good design, overcoming economic barriers, and innovations for maintaining quality environments. The article concludes with statements on designing with new technology and with a rather idealic statement calling for everyone's participation in a move to overcome our urban blight. The authors profess that design and planning scales must be enlarged to better provide quality living. Parcel-by-parcel development must come to an end.

- 14 Carter, L. J.
1975. The Environment, a "Mature" Cause in Need of a Lift. Science:
Vol. 187, No. 4171, Jan. 1975.

This paper is an editorial comment concerning the Ford administration and its stand on environmental issues. "Thus far, President Ford's concept of environmental policy seems to involve bringing environmental and development values into some kind of vague 'balance'." The article is primarily concerned with Ford's stand on land use legislation.

3.2 RESOURCE MANAGEMENT ISSUES

- 15 Clepper, H.
1966. Origins of American Conservation. The Ronald Press Company:
New York, 1966, 193 p.

Clepper compiles writings by several men from all fields of natural resources. A total of ten papers covering the history and development of eight natural, historic, and recreational resources: 1) wildlife resources, 2) forest resources, 3) fisheries and aquatic resources, 4) soil resources, 5) watershed resources, 6) range and forage resources, 7) park and wilderness areas, and 8) scenic, historic, and natural areas. Men such as Merriam, Pinchot, Eschmeyer, Bennett, Marsh, Muir, Olmstead, Mather, and Zahniser are thoroughly portrayed along with their contributions to America's conservation ethic. This book is highly recommended and is very enjoyable reading.

- 16 U.S.D.A. Forest Service
1966. Multiple Use Management. PA-770, U.S. Department of Agriculture,
Forest Service, Sept. 1966.

This publication offers an explanation of what exactly multiple use management entails. As stated in the 1960 Multiple Use-Sustained Yield Act, multiple use means management of all the various renewable surface resources (wood, water, forage, wildlife, and recreation) in a combination that will best serve the people of the U.S. -- making the most judicious use of land -- understanding that some land will be used for less than all resources and management of all resources in such a way as not to impair the productivity of the land -- with consideration given to relative values of various resources -- and not necessarily

the combination of resources that will give the largest dollar return or greatest unit output. Sustained yield is the achievement and maintenance of high-level regular periodic output of the resources without impairment of land productivity. This brochure attempts to explain this very complex subject. It also tries to relate the concept of multiple-use management to the reader. To some degree, it is successful.

- 17 Eriksson, H. C.
1968. Managing the National Forests to Meet Changing Demands. Forest Farmer, June 1968, pp. 12, 14-16.

This article briefly describes forest management practices in use today. Eriksson spends considerable time in explaining the even-aged management concept and why it is being adhered to by the Forest Service. He also describes the rotational concept and multiple use management concept. Especially interesting is his view of the future of timber management. Since many landscape planners are interested in recreation planning, reading this article will provide necessary insight into the management of a large proportion of our recreation lands.

- 18 Hendee, J. C., Gale, R. P., and Harry, J.
1969. Conservation, Politics, and Democracy. Journal of Soil and Water Conservation: Vol. 24, No. 6, Nov. 1969.

The authors present a character sketch of the membership of conservation groups and discuss the implications of their growing numbers and power. The authors surmise that although the conservation-preservation movement is a successful lobby group, it does not rely on the strength of financial resources but is based upon human resources (individual members' time and money). Also, in spite of its social class bias, it remains more representative than many other politically active groups.

- 19 Soil Conservation Society of America
1969. Frontiers in Conservation. Proceedings of the 24th Annual Meeting: Ft. Collins, Colo., Aug. 1969, 149 pp.

The following is a topical list representing the papers presented at this conference: history of conservation, planning and design, water resources, satellite imagery, forest management, environmental study, range management, behavioral studies, outdoor recreation, population ecology, ecology, natural resource management, land use, flood plain regulation, soil science, and agriculture. This list does not include all the various subtopics discussed at this conference, for it truly runs the gamut. This booklet is highly recommended to landscape architects, planners, geographers, et al.

- 20 Harry, J., Gale, R., and Hendee, J.
1969. Conservation: An Upper-Middle Class Social Movement. Journal of Leisure Research: Vol. 1, No. 3, Summer 1969.

This study was conducted as a sociological study to determine the make up of the conservation-preservation movement. The results were highly indicative that the movement was primarily composed of upper-middle class occupations. The data also suggested that most conservationists concentrate their civic activities to the field of conservation.

- 21 Kury, C.
1975. Cifford Pinchot's Philosophy. Journal of Forestry: Vol. 73, No. 3, March 1975, pp. 154-155.

Cifford Pinchot's philosophy that "the greatest good to the greatest number for the longest time," is an extention of the utilitarian philosophy. This philosophy basically professes that the actions of society should be directed toward the creation of the greatest happiness for the

greatest number of people. A controversy has arisen, however, dispelling Pinchot's addition of "the longest time." The philosophy is criticized for being internally inconsistent. If Pinchot meant the maximization of the three goals (good, number, time) simultaneously, then granted, the philosophy would be erroneous. However, Kury claims that Pinchot, in his writings, creates a system of priorities which clearly leads to internal consistency. This article requires the reader to ponder about our conservation heritage, a heritage that all landscape architects should be aware of.

3.3 LAND USE ISSUES

3.3.1 LAND USE IN GENERAL

22 Cooperative Extension

1969. Resource Allocation for Indiana's Increasing Population, Purdue University: Lafayette, May 1969, 47 pp.

As land use is such a contemporary topic, this publication may be slightly out of date. However, the papers presented by W. J. Wayne ("Water for Increasing Population"), by A. A. Lindsey ("Nature Preserves and Recreation Areas"), and by E. E. Molitor ("Regional Planning in Resource Allocation") are topics that certainly relate to 1976 and beyond. Each of these authors represents a region very similar to Kansas and the issues that they confront are issues that Kansans must confront.

23 Illinois State Geological Survey

ND Land-Use Problems in Illinois, Environmental Geology Note #46, Urbana, 46 pp.

Three of the five papers presented are of particular interest: (Aldrich, Oswald, Fehrenbacher) "Implications of Crop Production Technology for Environmental Quality," (Ackermann) "The Oakley Project -- A Controversy in Land Use," (Weber) "The Development and Use of Coal Surface-Mined Lands in Illinois."

24 Wohletz, L. R. and Wildman, W. E.

1971. Land Use Planning by Foresight or Hindsight. Journal of Soil and Water Conservation: Vol. 26, No. 4, July 1971, pp. 135-137.

The authors state that resource leaders in California are stressing the use of soil data as a basis for land use planning. Their challenge is to plan the desired land uses via the capabilities of the soil and

other resources. Their objective is a desirable, efficient, harmonious pattern for land use which must be anticipated rather than generated by expediency and short run pressures. Their plan is to publicly promote the value and use of soil interpretive data and other available data which will heavily influence their social economic and environmental well being. This is an interesting article which could prove to be reassuring if a follow-up determined this effort to be effective.

- 25 Krochalis, R. F.
1972. State-Wide Land Use Planning. Urban Land: Vol. 31, No. 8, Sept. 1972, pp. 8-13.

The author catagorizes both regional and state land use planning techniques which have recently been adopted by a few states. 1) Washington and Vermont utilized tax incentives to preserve open space; 2) Wisconsin, Minnesota and Vermont use state-wide criteria concerning zoning and environmental standards that must be followed by municipalities; 3) New Jersey, Connecticut, Maryland, Delaware, Washington, and Vermont firmly control critical or endangered areas, e.g., coastlines, wetlands, and parks; 4) Maine and Vermont control, through a review process, all development above a minimum size; 5) Hawaii uses a State Land Use Commission to define zones for agriculture, urbanization, industry, and conservation. The author also elaborates on land use programs for Vermont and Maine, listing their rationale, statutes, and administrative agencies.

- 26 Clawson, M.
1972. America's Land and Its Uses. Resources for the Future: John Hopkins Press: Baltimore, 1972, 166 p.

Marion Clawson first relates land use to the citizenry. Land use is a diverse topic: it is heritage, it is economics, it is environment,

it is social, it is political, it is something which affects every person every day of their life. Clawson continues to discuss the historical significance of land use to include the evaluation of management systems, laws, public vs. private land holdings and controls. Chapters three through eight are devoted to specific land uses: urban lands, recreation lands, croplands, grazing lands, forest lands, and the inevitable "other" lands. Having earlier discussed historical and contemporary land use issues, Clawson concludes by enumerating possible trends in land use. This text provides its reader a clear understanding of the implications of land use issues and their potential affect on everyone's lives.

- 27 Environmental Protection Agency
1973. Land Use and the Environment: An Anthology of Readings.
Washington, 197 pp.

This anthology of readings could provide a reader with a good background on the subject of land use planning. Although this publication presents a rather general discussion of principles and issues relating to environmental quality and land use, it nevertheless will provide a framework from which further study into specific problems and issues can be accomplished.

- 28 Libby, L. W.
1974. Comprehensive Land Use Planning and Other Myths. Journal of Soil and Water Conservation: Vol. 29, No. 3, May 1974, pp. 106-108.

"Comprehensive planning" does not exist according to Libby. It is an illusive idea that has been over marketed. Both governments and people react to specifics, especially economic specifics; whereas illusive ideas generate relatively small interest. Planning may result in a

self-feeding bureaucracy, one which can sustain itself at full capacity with little outside stimuli. Yet, Libby concludes, land use planning must proceed at all levels of government, and the search for comprehensiveness produces a number of contributions. Finally, Libby adds, "Emotions, conflict, and demands are the substance of planning as a process of reconciling human preferences."

- 29 Denney, E.
1974. Rural Land Subdivision and Environmental Pressures. Journal of Soil and Water Conservation: Vol. 29, No. 3, June 1974, pp. 114-118.

Denney presents an interesting case study concerning vacation home development and its impact on the environment. The area under study is San Jaun County, Washington. The county consists of numerous islands located in the dry rainshadow of the Olympic Mountains in the Straits of San Juan de Fuca. Specific impact upon groundwater, soil, intertidal and subtidal ecosystems, and public health and safety is severe and growing. The stumbling block is primarily political in that planning of any sort cannot gain a foothold. This study is highly recommended as a reference for uncontrolled development and environmental impact.

- 30 Drobny, N. L. and Dee, N.
1975. Land: An Emerging Dimension of Planning. Research Outlook: Vol. 7, No. 1, pp. 6-10.

The authors state that, traditionally, land-use planning consisted of preparing multi-colored maps depicting professional planners' best idea on how to use the land. These plans are typically non-representative of the values of the public being "planned for," with very little flexibility for updating. Planners must ask two fundamental questions: "Why

should a specific land use exist at a specific location -- or why shouldn't a given location be developed in another way? Why does the planned land use require the prescribed acreage?" The authors further state that land-use planning must be adaptable and responsive and must be based on accepted criteria that can be used to answer the above two questions. This article is brief but it adequately represents the present state of land use planning.

- 31 Hessel, D. L., Moore, J. L. and Warner, M. L.
1975. The Challenge to Land-Use Policy Makers. Research Outlook:
Vol. 7, No. 1, pp. 16-20.

The fundamental problems in making land-use policy lie in the balance of state vs. local jurisdiction. The authors further state that three challenges are crucial to attaining improved land use: "1) Achieving a balance between state guidance and local determination, 2) Resolving conflicts between competing plans and competing interests, 3) Developing an effective implementation program." This article is a good overview of problems and needs concerning land-use implementation.

- 32 Kansas Cooperative Extension Service
1975. Proceedings of Kansas Conference on Land Use. Kansas State
University, May 1975.

This publication is an especially good reference on existing and proposed land use regulation in Kansas. As Kansas is not afflicted by the myriad of land use problems incurred by more populated areas, it is a good commentary that it realizes that land use problems are not all centered in urban areas. The proceedings of this conference concern three primary areas: 1) Resource issues in rural and urban areas, 2) public interests vs. private rights, 3) Implementation of land use planning in

Kansas. Although a few suggestions were made as to what might be included in drafting a land use plan for the State, a region or a county, the majority of the issues discussed concerned areas that needed change or improvement.

- 33 Huefner, R. P., Johnson, M. E. and McKell, C. M.
 1975. Utah's Support for Land Use Planning: Fragile as the Landscape.
Journal of Soil and Water Conservation: Vol. 30, No. 3, May
 1975, pp. 112-115.

This article describes the public attitude toward land use in Utah. In 1973, Utah passed a somewhat watered down land use bill. However, in 1974, a referendum passed which abolished this bill. The authors present possible reasons for this setback and prescribe five measures which must be taken in the area of land use if the welfare and the landscape of much of Utah is to be preserved.

- 34 U.S.D.A. Committee on Land Use
 1975. Perspectives on Prime Lands: Background papers on Seminar
on Retention of Prime lands. U.S. Dept. of Agriculture:
 Washington, D.C., July 1975, 257 pp.

This publication is an ambitious attempt to define, classify and analyze agricultural and forestry land use. The following topics were discussed by prominent individuals in their respective fields: trends, demands, definitions, classifications, politics, economics, and competition of and for prime and unique farm lands, forest lands, and "prime" lands for uses other than agriculture and forestry. What makes this publication so valuable is that each topic presented is also reviewed by four individuals who are also prominent in that topical area or in a related area. I would highly recommend the use of this text as required or recommended reading for those persons working in areas that concern land uses.

3.3.2 SPECIFIC LAND USES

3.3.2.1 Urban Lands

- 35 Cahterberry, J. H.
1970. The Greening of a Subdivision. Soil Conservation, Vol. 36,
No. 12, Dec. 1970, pp. 267-268.

This is a brief article describing erosion and sediment control procedures for the Thousand Oaks subdivision in the South Charleston region of West Virginia. The author discusses with photos the use of drainage tile for channeling runoff and the use of foundation tile to protect homes from high water tables. Also discussed, is the use of crownvetch and Kentucky 31 fescue to prevent erosion and sedimentation following development. This municipality was the first in West Virginia to adopt erosion and sediment control regulations.

- 36 Bowen, D. K.
1972. Sediment Control. Agricultural Engineering: July 1972,
pp. 17-19.

Bowen reports on the successful move to provide sediment control legislation for Montgomery County, Maryland and subsequently by the State of Maryland. The following principles were enacted: 1) regulations to control sediment must be established at county levels (where land use decisions are made); 2) development and guidance of control measures must come from a cross-section of interests; 3) programs must be supported and understood by the highest levels of county government; 4) follow-up on enforcement must be required; 5) state "oversight" must provide for uniformity between counties; and 6) soil conservation districts must be prepared to assume the role of review and approval of sediment control

plans. This legislation is long overdue especially in those areas where rural interests have been overshadowed by encroaching suburbanization. In such cases, principles of soil conservation are not being realized and stream hydraulics and hydrology are being altered irreversibly.

- 37 Clawson, M.
1972. The Scrambled Pattern of Suburban Land Conversion. Journal of Soil and Water Conservation, Vol. 27, No. 4, July 1972, pp. 149-151.

The byline to this article reads, "Unguided urban sprawl -- the product of myriad public and private decisions and transactions -- wastes land resources and aggravates many social, economic, and political problems of our time." Clawson elaborately describes the process of suburbanization. He includes a description of the "Land Conversion Chain:" farmer → speculator → developers → suburban home buyer. This conversion has its pluses and minuses. Minuses usually win hands down. Clawson recommends methods of controlling land conversion. Historically, zoning methods have had very little success. The ultimate means, and perhaps the only means, is public land purchases. This has been done in numerous instances since the writing of this article. Time will tell how effective such a method will be.

- 38 Davis, A. A.
1972. Environment and Development, Striking the Balance. Urban Land: Vol. 31, No. 8, Sept. 1972, pp. 3-7.

Davis lists important changes which will inalterably affect future housing development: 1) increased public concern for environmental values; 2) willingness of government to support environmental values; 3) new public attitude toward private property; 4) increased public involvement

toward decisions which affect it; 5) changing life styles; and 6) concern for size and livability of the city. Davis then presents certain case studies which bear out the significance of a changing public.

- 39 Reilly, W. K.
 1973. The Use of Land: A Citizens' Policy Guide to Urban Growth.
 Thomas Y. Cromwell Company: New York, 305 pp.

Reilly presents the report prepared by the Task Force on Land Use and Urban Growth. This task force was created in 1972 and its problem was to determine the organization, control, and coordination necessary to protect the environmental, cultural, and aesthetic characteristics while developing our urban areas. The topical areas discussed include: recreation land use, urban land use, open space, land use in general, environmental impact, and regional planning. This is a highly quoted book which land planners should read and draw their own conclusions. Although not all land use issues are presented, this book explores in depth those issues related to urban land use.

- 40 Franklin, H. M.
 1973. Land Use and Litigation. Urban Land: Vol. 32, No. 5, May 1973, pp. 3-8.

This article explores urban land use as it is affected by the 1968 Housing Act and the 1968 Civil Rights Act. In 1973, a moratorium was placed on federally subsidized housing. Franklin describes certain litigation preceeding this moratorium and states that they were indeed the cause for this moratorium. As housing was being concentrated into large developments located in underprivileged and racial segregated areas, HUD was being sued for anti-desegregation and therefore discriminatory

practices. This article is a pressing issue to landscape architects and planners, for it is an issue that must be considered in the site selection of federally funded or subsidized housing.

- 41 Coleman, R.
1975. Land Use Concerns in Mid-America. Soil Conservations, Vol. 40, No. 8, March 1975, pp. 4-5.

This article strikes close to home. The Mid-America Association of Conservation Districts (MAACD) is comprised of six conservation districts surrounding the greater Kansas City area. Three Kansas counties and three Missouri counties have coordinated their conservation efforts to promote good land use management surrounding Kansas City. With their close associations with the Mid-America Regional Council, League of Women Voters, and chapters of the Soil Conservation Society of America, they now play an effective role in the decisions concerning land use in the Kansas City area.

3.3.2.2 Rural Lands

- 42 State Soil and Water Needs Committee
1961. An Inventory of Kansas Soil and Water Conservation Needs. Published by the State Soil and Water Conservation Needs Committee of Kansas: Kansas State University, June 1961, 11 pp.

A Conservation Needs Committee in each county developed an Inventory to provide an appropriate standard for each county's soil and water conservation activities. This publication summarizes the Conservation Needs Inventory (CNI). It is divided into four sections: present use of agricultural land, expected changes in land use, needed conservation treatment, and a discussion of CNI data on small watersheds. This rather

brief overview of agricultural land use in Kansas is significant, for when it is used in conjunction with the CNI, it will provide the only detailed information available on agricultural land use.

- 43 U.S.D.A. Soil Conservation Service
1967. Kansas Conservation Needs Inventory. U.S.D.A. Soil Conservation Service, State Office: Salina, Kansas, 191 pp.

The objective of this publication is to develop detailed data on land use and conservation needs on non-federal rural land, and to obtain data on watershed project needs on both privately and publicly owned land in Kansas. The information presented in a CNI publication has proven to be of great value for planning purposes in many states. Both public and private planning firms use the CNI data for predicting future needs and present weaknesses in areas of land and water planning. Recently, this data has been extensively used in determining land use for tax assessment purposes.

- 44 Great Plains Agricultural Council
1967. Projections of Crop Yields Land Resource Regions 1980-2000-2020. Publication No. 33, University of Nebraska Agricultural Experiment Station: Lincoln, 1967.

This publication provides projections for crop yields of the Missouri Basin to 1980, 2000, and 2020. As in all projects there are certain assumptions which must be made; consequently, such surprise free projections are normally limited to relatively short time frames. This data is useful, but care must be taken relative to the time expanse with which one is working. Included are most crop, pasture, and range yields.

- 45 Berger, M. E.
1973. Recreation Potential of Texas Rangelands. Journal of Range Management: Vol. 26, No. 2, March 1973, pp. 92-93.

Berger discusses the economic potential of private hunting lands in Texas. The rangeland of Texas is well portrayed, for the author describes its physical and cultural setting and history. The relationships between the two land uses, recreation and range, is well developed. And although hunting does appear to be the only economically feasible recreation use, the author does present other uses which, in time, may also prove to be profitable in terms of dollars and cents.

- 46 Anderson, W. D., Gustafson, G. C., and Boxley, R. F.
1975. Perspectives on Agricultural Land Policy. Journal of Soil and Water Conservation, Vol. 30, No. 1, Feb. 1975, pp. 36-43.

This summary on agricultural land policy certainly reflects the authors backgrounds: law, economics, and natural resources. The authors present an objective and encompassing view of the issues which surround this very debatable subject. Case studies of state, county, district, and local legislation which concern land use, suburbanization, prime agricultural lands, and open space are discussed. This is one of the better articles written on this very complex subject.

- 47 Cotner, M. L., Skold, M. D., and Krause, O.
1975. Farmland: Will There Be Enough? Economic Research Service, U.S. Department of Agriculture: Washington, D.C., May 1975, 16 pp.

This publication briefly discusses the food and fiber needs of the U.S. Historically, the demand, supply, and market activities of food and fiber goods have undergone considerable fluctuation. Presently, we have an abundant supply of agricultural goods and resources. Enough,

it is believed, to carry us beyond the year 2000. Projections are based on our resource capacity, and since capacity is far from being truly understood, the projections are therefore only moderately useful.

- 48 Frey, H. T. and Otte, R. C.
1975. Cropland for Today and Tomorrow. Economic Research Service,
U.S. Department of Agriculture: Washington, D.C., July 1975,
17 pp.

Frey and Otte discuss the effects of the suspension of the "federal land set-aside programs." They summarize both changes in farmland use and conversion of land to cropland. Included in this brief, are certain factors which are likely to retard land conversion. Such factors include: size of tract; ownership patterns; ease and scale of development; crop alternatives; and competition with other uses.

3.3.2.3 Recreational Lands

- 49 Johnson, H. A.
1963. Outdoor Recreation and Resource Conservation. Journal of
Soil and Water Conservation: Vol. 18, No. 2, March 1963,
pp. 45-48.

Johnson takes a sobering look at outdoor recreation as a natural resource. At the time this article was written, the study report by the Outdoor Recreation Review Commission was creating quite a bandwagon for outdoor recreation enthusiasts. Johnson merely states that recreation growth must not grow at such a rate that it cannot be monitored. To some degree, he was right. Management could not keep up with the opening of so many recreation areas during that period. Consequently, many of the more heavily used sites had to be removed from public access and put into "fallow" for natural regeneration.

- 50 Lucas R. C.
1964. The Recreational Capacity of the Quetico-Superior Area.
Research Paper LS-15, U.S.D.A. Forest Service, Lake States
Forest Experiment Station: St. Paul, Sept. 1964.

This is a quite extensive paper which explores the overuse of the Boundary Water Canoe Area (BWCA). Lucas first discusses those factors that limit carrying capacity. Such factors include: physical site features and user attitudes. Next, Lucas offers an explanation of the Quetico-Superior Area's site deterioration. Whether this deterioration can be used as a measure of dissatisfaction of the "wilderness experience," primarily depends upon user attitudes. Lucas summarizes by listing certain management implications. Some of these implications apply to design and layout and should therefore be very useful to landscape architects.

- 51 Randall, C. E.
1966. The North Cascades Study Report. Journal of Forestry: Vol. 64,
No. 5, May 1966, pp. 307-310.

This report is an interesting study of the conflict between the Department of the Interior's Bureau of Outdoor Recreation and the Department of Agriculture's Forest Service. Both are concerned about recreation opportunities offered in the North Cascade Mountains of Washington. The BOR proposed a National Park while the Forest Service proposed a wilderness area. This article is an interesting discussion of the events which led to the final designation of the North Cascades National Park.

- 52 McCool, S. F.
1968. Outdoor Recreation: An Index to the Literature in the Publications of the Society of American Foresters. School of Forestry: University of Minnesota, 32 pp.

This is a bibliography of articles concerning topics in outdoor recreation which have appeared in the following literature: Journal of Forestry (1900-1916); Journal of Forestry (1917-1967); Forest Science and Forest Science Monographs (1955-1967); and Proceedings, Society of American Foresters (1905-1916, 1947-1948, 1954-1960, and 1962-1966). All references (325) are indexed and cross-indexed.

- 53 Douglass, R. W.
1969. Forest Recreation. Pergamon Press: New York, 1969, 336 p.

Douglass discusses practically every aspect of outdoor recreation: economics, demand, carrying capacity, management, and layout and design; all of which receive good treatment. The second section of his book is devoted to recreation area types, e.g., campgrounds, picnic areas and water-based recreation areas. Problem areas such as water supply, sanitation, management and operation are also discussed. This is one of the better texts on this subject, for considerable attention is given to necessary planning, design, and management detail. This book is highly recommended to planners, designers and resource managers.

- 54 Hendee, J. C.
1969. Rural Urban Differences Reflected in Outdoor Recreation Participation. Journal of Leisure Research: Vol. 1, No. 4, Fall 1969, pp. 333-341.

Hendee studies and elaborates on the theories which try to explain urban-rural differences in recreation participation. He concludes that methods

used in the development of the theories are vague and lack rigor, characteristic of recreation studies. He recommends that recreation statistics should reflect other demographic variables, such as age and socio-economic status rather than residence.

- 55 Hendee, J. C. and Bury, R. L.
1971. Does Recreation Development Pay Off? Western Conservation Journal: Vol. 28, No. 1, Jan. 1971, pp. 28-30.

Hendee and Bury explore the realm of private (corporate) outdoor recreational development. The authors concluded that such an industry will not profit in the foreseeable future. However, large land holders must weigh the indirect benefits of providing for recreation on their lands. Public lands offer too much competition (low price and good quality), thus disabling private land holders from making a profit. In most all cases, fees received could not approach the costs for capital outlay, maintenance, and management. So, for the present, it would be wise to provide only those types of developments that will gain goodwill or minimize the costs of meeting public responsibilities.

- 56 Reid, L. M.
1971. Will the Present pace of Resource Development Allow for Recreation. Address given at Kansas State University, Feb. 1971.

The theme of Reid's address is the necessity for making recreation resources an integral part of the natural resource planning process. It is the authors contention that at the present pace and scheme of resource allocation, recreation can expect only residual lands and waters. However, at the time of the speaker's address, the U.S. and specifically her

home State of Texas, was under unheralded pressures from suburban and second home development. This address does enlighten the reader as to possible conflicts arising from development and recreation land use.

- 57 Clark, R. N., Hendee, J. C., and Campbell, F. L.
 1971. Values, Behavior, and Conflict in Modern Camping Cultures.
Journal of Leisure Research: Vol. 3, No. 3, Summer, 1971,
 pp. 143-159.

The authors report on the apparent differences between campers and recreation managers. Both have similar goals, e.g., the elimination of vandalism, theft, and nuisance behavior. However, the social goals and urban behavior patterns of campers differ significantly from those of the recreation managers; consequently, the means by which their similar goals are reached also differ. The basic problem is the changing of camping patterns. Modern campers are relatively unconcerned about the primitive experiences wishing only to bring the urban conveniences to over crowded campgrounds. The authors propose that planners and designers accommodate this trend by placing campgrounds in areas that will easily handle expansion. Also, a diverse range of camping experiences is needed, especially for those users who do not prefer the community camping experience.

- 58 Jensen, C. R. and Thorstenson, C. T.
 1972. Issues in Outdoor Recreation. Burgess Publishing Co.:
 Minneapolis, 1972, 241 p.

Basically, this is a compendium of works by numerous authors whose specialties lie in one or more areas relating to outdoor recreation. The topics touch on all aspects of outdoor recreation to include: Wilderness use, leisure studies, social and economic aspects, growth, legislation, natural resources, preservation, disabled, maintenance, pollution, noise,

needs and demands, and planning and management. This book might best be used in a reference capacity, for continuity is lacking throughout the book. There is, however, a great deal of information.

- 59 Wurman, R. S., Levy, A., and Katz, J.
1972. The Nature of Recreation. MIT Press: Cambridge, 1972,
82 p.

This is a rather unique book in that it discusses recreation from three different perspectives. The first is just an adequate treatment of recreation needs and standards. The second text is devoted to Frederick Law Olmstead and is presented simultaneously with the first perspective. Finally, the authors present an array of little known facts about certain recreation endeavors.

- 60 Soil Conservation Society of America
1972. Outdoor Recreation Through Managed Use of Natural Resources to Serve Communities and People. Journal of Soil and Water Conservation: Vol. 27, No. 1, Jan. 1972, pp. 43-44.

This article was prepared by the SCSA Outdoor Recreation Committee. The SCSA is concerned about the damaging effects of overuse or unmanaged recreation use of our natural resources. This article points out several needs which involve recreation planning and management: 1) special need for recreation lands near urban centers; 2) need for soil survey data in site selection; 3) support for nationwide planning of recreation areas; 4) research in areas of biology, economics, and sociology; 5) identification of outdoor recreation resources; 6) additional personnel trained in outdoor recreation; and 7) state funding to local groups or agencies for outdoor recreation facilities.

- 61 Jensen, C. R.
1973. Outdoor Recreation in America, Burgess Press Co.: Minneapolis, 1973, 277 pp.

This text is one of the most widely used texts in the field of outdoor recreation. Jensen introduces the subject of outdoor recreation in the first two chapters. The third chapter is a very good discussion of the socio-economic factors which affect outdoor recreation: such factors as population, urbanization, mobility, work and leisure time, income levels, technology, education, and changing values. Chapter fourteen is also of interest for it takes a look at the future of outdoor recreation.

Discussed here are socio-economic trends, needs, participation trends, supply and demand, economic impact, governmental involvement, private enterprise, and changing environments.

- 62 Kraus, R. G. and Curtis, J. E.
1973. Creative Administration in Recreation and Parks, C. V. Mosby Co.: St. Louis, 1973.

Chapter 1, "Scope of Recreation in American Society" is especially good. It is primarily concerned with the administration and organization of recreation and park systems in the U.S. Chapter 4 and Chapter 7 are also informative. Chapter 4 describes "Policy Development in Recreation and Parks" and Chapter 7 is an especially good treatment of "Recreation Areas and Facilities." The reader can become involved in the "why" or "for what reason" of park planning and design. Standards are given and to some degree are explained. The park planning process is fully explained—from initial planning, to acquisition of properties, to the design process. Kraus also presents challenges for traditional facilities and design approaches. Finally, Kraus discusses "Planning, Evaluation,

and Research" for parks and recreation. This text is one of the best in its field and is highly recommended as a reference.

63 Corps of Engineers

1973. Recreation Statistics. U.S. Army Corps of Engineers, Civil Works Directorate, U.S. Government Printing Office: Washington, D.C., April 1973, 25 p.

This document is basically a summary of the Corps involvement in the field of recreation. The report begins with a statement relating recreation to the Corps of Engineers. The next section discusses the statistical base for this study as it defines such phenomena as recreation days, percent activity use, land and water area, etc. Adjacent to this section is U.S. map of all Corps activities relating to recreation. Finally, the publication lists each of the 365 designated areas and lists statistics pertaining to recreation use, sizes of water, land, and shoreline areas, and managing agencies for these areas. Unfortunately, Kansas is not represented in this data.

64 Whitaker, B. and Browne, K.

1973. Parks for People. Schocken Books: New York, 1973, 144p.

This is one of the better works on the subject of parks and park users. The introduction provided by Albert Fein is both informative and inspirational. He is in basic agreement with the authors of this book in that the future of urban open space and public parks is encouraging. Both authors are British and their perspective of American parks are interesting from many aspects. Their historical sketch of American parks reflects the Anglo-American tradition of one influencing the other throughout

periods of park and open space movements. Especially interesting is the authors deep concern for relevancy to users of our parks. This book is highly recommended to all designers and planners.

- 65 Wagar, J. A.
1974. Recreational Carrying Capacity Reconsidered. Journal of Forestry: Vol. 72, No. 5, May 1974, pp. 274-277.

Wagar reconsiders his previous interpretation of "quality" recreation. This article is primarily a discussion of physical carrying capacity as opposed to a more important matter relating to psychological experience which more closely defines recreation. Wagar discusses quality recreation as it relies on a person's expectations, belief systems, and prior experience. Although he still maintains that wilderness recreation has cause for concern in physical carrying capacity, he does qualify his stand. "Administrators who choose to impose use limits will therefore need courage, a good conceptual framework to guide their decisions, and highly visible evidence that a system of opportunities is available to meet the needs of diverse of conflicting groups of visitors."

- 66 Hortin, J. K.
1974. Park Planning is No Picnic. Soil Conservation: Vol. 39, No. 12, July 1974, p. 11.

The author refers to problems of urban growth and an increasing demand for more localized recreation. He cites the work of the Soil Conservation Service in aiding the Salt Lake City regions to better select those areas to be designated as parks. Hortin also recommends that schools be located on larger tracts of land, therefore providing more neighborhood recreation facilities and outdoor education areas.

- 67 Stewart, A. T.
1974. A Nature Trail for Ski Tourers. Soil Conservation: Vol. 40,
No. 5, Dec. 1974, pp. 12-14.

Stewart describes a ski touring area in the White Mountains of New Hampshire. A biologist for the Soil Conservation Service had plotted and interpreted a ski trail for ski tourers. The author presents some of the interpretive signs and relates these signs to the nature of the area and to the user. He also describes the rationale which went into the construction and placement of the signs. Outdoor recreation interpretation is an important topic which landscape architects should be concerned about.

- 68 Wagar, J. A.
1975. Recreation Insights from Europe. Journal of Forestry: Vol. 73, No. 6, June 1975.

As Wagar suggests, we would do well to observe the land management and land planning techniques of those European countries which for generations have been faced with the pressures we are beginning to feel today. Wagar comments on four specific topics: 1) landscape management, 2) interpretation, 3) recreation management, 4) and land use planning. Switzerland is a prime example of forests managed to protect scenic values. Their forests epitomize the importance of trade-offs and value systems. Many of the European countries offer interpretive displays that depict natural processes, or whole ecosystems at a reduced scale so that the visitor can actually relate to and better understand a systems concept. Recreation management in Europe uses zoning extensively. The zoning is hardline in those areas selected for preservation and rather soft line in those areas where heavy visitation is promoted. Wagar found that land use

planning in Europe is not what it is cracked up to be. The Dutch probably have better enforcement than most other countries, and indeed a wonderful philosophy; however, their techniques and methods are as confusing as any country's.

3.3.2.4 Wilderness/Natural Areas

- 69 Burch, W. R., Jr.
 1966. Wilderness - The Life Cycle and Forest Recreation Choice.
Journal of Forestry: Vol. 64, No. 9, Sept. 1966, 606-610.

At the time of this report, significant associations between user and type of recreation experience were found. Combination camping (wilderness and auto camping) was most representative of families in the early stages of the life cycle. Easy access camping (auto camping only) was representative of middle and postretirement stages. Remote camping was representative of new families and those families whose children are leaving home. This issue concerns the problem of balancing the quantitative demands of minorities. The basic conclusion is that the issue should be one of careful assignment of appropriate space and levels of development for different kinds of activities people seek. "Resource professionals, concerned with meeting the needs of their recreation clientele, may find that emphasis upon the range of variation is a better planning guide than observing the limitation of standardization."

- 70 Hendee, J. C., Catton, W. R., Jr., Marlow, L. D., and Brockman, C. F.
 1968. Wilderness Users in the Pacific Northwest - Their Characteristics, Values, and Management Preferences. Forest Service Research Paper PNW-61, U.S.D.A. Pacific Northwest Forest and Range Experiment Station: Portland, 1968, 92 p.

The authors introduce the reader into the field of wilderness management. They then discuss the wilderness users: their demographic characteristics,

their attitudes, and their behavior and attitude toward management policies. The authors summarize by discussing the need for differentiating the needs of the wilderness purist from other users. This paper is very informative and all planners and designers should take heed of the importance of knowing something about those who will use the facility that they design or plan.

- 71 Hendee, J. C. and Catton, W. R.
 1968. Wilderness Users... What Do They Think? American Forests.
 Sept. 1968, 6 p.

This is a brief report presented in an interview style. The questions are those which you might expect, e.g., "are many of them 'loners,' in the sense that they visit wildernesses solo?" However, the answers are at times provocative, leading the questions in a particular direction. The last question, "Your findings seem to suggest that more education is needed for many wilderness users and possibly stricter controls?"

Answer -- "That's about it." The photography interspersed throughout the article is superb.

- 72 Burke, H. D.
 1969. Wilderness Engenders New Management Traditions. The Living Wilderness: Summer 1969, pp. 9-13.

Burke discusses the differences between public attitude and management practices and traditions. The setting aside of public land for wilderness and recreation has been rapid and management has been caught between the rock and the hard spot. On the one hand he is abused for being a "wilderness nut" and on the other hand he is being accused of unprincipled destruction. Burke explains how a management tradition develops over time and how such tradition is stronger than laws, regulations or

procedures. Whereas range or timber management is conducted in periods of a few years, wilderness management is thought of in terms of centuries. Burke basically points out the differences in management systems for recreation and wilderness. Differences which concern multiple use, environmental impact, research methods and objectives, management methods, and social studies.

- 73 Hendee, J. C.
 1970. Recreational Values, Use and Management of Natural Areas. Symposium Proceedings of the Northwest Scientific Association, 1970, pp. 35-38.

The two issues which Hendee discusses in this paper are: 1) the Wilderness Act provides for primitive forms of recreation on our wilderness areas but only to the extent that such recreation will not impair or jeopardize preservation of this resource; 2) most people are not really concerned with environmental causes, the environmental movement is yet an upper-middle class concern. Consequently, environmental education must proceed at an even faster pace if we are to protect our wildlands. Under present management levels, these lands and especially our true wilderness lands are in jeopardy.

- 74 Stankey, G. H.
 1971. Myths in Wilderness Decision-Making. Journal of Soil and Water Conservation, Vol. 26, No. 6, Sept. 1971, pp. 183-188.

Stankey urges further study into the values and uses of wilderness areas. In public forums, people are shouting down the wilderness concept with arguments which are erroneous or in the authors words "mythical." Stankey stresses that the Multiple-Use and Sustained Yield act of 1960 specifically mentions wilderness areas as a valuable use. Further, Stankey explains the necessity for good management of wilderness areas --

it is mythical to believe management has no roll in the wilderness.

Finally, he states that wilderness use is not reflected by the status or income levels of people but rather by their tastes and lifestyles.

- 75 Moir, W. H.
1972. Natural Areas. Science: Vol. 177, Aug. 1972, pp. 396-400.

Moir defines natural areas using six basic criteria. 1) they are part of a system, 2) Minimum disturbance by man is essential, 3) They are based on ecological criteria, 4) Members of the "natural area system" must be preserved, 5) They are primarily scientific and educational laboratories, and 6) they harbor genetic stock that may be valuable to society. Moir continues his discussion of natural areas with a rather comprehensive review of their history, present status, and future. Moir stresses the importance of maintaining natural areas in an undisturbed state, for they have a great potential value in monitoring the deleterious changes to our environment.

- 76 Dasmann, R. F.
1973. A Rationale for Preserving Natural Areas. Journal of Soil and Water Conservation: Vol. 28, No. 3, May 1973, pp. 114-117.

Dasmann reflects on the world priority for continued economic development. In commenting on the most recent U.N. Conference on the Human Environment, Dasman says, "The fiction that nations can continue to develop to ever-higher levels of material consumption without limiting their populations was widely approved." This article is devoted to the enlightenment of such remarkable ignorance. Dasman comments on the world's willingness to accept natural protection since the establishment of Yellowstone National Park. He then offers a primer on the functions

of the biosphere and important ecological principles. Finally, Dasmann explains the human need for nature and concludes that even the greatest advocates of economic development would recommend rational land use planning and controlled use of natural resources.

- 77 Goodman, G. L.
 1974. Land as a Resource for Terrestrial Ecology and/or Public Parks -- A Case Study. Bioscience: Vol. 24, No. 9, Sept. 1974, pp. 521-524.

Goodman presents an interesting and well-documented report on the conflict of scientific study areas and competing land uses. The author uses the lands surrounding the Argonne National Laboratory at Lalage, Illinois as his case study. The competition for these lands are from two interests, recreation and science. Legal issues predominate this report: issues which may provide precedents for future allocation of lands for scientific study. This is an enlightening article on a type of land use we often forget is necessary.

- 78 Gould, E. M., Jr.
 1975. Wilderness: What are the Opportunities. Journal of Forestry: Vol. 73, No. 1, Jan. 197, pp. 8-11.

This is a very interesting article that concerns wilderness, social welfare, energy, recreation and land use. Gould discusses the wilderness concept: how it developed its present services and capacities, and where it is going. Gould proposes that future trends will likely be overuse of areas in an urban proximity, greater social need for outdoor experience, fewer visits to areas in out-of-the-way locations, and fewer allocations of wilderness lands. These trends lead the author to believe that a positive approach is needed to bring urban dwellers to the hinterlands.

Gould recommends a program that will entice all of the young to partake in the outdoor experience. Beginning with neighborhood parks and educating our youth to the out-of-doors. Then progressively giving the youth more varied and extensive wilderness background through day camps, field trips and ultimately wilderness outings. Not only would such a system help preserve our wilderness areas, but quite possibly it would allow our wilderness heritage to grow. Certainly, the program would offer a cleansing of the spirit, revitalization of mind and body, and a clear perspective of American lifestyles.

3.3.2.5 Wildlife Areas

- 79 Hendee, J. C.
1969. Appreciative Versus Consumptive Uses of Wildlife Refuges: Studies of Who Gets What and Trends in Use. Transactions of the Thirty-fourth North American Wildlife and Natural Resources Conference. March 1969, pp. 252-264.

The primary objectives of the Wildlife Refuge System as stated by its Advisory Board is: "protecting and perpetuating migration waterfowl as subjects of hunting and objects of great public interest, preserving rare and endangered species, and providing public hunting." In terms of outdoor recreation benefit, the refuge system expounds a similar dicotomy of interest, consumptive and non-consumptive use. Hendee states "...policy decisions affecting appreciative and consumptive recreation uses must be based...on who will benefit and knowledge of participation trends."

- 80 Hendee, J. C. and Potter, D. R.
1971. Human Behavior and Wildlife Management: Needed Research. Transactions of the Thirty-sixth North American Wildlife and Natural Resources Conference, March 1971, pp. 384-396.

Hendee discusses the need for research into human behavior and wildlife management. The author lists the following topics as broad problem areas

in terms of human behavior studies: 1) hunting satisfaction; 2) non-consumptive use of wildlife; 3) hunter populations; 4) access and hunting opportunities; 5) wildlife economics; and 6) political-legal issues.

- 81 Allen, D. L.
1972. The Future of Wildlife Resources. Journal of Soil and Water Conservation. Vol. 27, No. 6, Nov. 1972, pp.

Allen discusses the present state of wildlife conservation and its foreseeable future. The author views the future of his profession with an attitude of "cautious optimism." First, there exists and will continue to exist ominous environmental pressures. Secondly, there should be continued and growing reaction to such pressures partly induced by a growing environmental awareness. The author describes in detail such subjects as wildlife benefits, policy and public interest, water-wildlife problems, farmland wildlife, forest and range wildlife, and important wildlife issues the public will be facing in years to come.

4.0 NATURAL RESOURCE DATA

4.1 RESOURCE INTERRELATIONSHIPS

- 82 Fisher, J. L., Clay, G., Lewis, P. H., Lord Holford, and Prendergast, J. 1962. Papers presented at the Texas Conference on Our Environmental Crisis. School of Architecture, University of Texas: Austin, 1965.

The following are papers which might appeal to landscape architects. Dr. Joseph L. Fisher, "Coping with Crisis in Natural Resources." Grady Clay, "Water Rights in an Urbanizing Society." Philip H. Lewis, "Environmental Values in the Paths of Progress." The Lord Holford of Kempton, "The Built Environment." Joseph Prendergast, "The Happy Environment -- Recreation and Parks."

- 83 Settergren, C. L. and Cole, D. M. 1970. Recreation Effects on Soil and Vegetation in the Missouri Ozarks. Journal of Forestry, Vol. 68, No. 4, April 1970, pp. 231-233.

The authors report on severe vegetative deterioration in several Missouri state parks. They discovered that subsoil moisture contents did not vary between plots subjected to user traffic and plots which remained in undisturbed areas. However, surface soils indicate surface compaction and sheet erosion, thereby, significantly reducing surface soil moisture. This phenomenon will definitely affect the establishment of grasses and groundcover. With more exposed soil and reduced infiltration, erosion will persist. The authors offer two recommendations. First, limit development to those soils (alluvial) that best withstand heavy traffic. Or, secondly, limit the number of users. Whether or not either recommendation will come to pass, the inordinately high cost of maintenance of those deteriorating areas will not cease. Another testimonial to designing without adequate analysis.

- 84 Odum, E. P.
1971. Fundamentals of Ecology. W. B. Saunders Company: Philadelphia, 1971, 574 p.

Odum divides his text into three parts. 1) Ecological principles and concepts. 2) "The Habitat Approach." 3) Ecological applications and technologies. One of the reasons his text is so popular, is because he introduces the reader to applied human ecology. Ecology is the study of the structure and function of nature. Landscape architects must understand that structure and function in order that they may better work with it.

- 85 Schilfgaarde, J.
1972. Soil and Water Conservation Research: Challenge for the 70's
Agricultural Engineering: April 1972, pp. 17,20.

This article briefly, but adequately, describes the accomplishments of soil and water research in such areas as soil erosion, nutrient loss, sludge management, feedlot management, and drainage management. The author has provided much information in a very short space.

- 86 Clawson, M.
1972. The Fitness and Flexibilities of Land Resources. Journal of Soil and Water Conservation: Vol. 27, No. 5, Sept. 1972,
pp. 202-206.

This five page article written in 1972 is perhaps one of the best summations of the present and future status of our land resources available. Clawson uses agriculture to explain the cause and affect relationships between natural resources and technology. Agricultural land demand will primarily depend on environmental constraints, technology, and our social structure. Forest land demand remains relatively untapped. Outdoor recreation land demand will continue to rise with increased emphasis on

user fees. Land use in general will remain relatively unchanged although local changes might be striking, especially for urban land demand.

- 87 Siccama, T. G.
1973. Vegetation, Soil, and Climate on the Green Mountains of Vermont. Ecological Monographs: Vol. 44, April 1973, pp. 325-349.

This is an interesting and rather technical report. The premise is that the transition zone between the Boreal Forest (upslope) and the Eastern Deciduous Forest (downslope) is climatically, not edaphically, controlled. Although the author's evidence is well composed, it remains unclear as to what is exactly the controlling factor. In other words, is any single factor of such significance as it could be entitled "the controlling factor." Basically there are four time continuums represented: Climate, Vegetation, Soil, and Geology. Each of these four factors is so inter-related with the other that it would appear to be extremely difficult to say which indeed controls the other.

- 88 Pahlsson, L.
1974. Relationship of Soil, Microclimate, and Vegetation and Sandy Hill. OIKOS: Vol. 25, pp. 21-34.

This study was conducted on the southern and northern slopes of a grazed hill in southern Sweden. Pahlsson found that the two slopes exhibited great differences in their vegetation, microclimate, and soil. The southern slope (warmer, drier, with high calcareous content) exhibited low and often sparse vegetation. The vegetation indicated extreme ecological conditions. The author also related the sandy soils of the study area to similar environmental conditions but different soil types in other study areas. Those areas with a silt or a silt loam soil will

exhibit different plant communities. This study is a very good example of the interrelationships of environmental factors on a micro-scale.

- 89 Russwurm, L. H. and Sommerville, E.
1974. Man's Natural Environment: A Systems Approach. Duxbury Press: North Scituate, Mass., 334p.

The authors present many scientific principles and facts via a framework which allows the reader a better understanding of the relationship of these principles to the environment. The book might have provided more continuity if the authors had written the text themselves. Fortunately, the topics discussed are both timely and well organized. The reader should better understand the relationships among the resources and subsequently with their relationships with the environment.

- 90 U.S. Department of Agriculture: Washington, D.C.
1974. Our Land and Water Resources: Current and Prospective Supplies and Uses. Misc. Pub. No. 1290, U.S. Department of Agriculture: Washington, D.C., May 1974, 53 pp.

This publication analyzes our land and water resources and projects our requirements for these resources for various land uses to the year 2000. Also discussed are the myriad of factors that will influence our supply of natural resources as well as the availability and quality of those resources. Federal, state, local, and private control of our natural resources are reviewed and the need for citizen participation and intra-governmental cooperation is emphasized.

- 91 Walmsley, M. E. and Lavkulich, L. M.
1975. Landform-Soil-Vegetation-Water Chemistry Relationships. Soil Science Society of America Proceedings: Vol. 39, pp. 84-93.

This study was conducted in the Mackenzie Valley in the Northwest Territories of Canada. The authors conducted this study by investigating the

relationships of landforms, soil, vegetation, and water chemistry along a transect from Cap Mountain (1170m) to a polygonal bog at the base of this mountain. This is a permafrost region in the boreal forests of Canada. Basically, the area studied represents five major land forms in a single topo sequence: Alpine meadow, stone strip and stonning, colluvial slope, coalescing fan, and polygonal bog. The authors believe that by understanding the coupling of the relationships of landforms, soil, vegetation, and water chemistry, one can gain a working relationship with a particular environment.

- 92 Whittaker, R. H.
1975. Communities and Ecosystems. MacMillan Publishing Company, Inc.: New York, 1975.

This text might be best received after an introductory course in general ecology; however, it is not essential. The author discusses basic population concepts as an introduction. He then presents fundamental concepts on communities and environments. The last four chapters cover production, nutrient circulation, pollution, and human ecology. This is a good text and would make good reference material. The reading is not overly difficult.

- 93 Voronin, A. D.
1975. The Energy State of Soil Moisture as Related to Soil Fabric. Geoderma: Vol. 12, No. 4, April 1975, pp. 183-139.

Voronin reports on soil moisture characteristics. Stating that the state of water in the soil is dependent upon the potential energy of retention at both the soil-water interphases and on the outer edge of water films. This soil energy depends on two factors: 1) soil fabric (size, shape, and arrangement of skeleton grains and soil aggregates);

and 2) moisture content. The following are Veronin's conclusions:

1) in loamy soils and especially in soils with clay fractions, the energy of water retention is also a function of the forces of the solid-water interface over a gradient of moisture contents; and 2) the active soil surface is a basic structural characteristic as well as a pore size distribution characteristic.

4.2 SOIL

- 94 Lutz, H. J.
 1945. Soil Conditions of Picnic Grounds in Public Forest Parks.
Journal of Forestry, Vol. 43, No. 3, March 1945.

This was one of the earliest studies on site deterioration in recreation areas, preceeded only by the authors earlier works and the work of Meinecke in 1928. This study was limited to the aspect of soil compaction as a result of user trampling. Lutz determined that sandier soils were not nearly as susceptible to compaction as the more silty and clayey soils.

- 95 Chepil, W. S.
 1958. Soil Conditions that Influence Wind Erosion. Technical
 Bulletin No. 1185, U.S. Department of Agriculture: Washington,
 D.C., June 1958, 38 pp.

Chepil goes into great deapth to cover the influence of soil conditions on wind erosion. The factors that primarily influence erodibility of the soil by the wind are as follows: size, shape, and density of erodible fractions; size and total volume of nonerodible fractions; soil moisture and rainfall effects; and mechanical stability and abrasability of soil structural units. The conditions which influence soil erosion include: soil that is finely devided, loose, and dry; smooth and bare soil surface; and strong winds. Conditions which prevent soil erosion include: stable aggregates or clods; compaction, roughening, or keeping soil moist; vegetative cover; and barriers to reduce velocity. Although there has been abundant work done in the area of wind erosion since this publication, it is a good primer on the subject and will provide a base for further study.

- 96 Lull, H. W.
 1959. Soil Compaction on Forest and Range Lands. Miscellaneous Publication No. 768, U.S. Department of Agriculture, Forest Service: Washington, D.C., Jan. 1959, 33 pp.

This publication is, in part, a technical publication, however, most of the information should be easily understood by most readers. Lull discusses three causative agents of soil compaction: logging, trampling, and rainfall impact. Next, Lull explains how certain site factors and soil factors relate to compaction. Also of interest, is Lull's explanation of soil-water, soil-vegetation, and soil-man relationships. This study is highly recommended for those interested in site relationships.

- 97 Williams, D. A., Hockensmith, R. D., Smith, V. W., Eikleberry, R. W. and Crabtree, R. D.
 1960. Five Articles concerning soils and land use. Soil Conservation: Vol. 26, No. 5, Dec. 1960, pp. 99-112.

The following list of articles and their authors appeared in the December 1960 issue of Soil Conservation. The titles are self-explanatory. The information will give a reader a greater insight into the value and use of Soil Survey information. 1) Williams, D. A., "Soils - The Key to Proper Land Use." 2) Hockensmith, R. D., "Soil Surveys Furnish Basic Data for All Land Uses." 3) Smith, V. W., "The Realtor's View About Soil Surveys." 4) Eikleberry, R. W., "By Reservation Only." 5) Crabtree, R. D., "Building Soil With Grass."

- 98 Bidwell, O. W., Hole, F. D.
 1965. Man As A Factor of Soil Formation. Soil Science: Vol. 99, 1965, pp. 55-72.

The authors discuss man's impact on soil. Each of the five soil forming factors is to some degree altered by man. In altering these critical factors, man has altered the soil; therefore, man also must be considered

a soil forming factor. Unfortunately, the impact of man is not as predictable as the influences of parent material, topography, climate, organisms and time. Man's impact may be slight compared to the impacts of the other five factors; but should his extremely complex alterations go unrecognized, his may very well be a most critical impact.

- 99 Klingbiel, A. A.
 1967. Know the Soil You Build On. Agriculture Information Bulletin No. 320. Soil Conservation Service, U.S. Department of Agriculture: Washington, D.C., June 1967, 14 pp.

Klingbiel presents many interesting examples of poor site selection for home building and discusses the soil factors as they relate to residential development. The graphics and photography successfully illustrate the importance of soil surveying prior to land buying. Since the time of this publication, much work has been done on soil suitabilities for residential development. This study would provide a very good basis for more recent works on this subject.

- 100 Dotzenko, A. D., Papamichos, N. T., and Romine, D. S.
 1967. Recreational Use on Soil and Moisture Conditions in Rocky Mountain National Park. Journal of Soil and Water Conservation: Vol. 22, No. 5, Sept. 1967, pp. 196-197.

The authors describe certain use-related changes in soil characteristics in three Rocky Mountain National Park campgrounds. The campgrounds represent a wide range of physiographic, soil, vegetative, and climatic conditions. The results of the study indicated that soil compaction; the resultant effect on infiltration, and the amount of forest litter appear to be the controlling factors. The authors use correlations and regression analysis techniques in arriving at these conclusions.

- 101 Simonson, R. W.
1968. Soil Resources in World Food and Fiber Production. Institute of Agriculture, University of Minnesota: St. Paul, 15 pp.

Simonson explores soils as a resource the world over. Concerning our present situation, he discusses the differing levels of technology and technology's affect on global food production. Concerning the future, he expresses the need for increasing yield and expanding crop acreages. Finally, Simonson reviews the needs in soil research. Besides continuing institutionalized research, he also recommends concentration in such areas as soil mapping, soil-plant relationships, tillage effects, and fertilizing methods.

- 102 Agricultural Experiment Station: Durham
1968. New Hampshire Soils. Research Rpt. No. 3, New Hampshire Agricultural Experiment Station: Durham. Oct. 1968, 25 pp.

This publication is a good primer on soil and its interpretive values. Soil-vegetation relationships are well developed and directly relate to the use of the Soil Survey and its application to the study of land use. The interpretations for urban and recreation are more expansive than the Kansas Soil Surveys. Also of interest are the soil-forestry relationships.

- 103 The Asphalt Institute
1969. Soils Manual for Design of Asphalt Pavement Structures. Published by Author, Feb. 1969, 269 p.

As a reference, this publication has more soil related material than the "PCA Soil Primer," although, it is not as easily understandable nor is it as well organized. A primer should remain a primer. This publication has perhaps gone a bit too far.

- 104 Gibson, J. S. and Batten, J. W.
 1970. Soils: Their Nature, Classes, Distribution, Uses, and Care.
 University of Alabama Press: University, Ala., 1970, 296 p.

This is a basic soil text that is geared to students who are not soil majors. It is easily understandable and presents only enough information that the reader does not become bogged down in too much detail. The sections pertaining to soil chemistry, soil uses and soil classifications would be of special value to those interested in soil science but who do not have necessary chemistry and agronomic background.

- 105 Magill, A. W.
 1970. Five California Campgrounds. U.S.D.A. Forest Service Research Paper PSW-62, Pacific Southwest Forest and Range Experiment Station, 1970, 18 p.

Magill describes a study undertaken in 1961 to observe and measure changes in campground habitat. This paper is the result of a part of that study. Five campgrounds and sites adjacent to these campgrounds were studied from 1961 to 1966. Magill evaluates factors responsible for changes in habitat, interpretations of the changes in campground conditions, and topics for future research. Barrier systems and public restraint from wood gathering and plant removal are essential. Expanded use of impact resistant plant materials, improved vegetation management and improved site design are also necessary. This is an interesting article and it would make a good reference for design and planting design.

- 106 Fenton, T. E., Dunca, E. R., Shrader, W. D., and Dumenil,
1971. Productivity Levels of Some Iowa Soils: Special Report No.
66, Cooperative Extension Service: Iowa State University,
23 pp.

The authors state that crop yields are influenced by many factors: soil type, slope, erosion, drainage, cropping pattern, fertility, crop variety, plant population, timeliness, and weather. The majority of these factors were used in the development of a Corn Suitability Rating (CSR) and yield estimates for corn, soybeans, oats, and hay. Yield estimates reflect soil, weather, and response to technology; whereas the CSR reflects the integrated effects of numerous factors, human and natural, that influence corn yields. Corn and soybean yields are reported to be more responsive to soil conditions, while oat yields are more responsive to weather conditions. Hay yields were estimated by a factoring system base on corn yields. The estimated yields in this report are for soil and weather conditions near the geographic center of the soil associations. Relatively high corn yields were reported over a wide range of soil conditions. Slope is the primary practical limitation. The cause of soybean yields being heavily affected by weather conditions is probably related to soil properties and moisture relationships. Oat yields were primarily related to weather in that it affects disease and maturity. Hay yields were found to be higher in the more humid areas of the state. This is a very good reference for the study of soil productivity and soil-crop-environmental relationships.

- 107 Hobbs, J. A.
1971. Soil Management. Published by the author, 1971, 419 p.

Dr. Hobbs publication would be a worthwhile addition to the Quinlan Library. Many of the problems incurred by the planner and designer are directly related to the soil. As a natural resource, soils require care and management. Hobbs book will serve as reference to those management techniques that will nurser or preserve that natural resource upon which everyone depends.

- 108 Olson, G. W.
1971. Using Soils as Ecological Resources. Information Bulletin No. 6, Cooperative Extension, Cornell University: Ithaca, Feb., 1971, 14 pp.

Olson has presented fifty photos with captions that relate soil to man and his landscape. These photos were made available in slide form to those interested. The photos as well as their descriptive caption would be a good teaching aid, especially for such disciplines as landscape architecture.

- 109 Bidwell, O. W.
1972. Development and Classification of Soils. Published by the author, 1972, 82 p.

This publication primarily concerns soil formation, soil properties, and techniques of soil mapping and classification. This book is both a text and a lab manual, and the information is presented in a precise manner allowing quick and easy reference. This publication is highly recommended to landscape architects and planners who wish to have a better understanding of soil properties and soil classification.

- 110 Thorud, D. B., and Duncan, D. P.
 1972. Effects of Snow Removal, Litter Removal and Soil Compaction on Soil Freezing and Thawing in a Minnesota Oak Stand. Soil Science Society of America Proceedings: Vol. 36, pp. 153-157.

Thorud and Duncan conducted a well executed experiment to better understand the relationships of snow removal, soil compaction, and litter removal on the freezing and thawing characteristics of sandy loam and loamy sand soils. Their conclusions were that snow removal had a most significant effect on soils-causing deeper and more persisting freezing. A litter layer will also retard thawing, as it acts as an insulator, much in the same way that it retards soil freezing in the fall and early winter. Laboratory tests suggested that increased density due to soil compaction had little effect on the depth of the frost layer; however, when compaction results in litter disturbance there is a significant increase in the depth of the frost layer. This study does have relevance to the design, management, and maintenance of recreation areas.

- 111 Buol, S. W., Hole, F. D., McCracken, R. J.
 1973. Soil Genesis and Classification. Iowa State University Press: Ames, 1973.

This text is concerned with the processes of soil formation or soil changes. To understand this process, you must understand the fundamental concepts of soil morphology or soil description. The authors proceed from this base to the soil forming factors. After discussing the processes of soil formation, the authors devote the remainder of the text to soil classification. This text would be a valuable reference for those with some soil background.

- 112 Portland Cement Association
1973. PCA Soil Primer. Published by Author, 1973, 39 p.

This publication can serve as a "primer" for the rudiments of soil science. It cannot serve as a soil reference in such areas as soil fertility, soil genesis, soil morphology. It is a good source for certain engineering properties of soils and it does present a few fundamental soil precepts which are easily understood.

- 113 Thompson, L. M., and Troeh, F. R.
1973. Soils and Soil Fertility. McGraw-Hill Book Company: New York, 1973, 495 p.

This is a text to be used primarily in agronomy. All aspects of soil genesis and soil morphology are described in detail, thus preparing the student for further lessons on soil fertility, classification and management. This text should be used as a reference.

- 114 Ayres, K. W., Button, R. G. and DeJong, E.
1973. Soil Morphology and Soil Physical Properties. Canadian Journal of Soil Science: Vol. 53, Feb., 1973, pp. 9-19.

This is a technical paper that would be of little interest to planners. However, the results of the authors research are of value in so far as soil-vegetation relationships are concerned. The authors concludes that soil structure does relate to mechanical impedance and hydraulic conductivity. Specifically, soils with a well-developed columnar structure can be detrimental to root growth.

- 115 Childs, E. C. and Young, E. G.
1974. Soil Physics: Twenty-Five Years On. Journal of Soil Science: Vol., 25, No. 4, pp. 408-419.

This article is quite technical. Of interest, however, is the progression of soil physics from the late forties to the early seventies. Also of

interest is the authors discussion on the subject of soil texture. Textural assessment has been a nemesis to the empirical discipline of soil science which the authors believe is removed from the discipline of agronomy. The authors are referring to mechanical testing and measuring versus the field testing relied upon by such professionals as soil surveyors.

- 116 Volobuyev, V. R.
 1974. Main Concepts of Soil Ecology. Geoderma: Vol. 12, No. 4, pp. 27-33.

Volobuyev is a Russian following in the footsteps of his renowned predecessors, Dokuchaev, Wysotsky, and Sibirtsev. He and his colleagues, Ehwald and Jenny, have made significant advancements in the field of soil ecology in the last few decades. This report brings these advancements into focus so that the reader may gain a better perspective of this study area. Defining soil ecology as "the study of regular correlations between the soil and its environment," Volobuyev proceeds to discuss and elaborate upon these correlations.

- 117 Ruhe, R. V.
 1974. Holocene Environments and Soil Geomorphology in Midwestern United States. Quarterary Research: Vol. 4, Dec. 1974, pp. 487-494.

Ruhe reports that the Holocene Epoch has received little emphasis in Quarterary geologic studies. Yet much of the landscape of the mid-western U.S. was developing during this time. Ruhe emphasizes the local effect of Holocene development along soil geomorphic units (similar to toposequences or soil catenas depending upon the discipline

of study). This unit encompasses time, lithology, landscape, and soils and, according to Ruhe, will provide a means for mapping the Holocene on the landscape. This study provides interesting insight into the formation of the midwestern landscape. The data that was most widely used throughout this study was extracted from Soil Surveys.

4.3 VEGETATION

- 118 LaPage, W. F.
 1962. Recreation and the Forest Site. Journal of Forestry: Vol. 60,
 No. 5, May 1962, pp. 319-321.

This was one of the first studies to determine the effects of concentrated recreation use on recreation site. LaPage wished to determine if overuse actually affected the physical site - it had been previously established that overuse was directly accountable for aesthetic deterioration. His conclusion was that it is highly probable that recreation pressures have an adverse effect upon the diameter growth of the white pines surrounding certain study plots. Therefore the deterioration is more than the aesthetic loss of ground cover, for recreation pressures will adversely affect the site index (a multiplicity of natural factors).

- 119 Rickman, R. W., Letey, J., and Stolzy, L. H.
 1966. Compact Subsoil Can Be Harmful to Plant Growth. Parks and Recreation: Vol. 1, April 1966, pp. 334-335.

The authors are primarily concerned about land preparation in housing developments and in recreation areas. In moving surface soils two problems arise. First, more dense subsoils are often brought closer to the surface, and secondly, heavy equipment often leave topsoil in a compacted state. The effect of this compaction upon plant growth can be severe. The authors conducted experiments to test these effects and their conclusions were well substantiated. Compacted layers will act as physical barriers in root development for young shrubs and trees. The compacted layer also results in excessive moisture accumulation thereby decreasing the oxygen content of the compacted layer. To improve soils

with compacted layers the authors recommend either deep cultivation or drilling and using vertical mulching. A better solution, however, would be preventive maintenance, i.e., more care in site preparation.

- 120 Grether, T.
1966. Your Turfgrass Headache: What Variety? Parks and Recreation: June 1966, pp. 504-505.

The basic question one must ask before selecting a groundcover is: is it to be looked at or walked on? The author firmly stresses the importance of the intended use. He further stresses the use of soil studies in narrowing the selection of a turf grass. Breaking down the classification of turf grasses into warm-season and cool-season grasses, the author discusses the characteristics of varieties associated with these turf grass types. Although this article is rather brief, it should be extremely informative to those who have not studied turf grasses.

- 121 Stoeckeler, J. H.
1968. Skeletons in the Roadbuilders' Closet. Landscape Architecture Quarterly: Vol. 58, No. 2, Jan. 1968, pp. 114-116.

Stoeckeler relates the unsightly skeletal remains of wetland timber to man's inexcusably poor design. Where water tables are close to the surface and where culverts drain poorly, the road acts as a dam and raises the groundwater level. Hence, prolonged submergence of root systems drown the trees. Effective design can usually cure the problem; and where it cannot be cured trees should be felled and hydrophytic plants should be introduced. This article should be of interest to landscape architects and highway engineers.

- 122 Cordell, H. K.
 1969. Planting Grass Appears Impractical for Improving Deteriorated Recreation Sites. Research Note SE-105. USDA Forest Service, Southeastern Forest Experiment Station, Asheville, N.C., Feb. 1969, 2 p.

A definite need exists for reestablishing overused recreation sites. The author conducted a study on heavily used recreation sites in two recreation areas in Georgia and Tennessee. All sites are on a slightly acid sandy loam and capable of growing good stands of grass. Thirteen units on each site were planted with various mixtures of recommended grasses. The sites were to be observed over a three year period and continued treatment of cultivation, mulching, fertilizing, and watering was conducted. In less than three years, practically all grass was killed on all sites. The experiment was obviously unsuccessful; however, such alternatives as spreading sawdust, gravel, sand or various combinations of these materials do exist. The study may have been more conclusive had the author used different soil types. Sandy loams can be rather unstable to foot traffic.

- 123 Fryrear, D. W., and McCully, W. G.
 1972. Development of Grass Root Systems as Influenced by Soil Compaction. Journal of Range Management: Vol. 25, pp. 254-257.

Fryrear and McCully have studied the growth characteristics of sideoats grama in west Texas. They conclude that compaction resulting from tillage and extensive hoof traffic significantly altered forage yield. Although the emergence count was not affected both fibrous roots of grasses and tap roots of many crop plants were significantly inhibited. Growth rates were slower and mortality rates increased. To overcome compaction, the authors recommend preplant tillage and various chiseling practices.

This is a good management reference, especially in areas where recreation-range management conflicts exist.

- 124 Cook, D. I. and VanHauerbeke, D. F.
 1972. Trees, Shrubs, and Landforms for Noise Control. Journal of Soil and Water Conservation: Vol. 27, No. 6, Dec. 1972, pp. 259-261.

The authors present a study of the sound attenuating properties of trees and shrubs. Included in this study are the results of a companion study on noise control using forested land forms. The recommendations include procedures for selection and optimum placement of tree structures, and tentative procedures for sizing and placement of various combinations of trees, shrubs, and land forms. The study primarily concerns noise control in urban areas. Sound levels from both high speed and moderate speed traffic were used. This study should be of value to landscape architects.

- 125 Aldon, E. F.
 1973. Revegetating Disturbed Areas in the Semiarid Southwest. Journal of Soil and Water Conservation, Vol. 29, No. 6, Sept. 1973, pp. 223-225.

Aldon describes a study conducted on a watershed in an area receiving less than 10 inches of rainfall per year. Two plants native to the study area were observed to determine their usefulness for watershed rehabilitation. The plants were fourwing saltbrush (*Atriplex canescens*), and alkali sacaton (*Sporobolus airoides*). The author concludes that these plants were successful and would be very useful in rehabilitating such areas as coal spoil banks, new roadcuts, large subdivisions, overgrazed ranges, and other areas needing soil stabilization.

- 126 Willis, A. J. and Grubb, P. J.
 1974. The Behavior of Seeds in Soil. Journal of Ecology: Vol. 62,
 No. 1, pp. 47-65.

Willis and Grubb thoroughly explore the effect of a soil surface on the germination of a seed. Their discussion of the soil "microtopography" is very revealing. The factors which influence both germination and establishment include: soil compaction, soil crusting, and raindrops. This report is interesting reading and although the results are already well established the exact mechanics were previously unknown. This report sheds a great deal of light on this subject.

- 127 Foose, D. R.
 1974. Center Focuses on Conservation Plants. Soil Conservation:
 Vol. 40, No. 2, Sept. 1974, pp. 4-5.

The Soil Conservation Service's National Plant Materials Center in Beltsville, Md. started in 1938. Presently it is just one of twenty centers located throughout the country. Conservation uses for which they test plants include: stabilizing waste disposal sights, extending grazing seasons, improving windbreaks and shelterbelts, reducing air pollution, reducing wind and water erosion, and reducing snow drifts. This article lists some examples of conservation plants released through plant material centers. This is an interesting and informative article.

- 128 Hill, J.
 1974. Trees Play a Critical Role in Processes Within the Stream Itself.
 Soil Conservation: Vol. 40, No. 3, Oct. 1974, pp. 12-16.

This study should be read by all landscape architects. The article is an interview with Dr. Robin Vannote, a stream and river ecologist and head of the Stroud Water Research Center. Dr. Vanote discusses the

ecology of freshwater streams in a manner understandable to most readers. The effects of stream bank vegetation, especially trees, plays a major role in explaining how a stream ecosystem forms a continuum from headwaters to downstream river waters. By reading this article, one gains a good understanding of the importance of trees and how proper stream bank management and planning can effect the ecosystem of an entire stream. Hill provides a great deal of information in a very short space.

- 129 Wilkum, D. A. and Wali, M. K.
 1974. Analysis of a North Dakota Gallery Forest: Vegetation in Topographic and Soil Gradients. Ecological Monographs: Vol. 44, Fall 1974, pp. 441-464.

This is a highly technical study of vegetation-environmental relationships. The authors use correlation analysis and multiple regression analysis to determine which, if any, environmental characteristics are indicators of the presence or absence of certain types of vegetation. The conclusions reached by the authors are significant and could be of interest to the landscape planner. Studies such as this one have been conducted on various ecosystems in various parts of the country. A knowledge of the results of these studies would provide valuable information for the landscape architect, and would provide for better site analysis and site requirements for plantings.

- 130 Cordell, H. K., James, G. A., and Tyre, G. L.
 1974. Grass Establishment on Developed Recreation Sites. Journal of Soil and Water Conservation: Vol. 29, No. 6, Nov. 1974.

This is one of the more recent studies on the management of recreation sites. The problem is concentrated recreation use and limited operating

and maintenance budgets. The results are the trampling and killing of understory vegetation, soil compaction, and erosion. The primary objectives of this study were fourfold. 1) which is more successful, selected grass species or indigenous species? 2) If selected species are preferable, which is best suited for recreation sites? 3) Would thinning the tree canopy aid in the establishment and maintenance of turf grass? 4) What is the time necessary for optimum development of ground cover?

The authors felt secure only in respect to answering the last two questions. Sown grasses decreased over time with a continued heavy influence by invading volunteer grasses. However, it may be wise to initially introduce selected species while volunteer grasses are establishing themselves. There was no significant difference in the success of the three grass species used. Although, after five years Kentucky bluegrass and tall fescue did show better survival rates than the shade fescue. Reducing the canopy cover to 60 percent doubled the grass cover produced under a 90 percent canopy. A reduction to 30 percent canopy more than tripled the grass production. Finally, there appeared to be very little cause for establishing groundcover more than one year in advance of opening a recreation site. One year appeared to be an optimal time for establishment.

131 Agricultural Group

1974. Symposium on Control and Quantitative Description of Root Development in Soil. Journal of the Science of Food and Agriculture: Vol. 25, 1974, pp. 231-235.

Seven papers are summarized by their authors. Such parameters as soil compaction, nutrient levels, and other environment influences are discussed. The summaries are rather technical and therefore may or may not provide significant information to a reader not having some knowledge of soil and plant science.

- 132 McIntosh, R. P.
1974. Plant Ecology: 1947-1972. Annals of the Missouri Botanical Garden: Vol. 61, No. 1, 1974, pp. 132-165.

McIntosh discusses the growth and development of the study of plant ecology. The author divides this discipline into specialty areas providing a comprehensive and thorough treatment to the topic of plant ecology. According to McIntosh, the discipline of plant ecology is largely becoming an applied science; emphasis is therefore needed on more of the quantitative, theoretical, and ecosystem ecology which once made up a science of ecology.

- 133 Sonesson, M.
1974. Late Quaternary Forest Development of the Torneträsk Area, North Sweden. OIKOS: Vol. 25, pp. 121-133.

This study provides an interesting look into the structure of modern forest ecosystems. By studying the forest types (four heath types and two meadow types) and their historical development following the Pleistocene Epoch, the authors were able to relate the vegetation to differences in moisture, nutrient conditions, snow cover, and other biotic influences. This study is brief but does enlighten the reader on environmental relationships and ecosystem development.

- 134 Journal of Food and Agriculture
1974. Symposium on Control and Quantitative Description of Root Development in Soil: Summary papers. Journal of Food and Agriculture: Vol. 25, pp. 231-235.

Seven papers are summarized. Topics include: "Hormonal Control of Root Development" (Hall, M. A.); "Root Growth of Different Species and Varieties of Cereals" (Welbank, P. J.); "Proportion of Assimilates Supplied to Roots" (Rees, A. R.); "Mathematical Descriptions of Root Systems in

Soil," (Page, E. R., Gerwitz, A.); "Development of Perennial Root Systems" (Reynolds, E. R. C.); "Inorganic Nutrient Levels and Root Development" (Drew, M. C.); "Soil Mechanical Properties and Root Growth" (Payne, D.). Of interest to readers is that each of the summaries discusses the work that is going on in each area. The only value that this article might have would be to give the reader a cursory glance of environmental relationships within root systems.

- 135 Lowry, G. L.
 1975. Black Spruce Site Quality as Related to Soil and Other Site Conditions. Soil Science Society of America: Vol. 39, pp. 125-131.

This study was conducted in the Continental and Atlantic Regions of eastern Canada. Lowry describes the relationships between site factors and site indices of black spruce. His conclusions were that extensive mapping of site productivity should primarily rely on landform, associated soils, and geologic formations. This study substantiates previous studies (Gimbarzsky, 1968; Hills, 1952). Only a few factors studied had predictive values; whereas, all of the previously mentioned factors along with moisture regime and nutrient regime proved to be of important site classification factors.

4.4 WILDLIFE

- 136 Odum, E. P. and Davis S.
1969. More Birds in the Bushes from Shrubs in the Plans. Landscape Architecture Quarterly: Vol. 60(1), Oct. 1969, p. 36.

In this rather brief paper, Odum and Davis have successfully related to the reader the need for an intermediate shrub layer in our urban and suburban landscape. By intermediate shrub layer the authors refer to woody plant growth higher than groundcover and lower than a medium-sized tree. The authors conclude that the average nesting height of birds are approximately 8 feet. Davis concluded from her study that the diversity index for all shrubs observed on the University of Georgia campus was significantly greater than either grass or tree habitats. The authors list many bird species and their shrub habitats which may be of benefit to the landscape architect.

- 137 Committee on Agricultural Land Use and Wildlife Resources
1970. Land Use and Wildlife Resources. National Academy of Sciences: Washington, D. C., 1970, 261 p.

The following is a list of topics covered in this document: 1) historical background; 2) wildlife values today; 3) wildlife and land management; 4) water, watersheds, and wildlife; 5) wildlife and pesticides; 6) wildlife as predictors; 7) wildlife and legislation. This is a very informative and enlightening book, one that is recommended to all planners and designers.

- 138 Ritchie, J. C.
1972. Sediment, Fish, and Fish Habitat. Journal of Soil and Water Conservation, Vol. 27, No. 3, May 1972, pp. 124-125.

Ritchie briefly but skillfully describes the damaging effects of sediment either directly upon the physiology of fish or indirectly upon

their habitat. Ritchie concludes that the ecological effects are probably greater than direct physiological effects. However, the combination of both effects produces an even greater stress on fish populations. Such stress tends to alter populations, either in numbers or dominant species, thereby altering the entire aquatic ecosystem. This is an interesting and informative publication.

- 139 Crawford, H. S., Hooper, R. G. and Harlow, R. F.
1973. Campgrounds and Bird Sounds, Virginia Wildlife: Vol. 34,
No. 5, May 1973, pp. 22-27.

This publication is a guide for outdoor recreation users in the Southeastern Forest Region. The authors divide this region into five forest communities and describe these communities in terms of their vegetative structure, bird habitats, and bird species. The five communities are conifers, deciduous hardwoods, conifer-hardwood, cove-hardwoods, and park-like lands.

- 140 Lotrich, V. A.
1973. Growth, Production, and Community Composition of Fishes Inhabiting a First-, Second-, and Third-Order Stream of Eastern Kentucky. Ecological Monographs: Vol. 43, No. 3, Summer 1973, pp. 392-376.

Although the methods and terminology used in this study are rather technical, Lotrich offers a great deal of information on fish habitat that could be useful to those interested in the study of fresh water streams. The author's conclusions are interesting. He postulates that a stream order in most cases represents a biological unit. Each unit can be subdivided into "microhabitats" based upon riffle, pool, type and substrate.

- 141 Hooper, R. G., Crawford, H. S. and Harlow, R. F.
 1973. Bird Density and Diversity As Related to Vegetation in Forest Recreation Areas. Journal of Forestry: Vol. 71, No. 12, Dec. 1973, pp. 766-769.

This is an interesting study of bird habitats that could be very useful to the landscape planner and designer. The following are a few of the conclusions reached by the authors: 1) foliage less than 12 feet high accounted for 56 percent of the density variation of nesting birds; 2) coniferous and deciduous foliage greater than 12 feet high accounted for 66 percent of the variation in diversity of birds; 3) clumping of understory foliage is important to birds in open, parklike recreation areas. Numerous recommendations were given in regards to planning and layout of recreation areas to accommodate maximum wildlife interest.

- 142 Hickey, Joseph J.
 1974. Some Historical Phases in Wildlife Conservation. Wildlife Society Bulletin: Vol. 2, No. 4, pp. 164-170.

This historical study not only describes the birth and growth of the wildlife movement, but it also describes similar growth patterns of other conservation movements. Hickey states that all major conservation efforts begin with an "awareness phase," continue through an "action level phase," and culminate in an "ecological phase." Such conservation movements include: wildlife, forestry, soil, water, and landscape. In the last decade, the atmosphere, energy and food conservation movements have begun to evolve.

4.5 GEOLOGY

- 143 Thornburg, W. D.
1969. Principles of Geomorphology. John Wiley and Sons, Inc.:
New York, 594 p.

This basic text on the discipline of geomorphology is well written and well organized. It is packed with facts and would make an excellent reference. Thornbury's discussions of philosophies and theories concerning earth forms are very readable and quite informative.

- 144 McComas, M. R., Hinkley, K. C. and Kempton, J. P.
1969. Coordinated Mapping of Geology and Soils for Land-Use Planning.
Illinois State Geological Survey: Urbana, Dec. 1969, 11 pp.

This study primarily discusses the relationships of soil data and geologic data. The implications of the coordination of soil and geologic resources are very significant, especially in studying structural limitations, fertility, water quantity and quality. The implications for land planning are also significant. Water availability, flood hazard, foundation conditions, road location, ground water and surface water pollution are only a few of the many possible uses.

- 145 Flawn, P. T.
1970. Environmental Geology: Conservation, Land-Use Planning and Resource Management. Harper and Row: New York, 1970, 313 p.

Flawn begins with a summary of the fundamentals of geology with some emphasis on soil science. Next he discusses certain endogenic and exogenic processes. The next five chapters involve the applied science of geology: geology as a resource, man as a geologic agent, geology and conservation, and the application of geologic data. This text would serve as a very good reference in areas of planning and design.

- 146 U.S. Departments of the Interior and Housing and Urban Development
1971. Environmental Planning and Geology. Proceedings of Symposium on Engineering Geology in the Urban Environment. U.S. Departments of the Interior and Housing and Urban Development: Washington, D.C., Dec. 1971.

This is one of the best sources available concerning geology and planning. Since this publication, there has been much more material published. The publication is divided into three principle parts: "Problems to be Faced," "Distribution of Responsibility for Solving the Problems," "The Use of Engineering Geology in Urban Planning." Engineering Geology is a fast-growing profession, and environmental awareness has been a strong catalyst to this growth. Courses in environmental geology are relatively new and have been a spinoff of the new influence of geology to planning and development. This is a very good reference, but a follow-up of more recent work is certainly recommended.

4.6 WATER

- 147 Mackenthun, K. M. and Ingram, W. M.
1967. Biological Associated Problems in Freshwater Environments,
U.S. Department of the Interior: Washington, D.C., 1967,
266 pp.

This is a text which discusses the identification, investigation, and control of problems concerning the biota in flowing streams, lakes, reservoirs, and ponds. "This book is for the person who must identify, investigate, relate, interpret, and control biological problems as they may relate to recreational water quality." Water is becoming an increasingly valuable natural resource without which we cannot survive. It should be of critical importance to the planner and designer to understand its basic quantitative and qualitative properties.

- 148 Hem, J. D.
1970. Study and Interpretation of the Chemical Characteristics of Natural Water. Geological Survey Water-Supply Paper 1473,
Department of the Interior: Washington, D.C., 1970, 363 p.

This text is relatively up-to-date and provides valuable information pertaining to water studies. The information is, at times, technical and would require a reader to have some background in chemistry. However there are two sections of this text that provide fundamental but valuable data relating to water. Pages 40 through 50 concern environmental influences upon water composition. Pages 287 through 336 cover the relationships of water quality to rock composition, influences of human activity, water quality and land use, and water-management concepts.

- 149 Swift, L. W. and Messer, J. B.
 1971. Forest Cuttings Raise Temperature of Small Streams in the Southern Appalachians. Journal of Soil and Water Conservation: Vol. 26, No. 3, June 1971, pp. 111-115.

Swift and Messer report the effects of clear-cutting on stream temperatures in small watersheds. Where all vegetation (forest trees and understory to include riparian vegetation) were cut, maximum summer stream temperatures increased from 66°F to 73°F. Where streambank vegetation was uncut, summer maximums remained unchanged or declined. Under clear-cutting management, water temperatures exceeded optimum levels for trout habitat.

- 150 Creath, W. B. and Troell, A. R.
 1972. Altering Surface Drainage for Better Land Use. Urban Land: Vol. 31, No. 5, May 1972, pp. 9-18.

This is quite an extensive study on the effects of drainage and its relationship to urban design and engineering. The article presents a good brief on fundamental hydrologic principles with good graphics and photography that aid the reader in better understanding these principles and problems related to drainage. The authors also present a few recommendations which outline in detail needed measures for flood plain management. This is a very informative report which would be a valuable addition to a suggested reading list for landscape architects.

- 151 Leopold, L. B.
 1974. Water--A Primer. W. H. Freeman and Company: San Francisco, 1974, 171 p.

This brief text was especially written as a supplementary text. It does, however, touch upon most all aspects of water resources. The hydrologic cycle, surface water, and ground water are explained in

enough detail that the author can continue with such topics as flood-plain and flood water characteristics, sediment load, and inter-relationships between water, soil, and vegetation. Finally, Leopold discusses water availability and water consumption. This is a highly recommended book for those who know little about our water resources.

- 152 American Society of Civil Engineers
 1974. Report, International Workshop on the Hydrological Effects of Urbanization: Warsaw, Jan. 1974, 61 pp.

This report outlines the basic hydrologic problems that confront our urban areas. The following topics are discussed: urbanizations, environmental impact, urban hydrology, and urban hydrological research and development. This is a pressing issue, for urban hydrologic studies have lagged far behind catchment studies. As water becomes an ever more valuable resource, the need for better understanding this resource will continue to increase. This report is not written in too technical a language and would therefore be a valuable reference to the landscape architect. Included is a very useful glossary of terms.

- 153 Garriot, R. E.
 1974. Small Urban Lakes: Problems and Possible Solutions. Urban Land: Vol. 33, No. 6, June 1974, pp. 16-17.

This is an interesting study of small lakes which pervade many of the newer urban, suburban, and "new town" developments. Garriot states that the single prevailing cause of the very short life spans of these lakes is uncontrolled sedimentation. This sedimentation also contributes to eutrophication of these lakes. The combined causes of sediment buildup and eutrophication are largely a result of poor planning,

design, and construction techniques. The author describes methods by which erosion can be minimized. This article provides valuable information to the planner and designer. Although the explanation of sedimentation and eutrophication is very brief, it provides an adequate basis for further study if the reader so desires.

- 154 Massie, L. R. and Bubenzer, G. D.
 1974. Improving Roadbank Erosion Control. Journal of Soil and Water Conservation: Vol. 29, No. 4, July 1974, pp. 176-178.

This report was a result of a study conducted in Wisconsin in 1968 with a follow-up survey in 1972. Initially a survey was conducted to determine potential erosion hazards on roadbanks along state, county, and town roads. The follow-up survey in 1972 was conducted to see if the 1968 report with findings were being used to improve roadbank conditions. The greatest erosion potential existed in towns which did not keep pace with state and county improvements. This report points out glaring examples of roadside conditions which cause heavy erosion potential. Included in these causes is poor planning and design.

- 155 Kimpe, C. R., MacKeague, J. A. and Topp, G. C.
 1974. Soil Properties in Relation to Water Regime at a Site Near Quebec City. Canadian Journal of Soil Science: Vol. 54, No. 4, Nov. 1974, pp. 427-447.

This is a rather technical study to determine the relationship between the soil water regime and soil morphology. The study consists of testing soil properties and the reaction of these soil properties to the dynamic changes in the soil water regime. The results of the study suggest various methods for improving the management of the soils

studied. For example, it was discovered that drainage limited to the surface layers might significantly improve water management rather than the use of typical entrenched drain tiles. Other results suggest that better understanding of the water regime of certain soils may very well lead to improved soil interpretation and soil management.

4.7 CLIMATE

- 156 Bach, W.
 1971. Seven Steps to Better Living. Landscape Architecture: Vol. 61, No. 2, Jan. 1971, pp. 136-138.

This study centers on the heat island effect or the green house effect. Basically, it involves solar radiation, reradiation from polluted atmospheres, and artificial heat generated within an urban area. Vegetation is a prime factor in combating the effects of a heat island. The author specifically recommends man-oriented planning in the location of residential developments and the use of buffer strips of vegetation.

- 157 McDole, R. E. and Fosberg, M. A.
 1974. Soil Temperatures in Selected Southeastern Idaho Soils: II. Relation to Soil and Site Characteristics. Soil Science Society of America Proceedings: Vol. 38, pp. 486-491.

The data presented in this paper indicate the existence of some interesting relationships between mean annual soil temperatures (MAST) and soil and site characteristics. This study shows that MAST is directly related to elevation (Elev ↑: MAST ↑). MAST is also related to the presence of groundwater (Good → Poor Drainage: MAST ↓). The mean summer soil temperature (MSST) decreases in going from a well-drained soil to a poorly drained soil; however, the mean winter soil temperature (MWST) increases over the same drainage gradient. Although it is not conclusive, south-facing slopes and coarse soil texture gave indications of slightly increased MAST over nearly level slopes and medium textured soil. North-facing slopes show decrease MAST over nearly level slopes.

158 American Meteorological Society

1975. Symposium papers, Bulletin of the American Meteorological Society: Vol. 56, No. 1, Jan. 1975, pp. 114-115.

Two papers whose summaries were published may interest planners and designers. DR. R. Miller presented a paper entitled "Microclimate at an Oak Forest-Asphalt Parking Lot Interface." Miller concludes from his study that significant amounts of heat are directed from the parking lot into the adjacent tree stand. R. D. Burman, et al., presented a paper entitled "Inadvertent Climate Modification Near the Surface of a Large Irrigated Area." Burman concludes that large scale irrigation will increase the frequency of thunderstorms as well as regulate thunderstorm activity. Papers such as the above will likely play a more significant role in landscape design as more is understood of microclimate effects upon the landscape.

5.0 ENVIRONMENTAL MANAGEMENT/PLANNING/DESIGN

5.1 INFORMATION SYSTEMS

5.1.1 CLASSIFICATION METHODS

- 159 Vermont Research Center
 1967. Scenery Classification. Agricultural Experiment Station,
 University of Vermont: Burlington, Rpt. No. 18.

This scenery classification system is based on two fundamental concepts:
 1) surface area of a scene; and 2) variety of items of interest which can be seen. The area of a scene can be subclassified as to distance viewed (depth), width of viewing angle, and vertical viewing angle. Variety of items can be subclassified by special interest and eyesores. Each of these factors is rated based on a predetermined rating system. Eyesores can be subjectively recorded or recorded by a survey of randomly selected people. The system does not appear to be an overly objective scenic classification system but it does offer ideas for those who may wish to research this subject.

- 160 Hart, W. J. and Graham, W. W.
 1967. How to Rate and Rank Landscape. Landscape Architecture: Vol. 57, No. 2, Jan. 1967, pp. 120-122.

This is an interesting study of a method to classify recreation lands. This study was a portion of the Canadian Land Inventory which began in 1962 with the classification of land base on agricultural capability. The authors realized that recreation lands were almost always best suited in areas of significant relief. They surmized that by working with slope and water combinations in consort with landforms they could adequately identify potential recreation sites. Predictably, after mapping with this method, a great percentage of the features considered

prime for recreational use were included in areas of varied landforms. With further analysis into each area and necessary climatic data they were able to accurately map regions based on recreation capability.

- 161 Burke, H. D., Lewis, G. H. and Orr, H.
1968. A Method for Classifying Scenery From a Roadway. Park Practice Guideline: March 1968, pp. 127-141.

The authors describe a method for classifying scenery. The basis for this method is termed "characteristic" landscape. This is the normal landscape for that region. For each view (arc is variable) there are three zones: "roadside zone" - detail can be seen; "outer zone" - from roadside zone to normal horizon; "far zone" - distant views rise from horizon. The view in each zone is then classified in one of five ways: (+1), natural or man-made beauty superior to "characteristic landscape;" (C), view is the characteristic landscape; (-1), a work of man detracts from characteristic landscape; (N), a work of man is neutral or attractive; (X), zone is not visible.

- 162 Cressman, D. R. and Hoffman, D. W.
1968. Classifying Land for Recreation. Journal of Soil and Water Conservation: Vol. 23, No. 3, May 1968, pp. 91-93.

This article is in reference to the Canada Land Inventory which was one of the first projects initiated under the Agricultural Rehabilitation and Development Act. Its primary objective is to identify, quantify, and qualify Canada's land resources for agriculture, forestry, wildlife and recreation. It was therefore necessary to classify lands according to capabilities. The classification systems for all four land uses had certain similarities, for example, each system has seven classes. Classes 1 and 2 pertain to land of high capability; classes 3 and 4 are lands

of moderate capability; classes 5 and 6 are lands of low capability; and class 7 pertains to lands of very low capability. Twenty-five recreation subclasses were recognized and defined in terms of their resource requirements. The author emphasizes two points: 1) land areas are rated on their capability of supporting recreation in general; 2) consequently, this classification system is generalized to the extent that it could not be used as a basis for detailed site planning. The system should only be used to formulate recreational development and management policies and programs. Its proper use should not allow recreational development to occur on poorly suited resources.

- 163 Parry, J. T. and Beswick, J. A.
 1973. The Application of Two Morphometric Terrain-Classification Systems Using Air-Photo Interpretation Methods. Photogrammetria: Vol. 29, No. 5, Oct. 1973, pp. 153-186.

The authors discuss the advantages of using aerial photographic interpretation as a method of terrain analysis. The authors are convinced that morphometric studies of topography are far more advantageous than traditional landscape analysis methods. Further, the authors believe that the use of air photo interpretation is more advantageous than the use of topographic surveys for morphometric studies. The advantages of the parametric approach (a broad term encompassing morphometric studies) over landscape approaches include: 1) greater precision in describing terrain attributes; 2) greater consistency in evaluation and therefore greater comparative advantages; 3) greater adaptability of data for computer use and statistical evaluation; and 4) greater adaptability for use with remote-sensing techniques. All of these advantages are a result of the quantitative nature of the parametric approach. The authors go on

to prove that the parametric approach can also be improved by use of aerial-photo interpretation.

- 164 Rozhkov, V. A.
1974. Coordinate-Statistical Approach to the Objective Classification of Soils. Geoderma: Vol. 12, No. 4, pp. 175-182.

This is a highly technical report on a specific statistical method used to classify "soil objects (soils, profiles, and horizons)." The results indicate that coordinative analysis and statistical solutions are promising for future use as a numerical classification tool. Bidwell and Sarkar were pioneers in the area of numerical classification of soils, and this study is one of the more recent follow-ups on their work.

- 165 Crossman, L. S. and Protz, R.
1974. Quantitative Comparison of Two Closely Related Soil Mapping Units. Canadian Journal of Soil Sciences, Vol. 54, Feb. 1974, pp. 7-15.

This technical study in its entirety would not be useful reading. However, the authors' conclusions are interesting and may prove to be of value to planners. The problem confronted by the authors is not uncommon to soil surveyors, for it involves the question of the number of samples needed to delineate a soil mapping unit. The authors conclude that on particular mapping units in southern Ontario two soil series cannot be separated by the testing of soil properties. However, the two soil series can be separated on the basis of their relative positions on the landscape.

- 166 Singer, M. and Ugolini, F. C.
1974. Genetic History of Two Well-drained Subalpine Soils Formed on Complex Parent Materials. Canadian Journal of Soil Science: Vol. 54, pp. 475-489.

Singer and Ugolini discuss the differences in two soils of a subalpine zone in the Washington Cascades. Their data explicitly suggest that present classification systems do not adequately represent mountain soils. Their interpretation of the soils is very informative. Of special interest, is their use of the soil descriptions to determine the postglacial vegetative and climatic history of that region.

5.1.2 INVENTORY METHODS

- 167 Clawson, M. and Stewart, C. L.
 1965. Land Use Information. Resources for the Future, Inc., Johns Hopkins Press: Baltimore, 1965, 402 p.

Clawson states in his Foreward, "The purposes of this book are broadly two-fold: first, to present information and ideas, and to develop a system for handling land use data; and, second, to suggest in a general way that a continuing organization is necessary." Clawson and the Committee on Land Use Statistics defined an ideal system of land data as having the following characteristics: 1) systems must be built upon logical concepts (aerial photography, observation, official records, etc); 2) data should relate to a specific area; 3) data should reflect maximum detail at initial stage; 4) data must be flexible in that they can be used in detail or in association or group form; 5) data must be easily accessible; and 6) the data system must be efficient. Clawson adds that scale is of practical importance and should always be appropriate to the ends sought; and methods used should support such a scale.

- 168 Taylor, G. D.
 1965. An Approach to the Inventory of Recreational Lands. Canadian Geography: Vol. 9, No. 2, 1965, pp. 84-91.

Taylor expresses concern for the lack of definition of the term recreational resources. A precise definition is not required until one has to identify or classify such a resource. Not only do land requirements vary from one type of activity to another but requirements also vary according to the amount of use and the physical resource itself. Taylor classifies land requirements in the following manner: 1) people intensive recreation where people receive considerable user satisfaction from a

relatively small area of land; 2) people extensive recreation where relatively few users are involved with a large area of land; and 3) special recreation where activities have special land requirements such as winter sports, water skiing, etc. To classify recreation lands of Canada, the author suggests that the country first be divided into its physiographic regions. Within each region potential recreation sites could be classified according to attraction, cover, terrain, size, and drinking water. All of these factors would determine the physical desirability for the three types of recreation land requirements previously mentioned.

- 169 Taylor, G. D. and Thomson, C. W.
 1966. Proposed Methodology for an Inventory and Classification of Land for Recreational Use. Forest Chronicle: Vol. 42, No. 2, June 1966, pp. 153-159.

The problem is to develop a system for determining the "capability of all land with respect to its suitability for recreation." To accomplish this, Taylor and Thomson set two major objectives: 1) develop a simple system of inventory indicating the potential of the physical landscape for recreation; and 2) use an approach allowing for varying scales of that inventory. The authors therefore developed a four-stage approach to the inventory and classification. Basically the approach proceeds from general to specific to general. 1) Present potential units of the landscape; 2) Provide intermediate levels of detail to reflect regional significance; 3) Provide a site analysis with sufficient detail to:

- a) permit site boundaries to be drawn; b) permit comparison of site to specific types of recreation use; and 4) permit the detail of stage 3 to be generalized and used on a regional basis. This entire approach is consistent with the concepts of situation and site in location theory.

- 170 Herrington, R. B. and Tocher, S. R.
 1967. Aerial Photo Techniques for a Recreation Inventory of Mountain Lakes and Streams. U.S. Forest Service Research Paper INT-37, 1967, 21 p.

This paper discusses a test conducted in the Uinta Mountains to determine the significance of aerial photography as a tool in water resource inventories. In recreation planning, water resources are extremely valuable and their inventory is a necessity. However, in mountainous terrain, only larger water bodies can be studied. 1:20,000 scale aerial photos may provide a solution to this problem. The test proved that a substantial amount of general descriptive detail can be obtained quickly and at a reasonable cost through the use of aerial photos. However, some information could only be obtained by field study.

- 171 Olson, C. E., Tombaugh, L. W. and Davis, H. C.
 1969. Inventory of Recreation Sites. Photogrammetric Engineering: Vol. 35, No. 6, 1969, pp. 561-568.

This study was conducted to test the use of aerial photo surveying for potential recreation sites. The inventory standards used in site classification were based upon the six recreation resource classes recommended by the Outdoor Recreation Review Commission (ORRRC, 1962). Site standards were developed for boating, swimming, and camping. These standards are entirely dependent upon the resolution of the photographs (1:20,000) and the experience of the user. The results of this test were encouraging, for after two months experience, the survey group was completing 30 to 50 square miles per man day. The errors incurred were primarily attributed to: 1) unrealistic or ambiguous standards of classification; 2) inexperience of photo-interpreter; and 3) failure to clearly separate functions between surveyor and management.

- 172 Kristof, S. J.
 1971. Preliminary Multispectral Studies of Soils. Journal of Soil and Water Conservation: Vol. 26, No. 1, Jan. 1971, pp. 15-18.

This study was conducted to test the use of multispectral imagery and computer mapping. This imagery was obtained by an optical-mechanical scanner system which collected reflected and radiated energy from 3,000 feet above the study area. Eighteen wavelength bands were used from 0.3 to 15 micrometers. The scanner data was converted from analog to digital form for computer input. Typically, soil tones were compared from known samples to unknown samples. Wavelength responses were the recorded for specific soil catagories. The results indicate potential use of this method for gathering soil association inventories (general soil maps). Further use for measuring soil erosion and flood damage were also recommended.

- 173 McCormick, R. J.
 1971. The Canada Land Use Inventory: A Basis for Land Use Planning Journal of Soil and Water Conservation: Vol. 26, No. 4, July 1971.

McCormick gives a good historical background leading to the development of the Canada Land Inventory Program. According to the author the major objectives of this program are: 1) classify lands as to their use capability; 2) provide a good estimate of the extent and location of each land class; and 3) promote the use of the data in land use planning. Maps are prepared at a scale of 1:50,000 for working documents and reduced to 1:250,000 for publication. All information is stored in a data bank. McCormack uses graphic displays for the classification systems in agriculture, recreation, wildlife and forestry. And for each

of these land uses, the author describes the interpretive data used in their classification. This is a very informative article and is especially applicable to large scale planning.

- 174 Klingebiel, A. A.
1972. Primary Factors in Carrying Capacity. Personal Paper, Nov. 1972.

Klingebiel discusses the primary factors relating to carrying capacity for recreation sites. The author states that the first step in site selection is an inventory of physical and biological resources. These resources include: 1) size and location; 2) climate; 3) landform and physiography (soils, geology, and hydrology); 4) plants and wildlife; 5) present land use; and 6) existing facilities. He has categorized these resources into physical resources, biological resources, and cultural resources. Although the term carrying capacity is used rather weakly, the information gained could be of great value to the landscape architect.

- 175 John, M. K., VanLaerhoven, C. J. and Sprout, P. H.
1972. A System of Soils Information Retrieval. Canadian Journal of Soil Science: Vol. 52, No. 3, Oct. 1972, pp. 351-357.

The objectives of the filing system for British Columbia's soil information are to: 1) collect and store soil data; 2) allow rapid retrieval of all available information; 3) allow easy editing of data; 4) allow storage for new information; 5) operate as easily as possible; 6) allow for necessary "feedback" to reevaluate or reclassify a soil; 7) allow for necessary flexibility so that the system can be linked with similar systems. This system uses remote terminals so that users throughout the province can have easy access to this data. Also, built into this

program are statistical subroutines which will enable the user to test soil classifications.

- 176 John, M. K., Lavkulich, L. M., Zoost, M. A.
 1972. Representation of Soils Data for The Computerized Filing System Used in British Columbia. Canadian Journal of Soil Science: Vol. 52, No. 3, Oct. 1973, pp. 293-300.

The authors describe a system of centralized soil data storage. Basically, the system has three separate inputs for a particular soil: 1) "the soil series" card includes only series identification, e.g., the classification, slope, drainage, etc.; 2) the "physical" card which identifies horizontal structure, color, texture, etc.; and 3) the "analytical" card which identifies laboratory data for a horizon, e.g., pH, cation exchange capacity, etc. This type of data access is a prerequisite for future use of computer inventories in land use planning or site analysis.

- 177 Klingebiel, A. A. and Myers, V. I.
 1974. An ERTS-Based Land Resource Inventory for Mexico's National Water Study. Soil Conservation: Vol. 40, No. 4, Nov. 1974, pp. 18-20.

This study was a basis for a general soil and water resources map for Mexico. The base maps were two sets of composite color transparencies (band 4, 5, 7) at 1:1,000,000 scale. Field maps were scaled down to 1:500,000. Their first task was to relate thousands of color tones and geometric patterns to specific and consistent differences on the ground. These ground features were landforms, vegetation, drainage patterns, geology and soil color. The next step was to ground truth and aerial survey test plots. These tests proved valid and the final soil maps (based on FAO classification) were delineated. These maps show crop and pasture potential for all of Mexico.

- 178 Lewis, D. T., Seevers, P. M., and Drew, J. V.
 1975. Use of Satellite Imagery to Delineate Soil Associations in the Sand Hills Region of Nebraska. Soil Science Society of America Proceedings: Vol. 39, No. 2, 1974, pp. 330-335.

The authors establish relationships between published soil association maps and ERTS-1 multispectral imagery of a region in north central Nebraska. Imagery taken during growing season was effective in stratifying soil associations to include subirrigated soils. Imagery taken during snow cover and at low solar angles was effective in stratifying soil associations based on topography. Band 5 and 6 of the multispectral scanner were used.

- 179 Moore, G. K. and Deutsh, M.
 1975. ERTS Imagery for Ground-Water Investigations. Ground Water: Vol. 13, No. 2, March, 1975, pp. 214-226.

The authors conclude that ERTS Imagery presently offers three distinct advantages. 1) A synoptic view which shows regional landforms and geologic structure. 2) A small scale and synoptic view which permits faster delineation of large hydrologic features. 3) Sharp delineation of boundaries which appear as gradational from lower altitude photography. The authors also describes existing and potential uses for ERTS imagery in the field of geology and surface and groundwater hydrology. This is a very informative article and will educate the reader in areas of satellite technology as well as geology.

- 180 Malmgren, R. C. and Garn, H. S.
 1975. Use of Color Infrared Photography for Forest Land Inventories. Journal of Soil and Water Conservation: Vol. 30, No. 3, May 1975, pp. 125-127.

This article presents the application of color infrared photography to a land-systems inventory. The ultimate purpose of the inventory is to

better allocate resources for land use. The classification is based on soil-vegetation units or ecological units. A standard procedure for such inventories is termed a genetic or landform approach which uses black and white stereophotos. In this study the parametric approach was used. This basically involves the classification and mapping of land on the basis of selected attributes. When color infrared photography is used, many attributes can be directly identified. The authors were pleased with the results of their study and commented that unlike conventional landform classifications, CIR photography was able to quantitatively identify specific land features and it reduced the necessary field work from 25 to 75 percent.

- 181 Hajek, B. F., Gilbert, F. L., and Steers, C. A.
1975. Soil Associations of Alabama. Agricultural Experiment Station:
Auburn University, Auburn, Alabama, Nov. 1975, 30 pp.

Hajek, Gilbert, and Steers have developed a report which basically describes the different kinds of soils of Alabama as they are characteristically associated within the landscape. The specific soil associations are used as mapping units and they are grouped into seven soil provinces. These provinces are closely related to the geology and physiography of Alabama thus identifying the nature of the materials from which the soils formed. Although this report can only be used for general planning purposes, it should be of special value to anyone who might be interested and concerned with a very important resource in Alabama, soil. This report is also of value in better understanding the use of soil associations.

5.1.3 INTERPRETATION METHODS

5.1.3.1 Ground Surveys

- 182 Bartelli, L.
1962. Use of Soils Information in Urban Fringe Areas. Journal of Soil and Water Conservation: Vol. 18, No. 3, May 1962, pp. 99-103.

Bartelli discusses the use of Soil Survey interpretation for improving planning and design in urban fringe areas. The description of generalized soil maps and their use for broad planning is very good. He specifically cites uses for agriculture, residential subdivisions, residential estates, industry and transportation, and recreation. Relating to detailed surveys, he describes their engineering uses, uses for determining feasibility of septic systems, uses for farm land and assessment, uses for wildlife management and uses for recreational development.

- 183 USDA Soil Conservation Service
1963. Know Your Soil. Agricultural Information Bulletin, No. 267, USDA Soil Conservation Service, U.S. Department of Agriculture: Washington, D. C., Feb. 1963, 16 pp.

The Soil conservation Service provides a relatively good overview of the Soil Survey Report. This publication describes the Soil Survey to include: its preparation, availability, and most importantly, its use. Many descriptive photographs illustrate the application of the soil survey in such areas as farming, land appraisal, real estate, home building, subdividing, engineering, forestry, and other uses. Although more recent soil surveys have a more comprehensive interpretation section the information that is presented still provides good insight into the preparation and use of the soil survey.

- 184 Mallonen, E. and Bryan, R.
 1963. Using Soil Data in Park Planning. Parks and Recreation:
 Vol. 1, June 1963.

Park Planners of the Huron-Clinton Metropolitan Authority of southeastern Michigan decided that one way to combat problems of overuse on their park lands is by better understanding the natural features of these lands. To do this, soil survey data was absolutely necessary. Not only is it important for engineering studies but it was also an integral factor in their reforestation program. By overlaying a soil survey map with a vegetative cover survey and topographic survey, planners were able to correlate native plants with soils. The distinguishing native pattern is then reproduced where reforestation is necessary. The planning authority judged the following soil and land characteristics to be of prime importance for park planning and development: topography, natural drainage, depth to water table, permeability-infiltration, workability (engineering characteristics) and productivity.

- 185 Allan, P. F., Garland, L. E., and Dugan, R. F.
 1964. Rating Northeastern Soils for Their Suitability for Wildlife Habitat. Twenty-eighth North American Wildlife Conference:
 1964, pp. 247-261.

At the time this paper was presented, the soil survey did not address the issue of wildlife habitat suitability. The authors' study played a significant role in the design of the Soil Survey to meet the potential demand for its use in this area. Basically, various benchmark soil series were evaluated in terms of habitat suitability. The next step was to weigh combinations of habitat elements to determine a rating for general classes of wildlife. Habitat elements included: grain and seed crops; grasses and legumes; wild herbaceous upland plants;

hardwood woodland plants; coniferous woodland plants; wetland food and cover plants; shallow water developments; and excavated ponds. General classes of wildlife included: openland wildlife; woodland wildlife, and wetland wildlife. All ratings pertain to potential wildlife habitat and do not reflect upon existing wildlife or positional relationships or boundary crossing. This paper would be a good background study for anyone who wishes to use the Soil Survey wildlife rating system.

- 186 Montgomery, P. H. and Edminster, F. C.
 1965. Use of Soil Surveys in Planning for Recreation. Annual Meeting of the American Society of Agronomy: Columbus, Ohio, Nov. 1965.

Criteria are given for the rating of soils for campsites, recreational buildings, playgrounds, picnic areas, and paths and trails. Soil qualities taken into account include: soils subject to flooding, perennially wet soils, arid soils, structural support of soils, slope, soil depth to bedrock, soil texture, presence of stones, soil permeability, soil productivity, and soil fertility for water impoundment. The methods used are typically soil limitation procedures, e.g., none to slight, moderate, or severe limitations for specific uses.

- 187 Bartelli, L. J., Baird, J. V., Heddleson, M. R. and Klingebiel, A. A.
 1966. Soil Surveys and Land Use Planning. Soil Science Society of America and American Society of Agronomy: Madison, 1966, 196 p.

This is the first text strictly devoted to the use of soil surveys for planning. While it adequately provides a background for such study, it lacks detail and more recent research on applications of soil survey data necessary to enable a planner to take real advantage of the soil survey. Olson's report "Improving Soil Survey Interpretations Through

Research" is a valuable document for researchers. He stresses the need for research on the relationship between soils and human settlement patterns, research on mapping units, and research on correlative mapping of soils and other resource surveys.

- 188 Stevens, M. E.
1966. Soil Surveys as Applied to Recreation Site Planning. Journal of Forestry: Vol. 64, No. 5, May 1966.

This is an exceptionally good treatment of the use of soil survey data in the design of recreation facilities. Stevens describes the soil characteristics commonly associated with recreation planning and provides the interpretation of soil units based upon these characteristics. The author also provides a good graphic example of design based upon the soil survey data. This example uses the "before and after" method for showing the importance of soil information. Stevens concludes by listing several important areas for research.

- 189 Kellogg, C. E.
1967. Fit Suburbia to Its Soils. Urban Land: Vol. 26, No. 11, Dec. 1967, pp. 3-8.

Charles Kellogg is an eminent soil scientist who moved the Soil Conservation Service into the limelight of conservation movements. This article relates to the years of work which he and his colleagues devoted to the study and mapping of soils in the U.S. The fruition of this work is a highly sophisticated yet easily understandable tool known as the Soil Survey. Kellogg discusses its history and elaborately explores its application to today's operational planning. The Soil Survey does not recommend, it merely gives its reader a better understanding of alternative uses for a tract of land. And for this reason it is a unique and invaluable tool for the planning and design professions.

- 190 Heil, R. D. and Nichols, J.
 1972. Using Soil Information for Land Planning in Colorado: U.S. No. 919, Colorado State University Experiment Station: Fort Collins, Oct. 1972, 17 pp.

The method used for interpretive displays of soils was a stop-go color system (Red-severe limitation, Yellow-moderate limitation, Green-slight limitation). The problems with this type of system are numerous.

Using soil limitations generally seems to be a common practice. However, it is very difficult to quantitatively interpret with this system. This color coded system is also very difficult to use for overlaying techniques and therefore difficult to use for analyzing two or more suitabilities concurrently.

- 191 Allemeier, K. A.
 1973. Application of Pedological Soil Surveys to Highway Engineering in Michigan. Geoderma: No. 10, 1973, pp. 87-98.

This article provides insight and data on the development and interpretation of highway soils maps. The particular system used in this article is the pedological soil classification system. The manual used in classifying soils was written for the Michigan Department of State Highways by S. W. Simonson. Allemeier describes the training of soil surveyors then goes through the procedure used in the soil mapping process. The basic difference between this system and the system used by the Soil Conservation Service is in the mapping units. The Field Manual of Soil Engineering lists approximately 165 soils for the State of Michigan. Since many soils listed by the SCS have only slight differences in texture, drainage, and pH values, the soils are usually combined. This article provides adequate information to enable the reader to gain a better understanding of engineering soil surveying.

- 192 Coen, G.
 1973. Soil Survey and Interpretation Procedures in Mountainous Waterton Lakes National Park, Canada, Geoderma: No. 10, 1973, pp. 75-86.

The impetus behind this study was the Canadian Land Inventory System. Prior to the inception of the CLIS, soil surveys were conducted for agronomic services; therefore, areas with little or no agronomic use were omitted from the soil survey. Coen uses stereomapping techniques for delineation of soil boundaries. His own classification designation and interpretive information appears to be quite sound and easily understandable. Coen concludes: 1) soil data should be based on properties of soil bodies; 2) the information can subsequently be applied to different interpretive uses; 3) the legend on a survey will affect the type of survey taken and the ease with which the interpretations are prepared from base data; and 4) the money spent on a soil survey invariably will return many times the original cost.

- 193 Dekker, L. W. and DeWeerd, M. D.
 1973. The Value of Soil Survey for Archeology. Geoderma: No. 10, 1973, pp. 169-178.

This is one of the best sources found relating to the use of soil data for developing an archeological survey. Soil interpretation has given archeologists a new breath of life for locating finds. Until recently, archeological finds were dependent upon "accidental" discoveries. The authors relate both verbally and graphically as to the mechanics of using soil data. Of primary importance is the origin and stratigraphy of the soil material. In this study, soil surveys were used to develop archeological surveys for the western part of the Netherlands. Finds are usually located in soils on beach and creek ridges. Human

habitation changed as areas were flooded by sea or river water. Knowing the age of sedimentary deposits lead archeologists to specific finds. Usually, the find occurs in the upper surface of these materials as habitation principally occurs at the end of sedimentation. This article is of potential value for those interested in environmental impact and recreation planning.

- 194 Loughry, F. G.
 1973. The Use of Soil Science in Sanitary Landfill Selection and Management. Geoderma: Vol. 10, pp. 131-139.

Loughry presents a comprehensive report on the importance of properly recognizing soil properties in the design and site selection of sanitary landfills. The author refrains from the use of highly technical language and thus makes this work enjoyable and informative reading. After briefly discussing the subject of landfills, Loughry elaborately defines the function of soil in relation to a landfill. 1) It contains and supports the Landfill. 2) It covers the landfill. 3) It reduces much of the waste by reaction, filtration, and retention. 4) It finally supports vegetation be it used for agriculture, forestry, or recreation.

- 195 Simonson, R. W. (Edited)
 1973. Non-Agricultural Applications of Soil Surveys. Geoderma: Vol. 10, Nos. 1 & 2, 1973, 180+ p.

Two back to back issues of Geoderma present a "special issue" devoted entirely to the use of the Soil Survey for non-agricultural purposes. Such uses include: regional planning, urban development, recreation, highway engineering, foundation engineering, on-site waste disposal, sanitary landfills, dike breaches, insurance claims, relations with other

sciences, and archaeology. This single piece of literature is without equal in so far as the subject of applied soil science is concerned. I recommend its reading by all who are interested in soil.

- 196 Estepp, R.
1973. Selecting Suitable Sites for Schools. Soil Conservation:
Vol. 39, No. 12, Sept. 1973, pp. 20-21.

Jefferson County, West Virginia is using soil surveys as a part of the site selection procedure for proposed schools. The local SCS agent helps the superintendent of schools select proper sites based on normal building site criteria used by the SCS and also criteria which would indicate favorable sites for outdoor environmental classrooms. This is an interesting article which indicates another way the Soil Survey can be useful.

- 197 Bouma, J.
1974. New Concepts in Soil Survey Interpretations for On-Site Disposal of Septic Tank Effluent. Soil Science Society of America Proceedings: Vol. 38, pp. 941-945.

Bouma introduces an approach to the interpretation of soil properties as they relate to septic tank effluent. He believes that soil potential rather than soil limitations are best used to describe the effects of liquid waste treatment. Basically, he prescribes the use of on site taxonomic soil classification from which the soil properties involved in waste treatment can be better defined. Since the soil limitation approach only assumes a prior level of technology in determining a slight, moderate, or severe level of limitation, new technology cannot be confronted. With a soil potential approach, the question of feasibility is open-ended and can be confronted with new methods and their specifications.

- 198 Olson, G. W.
 1974. Using Soils of Kansas for Waste Disposal. University of Kansas Publications: Lawrence, 1974, 51 p.

Olson presents one of the most complete studies ever done on the relationships of waste disposal systems and site requirements. The author thoroughly discusses soil properties that directly and indirectly affect the location, construction, and operation of septic tank seepage fields, sewage lagoons, trench type and area type sanitary landfills. Olson then presents Kansas soil series and their suitabilities for the various waste disposal systems. This is an extremely good reference that will be especially valuable for areas in Kansas which do not have recent soil surveys.

- 199 Stepanov, I. S.
 1974. Interpretation of Infrared Soil Spectra. Soviet Soil Science: Vol. 6, No. 3, 1974, pp. 354-368.

This is a highly technical study concerning the use of infrared spectroscopy to determine the composition of mineral groups and humic substances. This method can also be used in studying soil mass and the composition of solids, liquids, and gasses. The importance of this tool lies in its ability to: 1) study the interaction of humic substances with minerals and the grouping or "bridges" that influence their interaction; and 2) study the soil sample as a whole without physical disturbance.

- 200 Vermont State Planning Office
 1974. Vermont Land Capability, Sept. 1974, 65 p.

This publication presents a summary of land resources for the State of Vermont. A substantial portion of the text is entitled "Physical Limitations for Development." This section is primarily about soil

interpretation and provides a very good written analysis of soil limitations for most all major land uses. Other sections which may interest readers are "Resource Opportunities," and "Significant Environments."

It would be extremely worthwhile if all states could publish such information. Not only would better educate the citizenry as to their natural resources, but it would be invaluable to newcomers to a state or region.

- 201 Price, V. J.
1974. Seventy-Five Years of Soil Survey. Soil Conservation: Vol. 40, Nov. 1974, pp. 4-7.

This is a very interesting historical brief on the history of the soil survey. From the conception of the first soil survey crew in 1899 to the research and development of sophisticated computer analysis and interpretation of the 1970's, the Soil Survey has come a long way. Having experienced numerous systems of classification, and changes upon changes of methods and procedures, the Soil Survey has expanded and matured. To date, the Soil Survey has mapped over one and one-quarter billion acres. Its future only grows stronger. To anyone who uses the Soil Survey, this should be must reading; for in understanding its history one gains a truer perspective of the value of this document.

- 202 Galloway, H. M., Yahner, J. E., Scrinivasan, G., and Franzmeier
1975. User's Guide to the General Soil Maps and Interpretive Data for Counties of Indiana. Agricultural Experiment Station: Purdue University, 27 pp.

Ninety-two county general soil maps were issued in 1971. In 1975, these maps were revised as were their methods of interpretation. Basically, the soil series have been quantified and the erosion groups have been revised and also quantified. These maps have already proved useful in

the following areas: large scale planning; relating productivity to "prime agricultural lands"; comparing soil associations for competing land uses; locating agribusiness by land resources; judging values for general alignment of utility rights of way; equalizing tax assessment processes; and in research involving watersheds and soil-hydrologic regimes. This is a good reference of the application of soil association data.

- 203 Rust, R. H. and Hanson, L.D.
 1975. Crop Equivalent Rating Guide for Soils of Minnesota. Misc. Rept. 132, Agricultural Experiment Station: University of Minnesota, 40 pp.

This guide compiles information on the nature of soil resources, soil suitability, and soil productivity for crops, pasture, and timber. There are three primary factors used in determining a Crop Equivalent Rating (CER): Soil, Climate, and Management. Soil data was extracted from the Conservation Needs Inventory (1971), and other sources concerned with productivity levels for the soils of Minnesota. Climatic data was used in previous studies and taken into account in determining productivity data. Management was heavily weighed in this study. It was used in determining crop yield (Avg. management applied to soils) and also used in determining costs of operation. The CER represents percent of land used for specific purposes and the income less the cost of production. Finally, a means for determining CER for timber and pasture is also given. The procedural guide recommended for users is especially good.

- 204 Mausel, P. W., Runge, E. C. A., and Carmer, S. G.
 1975. Soil Productivity Indexes for Illinois Counties and Soil Associations: Bulletin 752, Illinois Agricultural Experiment Station: Urbana, Ill., Aug. 1975, 49 pp.

The objective of this report was to combine existing soil data and Productivity Indexes for quarter section tracts to obtain state, county, and subcounty productivity frequency distributions. Soil associations are used, for Illinois does not have modern soil surveys for the majority of its counties. The results of this study should be of great value to tax assessors in determining rural land quality. Illinois, as most other states, does not have an equitable or consistent system for evaluating rural lands. With the computer generated data made available by this report, an assessor can determine the soil productivity and then compare it to State and County averages for the soil association under study. The data necessary for developing a method such as Illinois include the following: Unprocessed CNI (Conservation Needs Inventory) data, comparable county soil association maps and a measurement of soil productivity that can be used for land evaluation. Three important needs exist in order to use soil information in determining land values: development of soil distribution data that are comparable in quality and associated with soil productivity, development of guidelines for the use of this data, and education of assessors in the use of soil data and guidelines that will eliminate inequitable assessment.

- 205 Shields, R. L.
 1976. General Soil Maps with "Ground Truth" Guide State Land Use Plan in Maryland. This paper was submitted for publication to the Journal of Soil and Water Conservation.

This is one of the best publications to date on the use of soil data for land use planning. The Maryland Department of State Planning asked

the Soil Conservation Service to develop a method for mapping soil data for large scale planning purposes. The SCS decided that detailed soil maps were the most accurate means of mapping soil suitabilities. They decided to "go backwards" and generalize from existing detailed soil surveys. The final product was a county map of soil groups composed of soil series that had similar characteristics that strongly influenced many different land uses. In the background, the soil series could still be read and therefore provided the necessary detail if so desired. This entire system was developed within a six-week period and was compatible with the Maryland Automated Geographic Information System.

- 206 Kansas State University Cooperative Extension Service
 1976. How to Distribute and Use Soil Survey Results. Cooperative Extension Service, Kansas State University: Manhattan, 15 pp.

This publication is directed to those interested in the initial distribution of Soil Surveys, e.g., SCS personnel, county agricultural agents, district conservationists, and interested private parties. However, it does enlighten one on the mechanics of the dissemination of information pertaining to the soil survey. Also of interest are those parties who may have need of this information and the efforts of SCS personnel in trying to reach these individuals.

5.1.3.2 Aerial Photography & Remote Sensing

- 207 Heller, R. C., Doverspike, and Aldrich, R. C.
 1964. Identification of Tree Species on Large-Scale Panchromatic and Color Aerial Photographs. Agriculture Handbook, No. 261, U.S. Department of Agriculture, Forest Service, July 1964, 15 p.

This study was conducted to test the use of color photography in the identification of tree species. Small scale aerial photography using

panchromatic film is very difficult to use for purposes of tree identification. Therefore the authors tested the use of color film (Super Anscochrome 77-mm) at a scale of 1:1584. The results showed a 90 percent success at identification. Accuracy was approximately 10 percent better than interpretation using panchromatic film.

- 208 Avery, T. E.
 1969. Foresters Guide to Aerial Photo Interpretation. Agricultural Handbook No. 308, U.S. Department of Agriculture, Forest Services: Washington, D.C., Dec. 1969, 40 p.

This publication is a handbook for the study of aerial photo interpretation. It is useful for education purposes as well as for vegetation mapping purposes. Terrain evaluation is not included in this study and therefore its uses are not all encompassing. However, it could be used as a basic text if additional interpretive information were provided.

- 209 Douglass, R. W.
 1970. Application of Remote Sensing Techniques to Water Oriented Outdoor Recreation Planning. National Technical Information Service - PB 194810, Jan. 1970, 17 p.

Douglass discusses the possible use of high altitude photography for evaluating water-based recreation sites. The author concludes that non-stereo color photos can be used with a relatively high degree of accuracy. Such methods would substantially reduce the cost of ground reconnaissance. This study is interesting from both a methods standpoint as well as a criteria standpoint. Appendix B lists criteria used for site selection for water based recreation. This information could prove to be valuable to the recreation planner and designer.

- 210 Bie, S. W. and Beckett, P. H. T.
 1973. Comparison of Four Independent Soil Surveys by Air-Photo Interpretation, Paphos Area (Cyprus). Photogrammetria: Vol. 29, No. 6, 1973, pp. 189-202.

This is an interesting study which had as its objective the comparison of four independent soil surveys using four different soil surveyors with different classification systems but with similar methods (air photos) and the same land unit. The results were four surveys with considerable variance in the delineation of soil landscapes. The author concluded that prior to planning a major soil survey, particular attention should be given to the legend a surveyor uses; for the skill of a surveyor is equally dependent upon his system as it is upon his skill in locating soil boundaries.

- 211 Eastman Kodak Company
 1974. Aerial Photography As a Planning Tool. Seminar Proceedings, Eastman Kodak Company: Rochester, N.Y., 1974, 49 p.

Seven papers are presented which relate to the use of aerial photography as a planning tool. The papers are entitled "State Planning and the Land Use Policy Act," "The Availability and Utility of EROS Data," "Land Use Data from Remote Sensing for Resource Planning," "A Practical Method for the Collection and Analysis of Housing and Urban Environment Data: An Application of Color Infrared Photography," "Why LUNR?", "Characteristics of Operating Inventories in New York and Puerto Rico," and "Aerial Photography in a Systems Approach to Land Development Analysis."

- 212 Piech, K. R. and Walker, J. E.
 1974. Interpretation of Soils. Photogrammetric Engineering: Vol. 40, No. 1, Jan. 1974, pp. 87-94.

This article discusses new techniques that are being used to discern the difference between soil moisture content and soil texture when viewing tonal variations in soil color. Before this work, photographic soil surveys were traditionally based upon landform analysis and visual evaluation. Difference in soil color can be attributed to texture of to moisture. By examining the reflectance ratios of a darker soil and a lighter soil, it can be determined that either moisture content or texture is responsible for the tonal differences between the two soils. If the ratio is greater in the darker soil then the tonal difference is principally caused by moisture. If the red-to-blue reflectance ration is smaller in the darker soil, then the tonal difference is principally caused by texture.

- 213 Crosson, L. S. and Protz, R.
 1974. Better Soil Maps with Orthophotos. Journal of Soil and Water Conservation: Vol. 29, No. 3, May 1974, pp. 135-137.

Orthophotography is a relatively new concept in the U.S.; although it is now being used extensively in Western Europe and in Canada. The basic difference between the orthophoto and the conventional air photo is the shooting angle of the camera. Conventional photography often uses tilt displacement and the contours are perspective contours in which scale is increased from bottom contours to top contours. Therefore, with increasing relief you will have increasing distortion. Orthophotography uses a truely verticle shooting angle. Orthophotos have the features of a photographic image and the position accuracy of a line map. Since they can be viewed in stereo their slope and relief images are as accurate as

their position. They significantly ease the construction of photomosaics and can be accurately used in soil mapping where slope is of concern. They are a significant advancement to planning and design firms needing accurate images that can be used as base maps.

- 214 Reeves, R. G.
 1974. Education and Training in Remote Sensing. Photogrammetric Engineering: Vol. 40, No. 6, June 1974, pp. 691-896.

This article describes the state of the art in remote sensing education. Programs of instruction include university training or instruction offered at the EROS Data Center in Sioux Falls, South Dakota. Universities began teaching remote sensing based primarily on a single discipline or a particular instrument specialization. Kansas University was one of the first to teach remote sensing favoring the disciplines of geology and geography and the microwave portion of the spectrum. Stanford University specialized in the infrared spectrum and disciplines of geology and hydrology. Purdue University and the University of Michigan specialize in the use of analog and digital methods for agriculture.

- 215 Frazee, C. J.
 1975. Soilsapes Interpreted from Landsat Imagery. Remote Sensing Institute, Agricultural Experiment Station: South Dakota State University.

Frazee has used LANDSAT imagery to produce a general soil map for eastern Pennington Co., South Dakota. The particular imagery used in this study was a negative print from Band 7 (reflected infrared) of the Multispectral Scanner (MSS) of LANDSAT-1 (formerly ERTS-1). Visual photo interpretation was used; and for mapping soil boundaries the following image characteris-

tics were found to be useful: tone or color patterns, drainage patterns, and land-use patterns. From the interpretation, the following information was mapped (after ground truth): "Land Value Map," "Resource Opportunities Map," "General Soil Map," "Limitations for Urban Development," and "Computer Map of CDV Values."

- 216 Odenyo, V. A. and Rust, R. H.
 1975. Application of Density Slicing Techniques to Soil Survey. Soil Science Society of America Proceedings: Vol. 39, pp. 311-315.

This paper represents one of the more recent studies on the use of remote sensing devices. A density slicing instrument was used to analyze a 1:60,000 air photo using false color film. The study's objective was to determine the accuracy of existing soil maps using color-enhancing density-slicing equipment. The following problems were confronted with the use of this equipment: 1) two or more colors representing the same soil, and 2) two or more soils represented by the same color. The primary cause of either occurrence was the particular cropping system used on a soil. The study did prove to be of potential value; as the method could be used in the quantification of specific areas as they related to cultural practices. This process did point out certain disparities in the actual soil survey; and where a single color represented a specific soil type, the process proved to be a good mapping tool.

- 217 Anson, A.
 1975. Photogrammetry as a Science and as a Tool (An Index). Photogrammetric Engineering and Remote Sensing: Vol. 41, No. 2, Feb. 1975, pp. 225-236.

This is an index of articles appearing in Photogrammetric Engineering from 1962-1974. The topic headings include many subjects planners and

designers would be interested in seeing: Agriculture and Land Use Study, Close Range Photogrammetry, Color Aerial Photogrammetry, Electronic Mapping, Forestry, Geology, Highway Engineering, Hydrology, Remote Sensing, and Soils Engineering. Another index appearing in January, 1963, lists articles appearing in this publication from 1934 to 1962.

- 218 Wobber, F. J.
 1975. Remote Sensing Trends in State Resources Management. Photogrammetric Engineering and Remote Sensing: Vol. 41, No. 6, June 1975, pp. 735-740.

Wobber describes five case studies which are apt to reflect trends in the applied science of remote sensing. The cases represent a variety of uses: 1) Indiana Coal Refuse Site Inventory and Cost Analysis; 2) New Jersey Statewide Wetlands Mapping; 3) New Jersey Regional Coastal Zone Management Program; 4) Pennsylvania Environmental Planning Programming; and 5) Maryland Land-Use Planning Program. The following are summaries of this comparative study. 1) "Emphasis on Practical Results and Products." 2) "Increasing Regulatory and Legal Use." 3) "Increasing Number of Repeat State User Agencies." 4) "Adoption of Special Classifications Unique to Remote Sensing." 5) "Introduction of Information Systems and Models." 6) "Changing User Attitudes in the Scale and Format of Remote Sensing Records."

5.1.3.3 Computer Analysis

- 219 Wenner, K.
 1972. A Computer Method for Interpretation of Natural Resource Data for Four Types of Land Uses. A Dissertation, Ph.D., Michigan State University, University Microfilms: Ann Arbor, 1972, 108 p.

Wenner describes a method of analysis applied to resource interpretation and physical site suitability for four land uses: 1) trench type sanitary

landfills, 2) dwellings with sanitary sewers and without basements, 3) dwellings with septic systems and no basement, and 4) continuous corn. Wenner uses a point system to designate suitability based upon natural resource criteria. Each natural feature used for evaluating a specific land use was considered on a basis of correction-cost. Linear regression techniques were used to determine relative effects of natural features for a land use. Thus given a site with defined natural features, it is possible to evaluate the suitability of that site for a particular use. Although this method is entirely based on economic judgement, it remains a viable method for analysis.

- 220 Kloosterman, B. and Lavkulich, L. M.
 1973. A Method of Statistically Interpreting Soil Data for Agricultural and Engineering Land Use. Soil Science Society of America Proceedings: Vol. 37, pp. 285-291.

The authors of this study recognize the importance of quantitatively evaluating soils and using the evaluations for soil interpretation. Presently, most soil interpretation is done on a qualitative basis thereby leaving the use of soil survey data open ended insofar as comparative degrees of management and improvement are concerned. The authors present a means to statistically compare a given soil with a "model soil" for a specific use. In so doing, they are able to predict the amount of management and money it will take to impart a particular use over that soil. The statistical methods used include correlation and regression analysis and factor analysis. This method of approach has many valuable "spin-offs." For example, one could use this method in determining soil groups for particular land uses, i.e., given a particular use, you could group those soil types which would be best suitable for that use and

quantitatively determine to what extent a group of soils would have to be improved to satisfy that use. The uses addressed in this publication were cash cropping and road bed construction.

- 221 Nichols, J. D. and Bartelli, L. J.
1974. Computer-Generated Interpretive Soils Maps. Journal of Soil and Water Conservation: Vol. 29, No. 5, Sept. 1974.

The authors stress the fact that the minimum size delineation on a soil map should match the scale necessary for proper decision-making. The method suggested by the authors is a means of generalizing soil data using grid cells that reflect a specified scale. The cell will mark a dominant soil type. Soils are then rated and computer printouts graphically display soil suitabilities for a particular use. Transparent overlays indicating roads, stream, utilities, and structures is then placed over the printout. The final product is a good graphic representation of an area with emphasis on a particular suitability for a particular land use. This system is primarily applicable to general planning where detail can often confuse and mislead the users of this information.

- 222 Decker, G. L., Nielsen, G. A., and Rogers, J. W.
1975. The Montana Automated Data Processing System for Soil Inventories. Montana Agricultural Experiment Station: Montana State Univ., 77 pp.

This system is one of the most advanced computer assisted systems in existence. Decker, Nielsen, and Rogers have compiled a number of programs which have the capacity to retrieve data from disc storage and provide the following output: pedon descriptions, mapping unit descriptions, soil classification tables, and mapping unit identification legends. These programs will also evaluate soil potential for urban,

agricultural, and recreational uses. As this system was only recently initiated, future plans for additional uses are numerous. The mark sense forms used as input by surveyors in the field are also a rather unique feature. This system has tremendous potential in areas of soil research, land planning, site analysis, and in other areas where natural resource data is useful.

5.2 ANALYSIS SYSTEMS

5.2.1 NATURAL RESOURCE DATA

- 223 Simmons, S. R. and Dotzenko, A. D.
 1974. Proposed Indices for Estimating the Inherent Wind Erodibility of Soils. Journal of Soil and Water Conservation: Vol. 29, No. 6, Nov. 1974, pp. 275-276.

This is an informative report on the wind erodibility of soils. The authors state that previous measurements of organic matter content and texture to determine the inherent wind erodibility of soil did not correlate nearly as well as using the factors: 15-bar moisture percentage and cation exchange capacity. The results of their study are convincing. The rationale is that soil erodibility is dependent upon the ratio of erodible to non-erodible soil fractions (particles <.84 mm are considered erodible). The inorganic and organic colloidal complex have a very definite bearing on soil aggregation and thus would be a good indicator of the inherent erodibility.

- 224 Tilman, S. E., Upchurch, S. B., and Ryder, G.
 1975. Land Use Site Reconnaissance by Computer-Assisted Derivative Mapping. Geological Society of America Bulletin: Vol. 86, Jan. 1975, pp. 23-24.

This study was conducted to test the use of computer generated land use analysis. The data used was primarily geologic and the print out was plotted. Grid cells of 40 acres were used to inventory both field data (hydrologic data) and point data (water-well data). Multiple factor data (soil maps and geologic maps) were also entered. Weighting factors were used and are variable depending on land use and extenuating factors. This study was directed to three specific uses: 1) sanitary landfills, 2) septic fields, 3) spray irrigation and floor irrigation.

- 225 England, C. B.
 1973. Watershed Models: Tools in Planning Land Management for Water and Pollution Control. Journal of Soil and Water Conservation: Vol. 28, No. 1, Jan. 1973, pp. 36-38.

This article explores the use of mathematical modeling through computer simulation. The article is easily understandable and successfully relates to the reader the value of modeling to better understand the relationships of various natural processes. England described the use of modeling on watersheds to determine the disposition of precipitation on different soil types, slope classes, and land uses. In one study, three particular types of land uses were simulated in each of three different watersheds. The three land uses were exploitive land use, conservation land use, and pasture. The results varied from each watershed; although under exploitive land use, surface flow was substantially increased on all watersheds.

- 226 Army Corps of Engineers
 1954. Engineering Manual, Civil Works Construction. w/change 2, 1972, U.S. Army Corps of Engineers, Department of the Army: Washington, D.C., March 1954.

Part CXVIII, Subsurface Investigation, Chapter three, page 1-4. This section of the manual discusses the various methods used in soils investigations. The three sections that may be of interest to landscape architects include: requirements and procedures, geophysical explorations, and preliminary examinations. Of particular interest is change 2 to this section found on page 4, "Protection of the Environment." The procedures discussed include the following: auger borings, wash borings, probings, disturbed drive borings, undisturbed drive or core borings, test pits, trenches, field permeability tests, and field boring tests. This material is easily readable and understandable.

- 227 Mitchell, C. W.
1973. Terrain Evaluation. Longman Group Limited: London, 1973,
221 p.

Terrain evaluation systems are a relatively new phenomena. This text attempts to organize and classify such systems and then discuss their applications to other related disciplines. Mitchell begins with a discussion of the principles which apply to the various systems. He then provides examples of their application. Such uses include: natural resource studies, military, civil engineering, climatology, hydrology, landscape, and recreational planning. The last two sections of this book concern methods and trends for terrain evaluation.

- 228 Frissell, S. S. and Duncan, D. P.
1963. Campsite Preference and Deterioration in the Quetico-Superior Canoe Country. Journal of Forestry: Vol. 63, No. 4, April 1965, pp. 256-260.

The authors conducted this study with three objectives in mind: 1) determine canoeists' preferences to campsite characteristics; 2) determine degree of deterioration on campsites; and 3) study the feasibility of developing a model to predict campsite durability. Campsites in pine stands and islands were the preferred campsites for canoeists. The authors found that even on slightly used sites there was from 50 to 99 percent deterioration (loss of ground cover). Absence of tree regeneration, erosion, soil compaction, and root exposure were common problems found on campsites. The dependent variables used in a regression analysis for predicting deterioration were: site use, slope, aspect, basal area, and percent silt plus clay. The authors highly recommend some form of user control to reduce site deterioration.

- 229 Belknap, R. K. and Furtado, J. G.
 1971. Three Approaches to Environmental Resource Analysis. Conservation Foundation: Washington, D.C., Nov. 1967, 102 pp.

The authors conduct a study to examine the methods of G. Angus Hills, Phillip H. Lewis, Jr., and Ian L. McHarg. This study is a comparative approach that examines the following elements: 1) methods of pattern and spatial identification; 2) definition, identification, and evaluation of elements that contribute to a quality environment; 3) method of transition from analysis to planning; and 4) treatment of the environment -- a resource or a use. This publication will require the reader to view the subject of resource analysis in depth. For this reason alone, it should be recommended reading for planners and landscape architects.

- 230 Steinitz, C.
 1970. Landscape Resource Analysis. Landscape Architecture: Vol. 60, No. 2, Jan. 1970, pp. 101-104.

This is a very interesting study of various methodologies used for resource analysis. Fifteen methods were studied and categorized in the following manner: 1) "resource inventory,; 2) "resource centered analysis," 3) "analysis linked with demand studies," 4) "single-sector models which predict the effect of change," and 5) "simulation models which can interact with other models in a general planning system." Each of these methods is briefly discussed as to its inherent characteristics. Steinitz then describes certain factors common to all methods: 1) available data, 2) objectivity of measured data, 3) interpretation of data, 4) orders of complexity, 5) specificity of evaluation; 6) potential integration of demand; and 7) predictive potential. Although all the methods are clearly

analytical, each differs from the other in terms of one or more of the above factors.

- 231 Tanabe, M. J. and Murdoch, C. L.
1974. A Modified Shop Press for Use In Soil Compaction Studies.
Soil Science Society of American Proceedings: Vol. 38.

This method for testing the effects of soil compaction on turfgrass could improve the present research being conducted on golf course construction techniques. Compaction resistant materials are being used and tested for high-use turf areas such as golf greens. This rather inexpensive method has had good results in conducting such tests.

- 232 Tam, W. C. and Karplus, W. J.
1974. Parameter Identification in Models of Hydrologic Systems Using the Digital Simulation Language PDEL. Simulation: Vol. 22,
No. 2, Feb. 1974.

Tam and Karplus indicate the need for analyzing and identifying necessary parameters from observed data. This is a prerequisite to the development of a suitable mathematical model. Such models as they now exist could only be constructed by those who were very adept to programming and higher mathematics. The program developed by Tam and Karplus eliminates the need for such abilities and makes modeling available for many more users.

- 233 Jacobs, R. and Way, D.
1969. How Much Development. Landscape Architecture: Vol. 59, No. 4,
July 1969, pp. 296-298.

The objectives of the authors is to develop a system which could measure impact and consequences of projected change. Basically, the system must determine a balance whereby development will not significantly destroy

the environmental quality of a tract of land. The impact referred to in this study is a visual impact and it can be measured by the landscapes potential to "visually absorb" development. "Visual absorption" is basically a function of "visual transparency" and "visual complexity." For example, a rolling dense landscape will have a much higher absorption than will a flat meadow. This is an interesting study and it could very well apply to present and future projects in landscape architecture.

- 234 Monahan, E. J.
 1974. A Method for Specifying Percentage Soil Compaction. Civil Engineering-ASCE, May 1974, pp. 82-85.

Monahan states that all too often the specification "95% Modified AASHO" density requirement is an often abused standard. Explaining why such a standard is either too high or too low, the author describes a method for determining the exact requirements for compaction. This article clearly illustrates the abuse of standards. Such a phenomenon occurs in the profession of landscape architecture as well.

- 235 Ellis, R., Jr., Hanway, J. J., Holmgren, C., and Keeney, D. R.
 1975. Sampling and Analysis of Soils, Plants, Waste Waters and Sludge. Agricultural Experiment Station: Kansas State University, Dec. 1975, pp. 20.

This publication was developed in conjunction with 14 other experiment stations in the USDA North Central Region. The recommended standards for sampling and analysis apply to the analysis of soil, sediment and plant materials. Although land planners might find this material difficult to fully comprehend, it could be a valuable reference for checking procedures used in the testing and analysis of resource data.

- 236 Zube, E. H.
1970. Evaluating the Visual and Cultural Landscape. Journal of Soil and Water Conservation: Vol. 25, No. 4, July 1970, pp. 137-141.

Zube describes the development of an approach to making visual and cultural environmental values effective decision making variables. This study is to be used by the North Atlantic Regional Water Resources Council (NAR) for a plan to optimize development and use of water and related land resources to the year 2020. The study emphasizes three definitive needs: 1) to develop a landscape inventory technique; 2) to identify visual qualities of the landscape; and 3) to apply water and related land planning concepts for environmental quality. The approach used by Zube is well developed and is certainly educational reading.

- 237 Daniel, C. and LaMaire, R.
1974. Evaluating Effects of Water Resource Development on Wildlife Habitat. Wildlife Society Bulletin: Vol. 2, No. 3, Fall 1974, pp. 114-118.

An analytical system was developed by the authors in response to the ineffectiveness of the present wildlife evaluation system which is primarily based on man's use of wildlife resources. Daniel and LaMaire base their development of this system on two premises: 1) all land has some value to wildlife; and 2) the effects of water resource projects (specifically, PL-566 projects) on wildlife can be expressed numerically. The methodology includes the following nine steps: 1) conduct, update, or secure aerial surveys of the project; 2) determine habitat components (types) present and select representative samples of each type; 3) calculate acreage of each habitat component within each project segment; 4) combine project segments and total the habitat units for the entire

project; 5) determine the value of any accrued benefits that can be attributed to the project and subtract from losses attributed to the project; 6) finally, determine the acreage needed to compensate for project losses (net). This study is very worthwhile, if only from a standpoint of better understanding impact upon wildlife.

- 238 Nordstrom, P.
 1972. A Natural Resource Analysis System for Outdoor Recreation. A Dissertation, Ph.D., Montana State University, University Microfilms: Ann Arbor, Michigan, 1972, 142 p.

The author's expressed objective is to determine guidelines for correlating natural resources and outdoor recreation activities. Each resource is weighted as to its influence upon an activity. Suitability ranges are established for each resource and then the outcomes (resource requirements) are compared to inventoried site data and the site is then rated as to its suitability for a recreation activity. Two recreation activities are used in this study: Stream trout fishing, and trail hiking. The study is interesting and certainly informative if only from the aspect of the activities researched.

5.2.2 BEHAVIORAL DATA

- 239 Stankey, G. H.
1971. The Perception of Wilderness Recreation Carrying Capacity:
A Geographic Study in Natural Resources Management. A Dissertation, Ph.D., Michigan State University, University Microfilms: Ann Arbor, 1971, 351 p.

Stankey's objectives were the determination of users perceptions of carrying capacity, spatial variations in their perceptions, measurement of crowding in wilderness areas, and possible methods for increasing carrying capacity. His conclusions were as follows: 1) institutional objectives (management) were not in compliance with 60 percent of the visitors; 2) no-use controls were acceptable to a majority of users; and 3) crowding as perceived by visitors is meeting more than two groups on the trail and anyone at a campsite.

- 240 Lucas, R. C.
1970. User Evaluation of Campgrounds on Two Michigan National Forests. Research Paper NC-44, U.S.D.A. Forest Service, North Central Experiment Station: St. Paul, 15 p.

A common problem in recreation areas is the varied intensity of use amongst different campground sites. The objective of Lucas' study is to determine how variation in recreation use among campgrounds is related to characteristics of the sites and to the way in which people view them. Lucas discusses the methods used in this study and various management implications. From these implications, the reader can gain significant introspect into principles of campground design and site selection.

- 241 Gilbert, C. G., Peterson, G. L. and Lime, D. W.
 1972. Toward a Model of Travel Behavior in the Boundary Waters Canoe Area. Environment and Behavior: June 1972, pp. 131-156.

The Boundary Water Canoe Area is a wilderness area comprised of over one-million acres of land and over one-thousand lakes. On the U.S.-Canadian border in northern Minnesota, this wilderness area is a major recreational resource, and serves the entire north central region. In recent years the problems of overuse have seriously taxed the management efforts of the U.S. Forest Service. This article is the result of an extensive study to determine what if any solutions exist. The authors realized that although control measures would alleviate overuse the primary problems of ecological degradation and the enhancement of user satisfaction would remain. So rather than control the number of users the authors realized the need to control the intensity of user impact on various lakes and land routes. The mechanism for this control is a "travel model" which will predict the distribution of users throughout the area. The variables include: 1) user type; 2) alternative measures; 3) characteristics of the area; 4) intervening conditions; and 5) entrance demand.

- 242 Wagar, J. A.
 1966. Quality in Outdoor Recreation. Trends in Parks and Recreation: Vol. 3, No. 3, 1966, pp. 9-12.

Wagar explains that "high quality" recreation is an admirable objective, but quality is a very subjective term that is usually reflected in personal bias. Wagar therefore outlines an approach to this problem. First he develops a frame work that will indicate quality recreation

for other people. Secondly, Wagar explains how this framework is translated into land-management decisions. His entire approach is based upon three premises: 1) land management has but one purpose -- provide benefits for people; 2) recreation is like all other human behavior -- it is motivated by needs; 3) quality of an experience (recreation) is therefore a function of the degree to which a need is satisfied. "In summary, quality is a human concept based on highly subjective criteria. It depends on the satisfaction of needs, which are mostly learned and therefore extremely varied. However, by using a few categories of needs, we can fairly well predict what people are likely to want. The important thing is not to expect everyone to want the same type of recreational opportunity. By providing a variety of opportunities, zoning, managing the area, and interpreting the attractions, we should be able to provide benefits from recreation from now on."

- 243 Ittleson, W. H., Proshansky, H. M., Rivlin, C. G., and Winkel, G. H.
1974. An Introduction to Environmental Psychology. Holt, Rinehart,
and Winston, Inc., 1974, 406 p.

This text will provide the reader with enough background in environmental psychology that he can adequately follow the mounting literature on this very important topic. Chapters ten and eleven are particularly useful in studying man's response to the natural environment and social design in site planning.

- 244 Lang, J., Burnette, C., Moleski, W. and Vachon, D.
1974. Designing for Human Behavior. Dowden, Hutchinson, and Ross,
Inc.: Stroudsburg, Pa., 1974.

This book is an anthology of readings concerning issues and methods of environmental psychology and their application to design. The book is

broken down into four major sections: "Emerging Issues in Architecture," "Fundamental Processes of Environmental Behavior," "Obtaining and Using Behavioral Information," and the conclusion. Part three is especially useful in that the papers provide good briefs on methods for obtaining and analyzing behavioral information. A reference bibliography is also included.

5.2.3 SOCIO-ECONOMIC DATA

245 Landscape Architecture.

1971. Five articles concerning carrying capacity. Landscape Architecture: Vol. 61, No. 2, Jan. 1971, pp. 117-127.

The articles included in the January 1971 issue of Landscape Architecture include: "Carrying Capacity" by Grady Clay; "How Many is Too Many?" by Daniel E. Willard; "Suicidal Growth: The Los Angeles Basin Case" by Mark von Wodtke; "The Political Limits on Environmental Quality" by Gordon P. DeWolf, Jr.; and "Early Warnings: The Trigger Effect of Upland Irrigation" by Patri, Streatfield, and Ingmire. Of particular interest to the designer is the article by Willard. He uses two Texas State parks to illustrate the effects of overuse.

246 Ramsey, R. W.

1971. Destruction Value: How to Change Developers for the Environmental Destruction They Cause. Landscape Architecture: Vol. 61, No. 3, April 1974, p. 255.

The author states, "If the developer eliminates these things (natural resources) by 'improving' through clearing, excavating, filling, dredging, refilling, regrading, covering with buildings and pavement, then he should pay to a public body of jurisdiction a destruction penalty equal to the appraised ecological loss incurred." Ramsey goes on to enumerate methods for determining destruction value. As a case study he uses the Nisqually Delta near Tacoma, Washington. This 4,150 tract was a potential port location and therefore Ramsey set out to determine the destruction value (largely based on replacement costs). The value exceeded \$40,000,000.00.

- 247 Shafer, E. L., Jr.
 1968. The Demand for Water-Oriented Outdoor Recreation. Parks and Recreation, Vol. 3, Feb. 1968, pp. 23-25.

In this article, Shafer makes certain recommendations which affect both management and design. He is concerned about user problems caused by conflicting interests, e.g., wilderness users vs. intensive recreation users. Shafer recommends that vegetation along shorelines has many advantages for multiple-purpose recreation. First, it screens out much of the campground activity when viewed from a lake or opposite shoreline, but does not screen the lake from the campground. The vegetation also serves as a windbreak and additional wildlife habitat. Shafer also discusses trail erosion and noise pollution and possible abatements to these problems.

- 248 Brown, W. G. and Nawas, F.
 1973. Impact of Aggregation on the Estimation of Outdoor Recreation Demand Functions. American Journal of Agricultural Economics: Vol. 55, May 1973, pp. 246-249.

This is a highly technical publication which is basically concerned with traditional approaches in measuring outdoor recreation demand. The method most widely used is the consumption-transfer cost approach developed by Clawson. The authors dispute the reliability of this approach because of its high correlation between increased distance and increased travel time. The result is an underestimate of a value for a particular attraction. Clawson's approach assumes that the difficulty in overcoming distance is solely a function of money. The authors contend that time is also a factor and must be considered.

- 249 Domoy, F. M.
1973. Outdoor Recreational Land Use Selection Model. A Dissertation, Ph.D., Michigan State University, University Microfilms: Ann Arbor, 1973, 305 p.

Domoy integrates economic, scenic, and physical resource characteristics in developing a tool for site selection. He also uses single and multiple objective functions to represent community concerns for the above resource characteristics. Computer mapping is used to represent the objective functions. Cellular data is used for the computer mapping.

- 250 Fisher, A. C. and Krutilla, J. V.
1972. Determination of Optimal Capacity of Resource-Based Recreation Facilities. Natural Resources Journal, Vol. 12, No. 3, July 1972, pp. 417-444.

Fisher and Krutilla propose a method for defining and determining optimal recreation capacity for low density recreational wildlands. Their approach is based on cost-benefit analysis. However, this approach leaves much to be desired. Cost benefit analysis has proven to be less than substantive in the development of an argument. Figures are too adjustable.

5.3 RESOURCE MANAGEMENT SYSTEMS

5.3.1 NATURAL RESOURCE MANAGEMENT

- 251 Chepil, W. S. and Burnett, E.
1963. Management of Sandy Soil in the Central United States. Farmers
Bulletin No. 2195, U.S. Department of Agriculture, 30+ pp.

This publication discusses sandy soils and their classification, use, problems and management. The soils are classed as sands, loamy sands, and sandy loams. The textural classification pertains to the top most horizon and only shallow and deep sandy soils are included. Moist sandy soils are not discussed. The authors break down the study area by climatic regions. The problem areas and management methods relate to agricultural practices which are discussed in detail. This publication would be a good reference for those interested in agricultural land use and natural resource management.

- 252 Keil, E. R.
1966. Maryland Builders Lead Conservation Drive. Izaak Walton
Magazine: Vol. 31, 1966, p. 13.

Maryland builders adopted a code of practices cited by many as "the first giant step toward a new era of urban conservation." New construction procedures included: 1) minimum exposure of bared soil; 2) quick replacement of ground cover; 3) minimum reduction of natural vegetation; 4) designed harmony with natural topography and drainage systems; 5) use of temporary sediment basins when other measures do not insure control. This area of the country has typically kept abreast of conservation and environmental measures. It is far ahead of most other areas in the country in recognizing the benefits (aesthetic and monetary) in environmental planning.

- 253 Ringler, T. A. and Kennaugh, J. H.
 1974. Flood Hazard Reports: Tools for Resource Planning and Management. Journal of Soil and Water Conservation: Vol. 29, No. 4, Aug. 1974, pp. 182-185.

This brief but very informative report describes the result of inter-agency cooperation in formulating a flood hazard report for Grand Rapids, Michigan. The report uses U.S.G.S. topographic maps, hydraulic evaluations by Michigan's Bureau of Water Management, S.C.S. soil maps, aerial photomosaic maps, high water profiles, flood photographs, and typical valley cross sections all of which combine to indicate the extent of flood that might occur. Fifty, one-hundred, and five-hundred year floods are evaluated. The authors also present examples of such cooperative efforts in other parts of the U.S. This is an informative study and would be highly useful to landscape architects.

- 254 Holbrook, H. L.
 1974. A System for Wildlife Habitat Management on Southern National Forests. Wildlife Society Bulletin: Vol. 2, No. 3, Fall 1974, pp. 119-123.

This is an informative report on the introduction of the "featured species concept" in the management scheme of the southern National Forests.

Guidelines for this type of wildlife management are based upon habitat requirements and mobility of a featured wildlife species. By applying management options to silvacultural practices, a forest land manager is able to provide wildlife requirements on "typical" even-aged timber stands. This system should have the following beneficial effects:

1) from understanding habitat requirements, the coordination and selection of silvicultural practices can be determined; 2) habitat shortcomings not met through silvaculture can be determined and therefore direct

habitat improvement can be applied; and 3) this system will provide the necessary foresight to hopefully preclude adverse environmental impact.

- 255 Hinman, K. and Heiney, C.
1975. Conservation Planning on State Game Lands in Pennsylvania.
Soil Conservation: Vol. 40, No. 7, Feb. 1975.

The authors describe a comprehensive management plan for the State of Pennsylvania. Prior to 1968, there were no effective management plans for the 261 separate game lands which totalled over 1,140,000 acres. Presently, each game land is divided into management units based on size and physical features. There now exists an effective management plan for these units. These plans are primarily based upon soils information. From this data, a detailed conservation map is prepared on an aerial photograph. It shows game land boundaries, roads, fields, food plots, impoundments, utilities, and planned conservation practices. A narrative is also provided with this map which indicates the following: where food plots will be located; where certain species of food and cover are to be planted; where parking lots and roads are to be located; and the conservation practices needed to protect and manage an area. Finally, a woodland management plan is also included for the area. One can well imagine the usefulness of information. Not only can it be used for improving wildlife management, but is extremely useful in requesting federal funds, mapping unique and endangered wildlife and plant species, planning construction and rights of way, mapping water resources, and improving commercial timber lands.

- 256 Loper, D.
1976. The Ecosystem Approach to Rangeland Management. Seminar
presented in the Department of Agronomy, Kansas State University,
Feb. 1976.

Dick Loper is a graduate student at Kansas State University who is conducting research in range management. In a topic outline for his seminar, Loper states that there are two schools of thought concerning the study of range management: 1) Management through forage production and livestock grazing with only "peripheral management concern" for rangeland ecosystems and 2) Management through understanding the interrelationships between "the six basic trophic levels" of rangeland and cooperation with all disciplines inherent to rangeland ecosystems.

5.3.2 WILDERNESS MANAGEMENT

- 257 Wagar, J. Allen,
 1964. The Carrying Capacity of Wild Lands for Recreation. Forest
 Science Monograph: Vol. 7, 1964, 24 p.

Do our wildlands have a maximum carrying capacity after which recreation activities should be limited? To answer this question, Wagar analyzes carrying capacity in terms of "1) the impact of the recreation environment on people, 2) the impact of people on the recreation environment, and 3) management procedures to modify these reciprocal impacts." Our attitude is one of exploitation and is exemplified by our behavior in wildland recreation areas. "We still tend to think of recreation primarily in terms of access rather than as something to manage on a sustained basis. Wagar defines wildland recreation as characteristic recreation activities which cover the spectrum from typical state park areas to wilderness areas. He further defines recreation quality as that degree to which a recreation experience or area normally contributes to the physical and psychic well-being of recreationists. Finally he defines recreational carrying capacity as "that level of recreation use an area can withstand while providing a sustained quality of recreation." "In many recreation situations, however, the dynamics of living communities must be considered" -- don't use up values faster than they can be produced. Wagar, in a historical overview of land capacity draws analysis of over-grazing of range lands and overcutting of timber lands and ends by quoting William Vogt who in 1955 estimated "that of the earths population... perhaps fewer than twelve percent are using their soils, waters, forests, and grasslands on a sustained yield basis." Wagar states that the degree of limited use will depend on: "1) Natural

durability of wildland areas, 2) the effectiveness of various methods for keeping areas in good condition, and 3) the degree of naturalness and solitude that people demand after considering costs and sacrifices necessary to maintain such conditions." "Thus, carrying capacity ultimately depends on the value judgements of people."

258. Lucas, R. C.
1973. Wilderness: A Management Framework. Journal of Soil and Water Conservation: Vol. 28, No. 4, July 1973, pp. 150-154.

Lucas stresses the need for concern for management of our wilderness areas. The public so often takes management for granted, for their concern is usually the classification of lands as wilderness. Wilderness management has two primary features: ecological and social. There are two ecological concerns: 1) maintaining the integrity of primary ecological processes; and 2) controlling visitor impact. The social aspect of wilderness management reflects upon the previous ecological aspects as well as enhancing the quality of the visitor's experience. The latter can be accomplished by four fundamental guidelines: 1) making opportunity available; 2) sensitive management of the wilderness periphery; 3) giving the visitor freedom; and 4) providing opportunity for solitude. Lucas concludes by saying that no wilderness can withstand neglect. "Wilderness cannot survive the draw-a-line-and-leave-it-alone philosophy."

- 259 Fazio, J. R. and Douglas, D. L.
1974. Mandatory Wilderness Permits: Some Indications of Success. Journal of Forestry: Vol. 72, No. 12, Dec. 1974, pp. 753-756.

Fazio and Douglas test the public acceptance of the wilderness permits. In the backcountry areas of Rocky Mountain National Park, a system of

mandatory permits was studied during the 1973 park season. The number of permits issued was determined by the number of designated campsites in the area. Backpacking campers were restricted to those designated campsites. Pre- and post-visit questionnaires were given to a random sample of visitors. The survey revealed a high degree of user acceptance of the restrictive permit system.

5.3.3 RECREATIONAL MANAGEMENT

- 260 Atkinson, N. H. and Hetherington, J. C.
 1972. Recreation Site Pressures and Their Variation with Site Location. Forestry: Vol. 45, No. 2, 1972.

The authors discuss a study on recreation management which determined that it is possible to study user behavior and their influence on the recreation site impact without actually surveying users. The following are some conclusions from this study: 1) survey data must indicate an estimated length of stay; 2) estimating peak times for visitor use has no effect on actual or estimated site use; 3) picnic sites need to be designed to provide some users easy access to their vehicles; and 4) activities should be provided for hikers or less active users, e.g., exhibits, nature trails, etc.

- 261 Beerdsley, W. C., Herrington, R. B., and Wagar, J. A.
 1974. Recreation Site Management: How to Rehabilitate a Heavily Used Campground Without Stopping Visitor Use. Journal of Forestry: Vol. 72, No. 5, May 1972.

Finding the most severe deterioration on those recreation sites with outstanding scenic and recreational values, the authors conducted a study to determine the most effective measures to prevent deterioration. The results were concurrent with other studies. The primary factors are improved design, careful reconstruction, and intensive cultural practices using grass and shrubs. While other studies found that cultural practices for establishing and maintaining grass and shrub cover did not succeed, the opposite was true in this study. The authors make a few recommendations concerning design and maintenance well worth noting: 1) Anticipate movement and design to channel these movement along paths and roads. 2) Areas

around tables and tent sites should be surfaced with asphalt, gravel, or other materials. 3) Barriers such as rocks, curbs, shrubbery (hearty) should be used to guide vehicle and foot travel. 4) Intensive vegetation management in combination with an informed public can be used to maintain attractive ground cover vegetation.

- 262 Echelberger, H. E., Deiss, D. H. and Morrison, D. A.
 1974. Overuse of Unique Recreation Areas. Journal of Soil and Water Conservation: Vol. 29, No. 4, July 1974, pp. 173-176.

The authors describe a study conducted in the White Mountains of New Hampshire. The study was to define the problem of overuse and determine a solution. The particular site is Tukerman Ravine, a semi-private recreation area lying beneath the summit of Mount Washington. Overuse affects the quality of a recreational experience in two primary ways: 1) physical degeneration of a site, and 2) too many people. Only two possible solutions to overuse were acceptable: 1) limited use (by permit only), and 2) designated camping. Both go hand in hand, for only the number of users that can be accommodated in the designated areas will be issued permits. This system was tried and it received 95 percent acceptance from people who volunteered to respond.

- 263 Godfrey, P. J. and Godfrey, M. M.
 1974. An Ecological Approach to Dune Management in the National Recreation Areas of the United States East Coast. International Journal of Biometeorology: Vol. 18, No. 2, June 1974, pp. 101-111.

This is a very interesting study in the use of natural processes in the management of our national recreation areas. Just as fires are now used to manage the giant Sequoia and insects are used to help manage other forests, the wind and the sea are being used in the overall management of our

National Seashores. The National Park Service has come to realize that it may be less important to preserve natural phenomena than it is to protect the processes which actually created them. Dune stability has become a problem. The beaches, if left alone are not in danger of obliteration for the coastal biome is a classic example of dynamic stability. Trouble occurs as man tries to stabilize this system. Only through massive efforts as used in the Netherlands can man hope to control the coastal biome. This study outlines the destruction caused by man on the Cape Cod National Seashore. This study is very informative and is recommended to all whose interests lie in recreation, design, or natural systems.

- 264 Densmore, J. and Dahlstrand, N. P.
 1965. Erosion Control on Recreation Land. Journal of Soil and Water Conservation: Vol. 20, No. 6, Nov. 1965, pp. 261-262.

Because of intensive use of recreation areas severe problems of soil erosion are occurring. The authors describe the use of modified agricultural practices on these recreation lands. Of major importance, is the disposal of increased surface water from pavement surfaces and from areas of high compaction. Methods for controlling runoff includes the use of grassed water ways, underground tile drains, earth dikes, creosoted planks and poles, or rip rap. Also the use of healthy and resilient ground covers is good practice. Most of these problems should be confronted in the initial design stage, for it is here that expensive maintenance can be limited or eliminated.

- 265 Hendee, J. C. and Lucas, R. C.
1973. Mandatory Wilderness Permits: A Necessary Management Tool.
Journal of Forestry: Vol. 71, No. 4, April 1973.

This article is about two rather controversial topics: controlling wilderness users, and rationing the use of the wilderness. Both of these topics involve the potential use of mandatory wilderness permits. In discussing the use of permits Hendee and Lucas also discuss the likely alternative to permits, self registration systems in wilderness areas. The authors explain costs and benefits of a permit system from both the standpoint of the user and the manager. They also discuss studies on user reaction to permits. Hendee and Lucas finally conclude that the permit system is the most viable means of controlling or rationing the use of wilderness areas, for without such means to eliminate overuse problems, their ability to adequately manage wilderness areas would be impossible.

5.4 ENVIRONMENTAL PLANNING AND DESIGN SYSTEMS: GENERAL REFERENCE

5.4.1 GENERAL

- 266 Parker, D. E., Lee, G. B., and Yanggen, D. A.
 1970. Using Soil Maps to Delineate Floodplains in a Glaciated Low Relief Landscape. Journal of Soil and Water Conservation:
 Vol. 25, No. 3, June 1970, pp. 96-99.

The objective of this study was to determine whether Soil Surveys correlated with engineering floodplain data. The authors conclude that the correlation is significant. All alluvial soils and many poorly drained soils adjacent to alluvial soils are flooded by a 10 year flood. The authors also conclude that in urban areas the soil survey is not of much use in delineating floodplains. They suggest that Soil Surveys include an additional mapping unit to identify those soils having a thin veneer of alluvium. This study points out both the strong and weak points of Soil Surveys for floodplain delineation.

- 267 Weddle, A. E.
 1967. Techniques of Landscape Architecture. American Elsevier Publishing Co.: New York, 1967.

This book is unsurpassed in its regard to the technical aspects of landscape architecture. Weddle demonstrates the application of engineering, natural resources, and basic design principles throughout his book. His illustrations of do's and don'ts, how's and why's make this text a valuable reference. If any single text was to be used for the teaching of landscape architecture, I would recommend this one. Each section is written by a different individual, presumably, one who's writing on a particular specialty. The following is a list of sections

appearing in this text: "1) Site Planning, 2) The Practice of Landscape Architecture, 3) Site Survey and Appreciation, 4) Earthworks and Ground Modelling, 5) Hard Surfaces, 6) Enclosures, 7) Outdoor Fittings and Furniture, 8) Water, 9) General Planting, 10) Grass, 11) Tree Planting, and 12) Administration and Maintenance."

- 268 Dorney, R. S.
 1970. The Ecologist in Action. Landscape Architecture, Vol. 60, No. 3, April 1970, pp. 196-199.

This is a very interesting study which addresses the problem of communication barriers between designers, engineers, and architects and the ecologists. Dorney suggests a method whereby such barriers can be broken. First, consultants examine a tract of land independently. Next, a team comprised of an ecologist, planner, and designer review the data gathered by the consultants. Finally, the team is expanded to include a civil engineer, landscape architect, and an economist. At this stage Dorney's "ecoplan" takes shape. Such a plan must follow five principles: 1) maximize diversity of plants and animals; 2) identify fragile environments; 3) identify hazardous areas (development limitations); 4) predict changes in vegetation through natural succession and changes in water quality as a result of development and consider these changes in the physical plan; and 5) identify the types of natural restoration which are feasible.

- 269 Rubenstein, H. M.
 1969. A Guide to Site and Environmental Planning. John Wiley and Sons, Inc.: New York, 1969, 190 p.

This book is a good introduction into the discipline of site planning. It is probably of greater value to the architectural profession in view

of the book's cursory approach to requirements of site planning. While the information might provide an adequate base for further study by landscape architects, it does not give adequate treatment to the myriad of details necessary to successfully conduct a site plan.

- 270 Lynch, K.
1971. Site Planning. The MIT Press: Cambridge, 1971, 384 p.

Lynch's name is synomonus with site analysis. Although his work is urban oriented, it nevertheless remains one of the best works on site planning. His approach is traditional in that it depends upon analytical tools developed prior to the use of overlays, programming, refined interpretive methods, and computer analysis.

- 271 Hackett, J. E. and McCamas, M. R.
1969. Geology for Planning in McHenry County. Circular 438, Illinois State Geological Survey: Urbana, pp. 29.

This publication was at the request of the McHenry County Planning Commission for a resource base. The geologic data was collected and interpreted via the following steps: detailed surface and subsurface mapping; evaluation of engineering, mineral-resource, and hydrologic properties of each geologic unit; land-use interpretive mapping; and terrain analysis of land units by differentiating their physiography and earth materials. This information is best suited for regional planning rather than for specific site data. This is a good example of the application of geologic data for large scale planning.

- 272 USDA Soil Conservation Service
 1971. Handbook of Soil Survey Investigations Field Procedures. Soil Conservation Service, U.S. Department of Agriculture: Washington, D.C.

This is a reference manual used by soil surveyors in their field work. It is slightly technical in nature but should pose no problems to those with a modest background in soil science. The information on soil morphology and soil genesis is extremely good. Sections on sampling, testing, and administrative procedures would probably be of little interest. This is a good reference for the material is relatively compact and the format and style is well organized and very understandable.

- 273 USDA Soil Conservation Service
 1971. Guide for Interpreting the Engineering Uses of Soils. U.S. Department of Agriculture, Soil Conservation Service: Washington, 1971, 87 p.

This publication is a guide for soil surveyors and survey staff. It discusses each soil property that will influence engineering uses. Each of the properties is a part of the soil survey that is presented in table form. Next, the guide discusses the interpretation for each engineering use. Such uses include: septic tank absorption fields, sewage lagoons, shallow excavations, dwellings with/without basements, sanitary landfill, roads and streets, road fill, sand and gravel, topsoil, pond reservoir, embankments, irrigation, terracing, frost action, highway location, grassed waterways, winter grading and soil piping.

- 274 Herriman, R. C.
 1972. Soil and Landscape Factors in Siting Sanitary Landfills. Journal of Soil and Water Conservation: Vol. 27, No. 2, March 1972, pp. 78-80.

This article is a brief but accurate and informative report on site conditions for sanitary landfills. Herriman outlines the four basic

operations of solid waste disposal on land. He then discusses the necessary information for the site selection and design of the sanitary landfill. The larger part of the article describes the use and interpretation of soil data and its implications for successful or disastrous design and engineering. Under a section entitled "Site Selection and Design," the author discusses such topics as pollution hazards, cover material, road construction, and erosion and sediment control. This article is highly recommended.

- 275 McHarg, I. L.
 1969. Design With Nature. Doubleday and Company, Inc.: Garden City, N.Y., 1969, 197 p.

This book, without doubt, has had a most profound effect on the profession of Landscape Architecture. It is inspirational, philosophical, consternative, philanthropic, and above all educational. Lewis Mumford believes, "it is a notable addition to the handful of important texts." History may prove likewise, but presently, the contributions this book is making can be felt in the offices of professionals and educators in many disciplines. It is not a book to be used as reference nor is it a book to be skimmed or read at one sitting. It is classic literature that should be pondered.

- 276 Robinette, G. O.
 1972. Plants/People/and Environmental Quality. U.S. Department of the Interior, National Park Service: Washington, D.C., 1972, 136 p.

This is perhaps one of the better references on the use of plants in the environment. What makes this reference valuable is the myriad of issues it addresses and its excellent graphic presentation that allows for

easier understanding. With such an appropriate title, it is unfortunate that Robinette failed to include three important issues that should be mentioned here: 1) the use of native plantings, which leads to 2) the use of site factors for plant establishment, and 3) the use of plant ecosystems for plant establishment, understanding important site factors, plant preservation and proper selection for native plantings.

- 277 McGrath, D. C., Jr.
 1973. Planning: Some Questions, Answers, and Issues. Journal of Soil and Water conservation: Vol. 28, No. 1, Jan. 1973, pp. 6-8.

McGrath discusses urban planning: its history, objectives, resources, inhibitions, and evolution. The author's analysis of the planning process as it relates to government function has a federal bias. This could be due to his politics or the political issues of the time. Other than this slight bias, the author presents an informative report which should educate the reader as to the state of the planning profession.

- 278 Austin, R. L. and Law, D. L.
 1975. The Elements of Planting Design. Interiors Exteriors: Manhattan, Kansas, 1975, 44 pp.

This publication is a very good treatment of physical design elements for planting plans. This text is divided into six major sections: 1) a preface describing the influence of plants on man; 2) an introduction describing the planting design process; 3) basic physical design elements; 4) plant ecology and management techniques for established and reestablished natural vegetation; 4) elements concerning plant selection; and 5) techniques for graphic presentation. An appendix is also presented to aid in plant selection and calculation of plant quantities. This booklet

is recommended as both a text and reference guide, for it is easily comprehended and well organized.

- 279 Burchell, R. W. and Listokin, D.
1975. Future Land Use. Center for Urban Policy Research, Rutgers University: New Brunswick, N. J., 1975, 369 p.

Burchell and Listokin compile various papers that were invited on subjects relating to land use. Each author is well-respected in his field and writes on issues affecting both present and future land use concepts and practices. The book is divided into four principle areas: 1) "Land Use and Growth;" 2) "Growth Versus the Environment;" 3) "Energy Constraints and Growth;" 4) "The Shape of Metropolitan Areas in the Year 2000." Of special interest to students in landscape architecture, should be the second section which discusses issues, theories, and practices of environmental planning. Also of interest is the brief introduction which discusses the future of housing in America. This is one of the most up-to-date texts concerning practical issues of environmental planning and land use.

5.4.2 Selected Land Uses

- 280 Spiegelman, R. G.
 1968. A Study of Industry Location Using Multiple Regression Techniques.
 Agricultural Report No. 140, Economic Research Service, U.S.
 Department of Agriculture: Washington, D.C., 1968, 66 pp.

Spiegelman states, "Knowledge of the factors determining the location of manufacturing establishments is essential if regional growth is to be understood or planned." The primary objective of this study is to determine if multiple regression techniques could be used to "analyze the forces of location for manufacturing activity." The result of this study suggests that certain independent variables were definitely related to industrial growth; however, these variables necessarily were considered separately. Many variables thought to be significant indicators could be considered as dependent variables in that their presence or absence could alter other variables.

- 281 LaPatra, J. W.
 1973. Applying The Systems Approach to Urban Development. Dowden,
 Hutchinson, and Ross, Inc.: Stroudsburg, Pa., 1973, 296 p.

This text is limited to the study of urban systems with an emphasis on social planning. However, the first two chapters describe in detail the systems approach and systems methods. Basically a systems approach is a method of analyzing a complex problem. As problems become more complex it is seldom possible to break it down and study the separate parts. When the parts are so interrelated that they must be studied as a whole, then systems analysis is the logical approach. The study of ecosystems is a good example of the need for a systems approach.

- 282 McGinsey, C. R., III
 1973. Preserving Archeological Resources in Land Use Planning. Journal of Soil and Water Conservation: Vol. 28, No. 6, Nov. 1973, pp. 256-259.

This article is a very good source on the value of archeological resources. The author presents a process or method whereby planners can play a major role in initiating investigations of archeological significance. Unfortunately, McGinsey does not explain those tell tail signs gained from inspection of soil surveys and topographic maps that will enable planners to determine potential archeological sites. However, the article does give the reader the impetus for searching out such information.

- 283 Crozier, E. S., Fuhrman, J. W., and Robinette, A.
 1974. A Resource Inventory System for Planning Wildlife Areas. Wildlife Society Bulletin: Vol. 2, No. 4, Winter, 1974, pp. 178-184.

The system described by Crozier, et al. is an approach very similar to the approach which is presently being used in the Department of Landscape Architecture at K.S.U. It is primarily based on McHarg's method of overlaying individual inventories to identify planning constraints and opportunities. Such a method is somewhat limited to larger areas (1,000 acres and over) because of the data used in their development. This paper would be a good review for method development. Unfortunately, there is only slight mention given to the inventory of wildlife resources.

- 284 Nehman, G. I., Griffin, J. M., and Duke, K. M.
 1975. Land Use In Environmental Planning. Research Outlook: Vol. 7, No. 1.

The researchers at Battelle Memorial Institute at Columbus, Ohio have developed a manual graphic display system which carries out the following

evaluations: a suitability analysis for development from an economic, social, and environmental standpoint; and a compatibility analysis of proposed land use with existing land-use patterns. The LUTOM model, as it is designated, attempts to ameliorate the distrust of developer-planner relations. The planner, realizing the economic importance of land-use decisions, must plan with a strong awareness of the economic, social, and environmental potentials and constraints. This is an interesting process. Unfortunately, the mechanics of this system are poorly described.

5.4.3 RECREATION

- 285 Tilden, F.
1957. Interpreting Our Heritage. The University of North Carolina Press: Chapel Hill, 1957, 119 p.

Freeman Tilden is an authority on interpretation. As interpretation is so important in our recreation areas, it is essential that planners and designers fully understand its philosophy, function, and methods. There is no better book written on this subject than Tilden's. He is philosophical, inspirational, and educational in his writing. Likewise, a good interpreter or interpretive program should reflect a sense of value and purpose, a sense of inspiration, and most importantly, a sense of education or as Tilden would say -- a sense of re-education.

- 286 Hart, W. J.
1966. A Systems Approach to Park Planning. Report, International Union for the Conservation of Nature and Natural Resources: Mages, Switzerland, 1966.

Hart explains the underlying concept of park systems, "within a given land area, all parks, no matter how large they may be, or for what purpose they were established, are related to each other, to the use of resources in the landscape which includes them, and to the society which supports them." Hart continues, "...parks cannot be considered in isolation. When one consciously takes into account as many of the biological, physical, and social interrelationships as possible in considering various kinds of parks and park programs for a region, nation, or group of nations, he is engaging in planning systems of parks, or park systems planning."

- 287 Eckbo, G.
1967. Building Beauty into Recreation Master Plans. Trends in Parks and Recreation: Vol. 4, No. 4, 1967, pp. 21-24.

Eckbo discusses a major dilemma of recreation design: standarization. In explaining how beauty can be a part of the recreation master plan, Eckbo offers these comments and suggestions: 1) preserve and accentuate the high quality experience; 2) design, whether good or bad, produces qualitative results; 3) reduce "visual anarchy" by considering the area, view, or experience as a continuum--inhibiting fragmentation; 4) understand the source of problems -- we never had a pedestrian problem until we had too many cars; 5) integrate design with programming -- each tends to inhibit rather than enhance the other.

- 288 Orr, H. R.
1967. Analytical Approach to Design. Park Maintenance: Feb. 1967, pp. 34-37.

Orr describes the meaning of poor design by equating it with maximum expenditure of funds, a low degree of user satisfaction, and deterioration of the site. Design psychology is important, for the designer must have an idea of what people do and how they react. Also the designer must understand the nature of the site. In so many cases, each site is inventoried as one of the last remaining sites suitable for recreation. These lands are priceless. When the designer makes a mistake and the site is destroyed by overuse or misuse, the damage can be irreparable. Good design cannot be happenstance, nor is it a luxury or a nicety, it is purely a necessity. Orr describes the design approach and uses an example to illustrate recreation design process. Due to space limitations, this article lacks detail; however, the concepts and principles are in tact and are well presented.

- 289 Bohart, C. V.
 1968. Good Recreation Area Design Helps Prevent Site Deterioration.
Journal of Soil and Water Conservation: Vol. 23, No. 1,
 Jan. 1968, pp. 21-22.

Bohart prescribes adequate facilities and good design for pains of site deterioration. Depending on the type of recreation area, good planning and design will save dollars and increase enjoyment. Limited and carefully planned development is required in wilderness areas; whereas the use of surfacing materials, barriers, and, again, carefully planned development is required on heavily used playgrounds and in metropolitan parks. Site selection is where good design begins. Soil surveys can play an integral role in site selection and site analysis. Important soil characteristics are topography, texture, slope, and permeability. Soil surveys also indicate presence of rocky soils, thin soils, infertile soils, wet soils, sandy soils, and soils subject to compaction. All of these soil characteristics will definitely affect the potential deterioration a recreation site will undergo. Facility design must consider site limitation as well as attraction. Bohart lists many ways in which design can limit use. Of course, before one can design for optimal use, he must be able to make a fair estimate of the number of visitor days to be expected. With this information and a knowledge of site limitations, a designer can promote maintenance and use of recreation areas "so as to leave them unimpaired for the enjoyment of future generations."

- 290 Rutledge, A. J.
 1971. Anatomy of a Park. McGraw-Hill Book Company: New York,
 1971, 176 p.

This text is a must for park designers. Rutledge addresses the problems facing designers and planners, puts them into an orderly perspective

offers various graphic approaches, explains the design process, and finally discusses techniques for evaluation. The text does not include basic management strategies or interpretive methods which some may feel is necessary. Overall, this text is very informative and should prove to be very useful for both recreation designers and recreation administrators.

- 291 Hopkins, F. S., Manning, G. H. and Webster, H. H.
 1973. Planning for the Future in Outdoor Recreation: An Economic Viewpoint. The Forestry Chronicle: Vol. 49, No. 2, April 1973, pp. 71-75.

This article discusses the recreation planning process: its weaknesses, its capacity to change from agency to agency, and its future needs. The authors are concerned about the characteristics of outdoor recreation which make it different from other goods and services. There exist four major concerns within the planning stage: 1) alternative types of sites, 2) alternative locations and their economic impact, 3) alternative management systems for new and old sites, and 4) alternative means for financing outdoor recreation opportunities. There exists a need for different types of information: 1) socio-economic status of users, 2) preferred activities and degree of preference, 3) cost to users, and 4) characteristics of recreation areas that are preferred by users. To expand outdoor recreation opportunity, several considerations must be made: 1) potential sites, 2) development type for each activity, 3) effect of design on cost, durability, and capacity, 4) methods for improving aesthetics; 5) carrying capacity; and 6) management techniques for expanding capacity or enhancing quality.

- 292 Fischer, D. W., Lewis, J. E. and Priddle, G. B.
 1974. Land and Leisure: Concepts and Methods in Outdoor Recreation.
 Maarouta Press: Chicago, 1974, 270 p.

This book is an anthology of readings which concern: 1) discussion of leisure studies and social values, 2) recreation resource patterns, 3) recreation and user behavior, 4) economic influences upon recreation, and 5) recreation and environmental impact. The last section would probably be most useful to designers, for there are five papers which discuss methods and requirements for management, planning, and operation of recreation areas.

- 293 Knetsch, J. L.
 1974. Outdoor Recreation and Water Resources Planning. Water Resources Monograph, No. 3, American Geophysical Union: Washington, D.C., 1974.

Knetsch presents a very good analysis of the recreation planning process. His historical background on analysis and planning is especially good. The author emphasizes demand analysis and the use of statistics and modeling. He cautions, however, that statistical studies are only meaningful when they directly relate to economic, social, and physical environments.

- 294 Ellis, S. P.
 ND The Making of a State Park. Maryland Conservationist. May, pp. 2-6.

Ellis provides a very informative discussion of the planning process for state parks. He divides this process into eleven steps. Each step is described in enough detail that its meaning is clear and its relationship to the process as a whole is understandable. In the fourth step, a feasibility study is done. During this study, five recreation area

classifications are considered: 1) Intensive Development Areas, 2) General Outdoor Recreation Areas, 3) Natural Environmental Areas, 4) Historic and Cultural Sites, and 5) Scenic Areas. Throughout this entire planning process, an idea grows and develops until finally, the idea is a reality. The park planning process is an exciting task. When you consider peak populations of 50,000 people, you suddenly understand that the park you are planning is more like a small city. Indeed it has most all of the characteristics of a small city. This article is very informative and highly recommended for students interested in the park planning process.

5.4.4 SELECTED ELEMENTS

- 295 Hass, H. C.
1966. Combat Soil Erosion. Camping Magazine: Vol. 38, June 1966, pp. 26, 28.

This is a very brief article, but it graphically describes a very good method for controlling surface runoff. The site is a large camp located on a lakeshore. Gravel basin beds are used to contain concentrated runoff.

- 296 Midwest Plan Service
1968. Private Water Systems. Midwest Plan Service: Iowa State University, 1968, 60 p.

This publication is distributed through the Engineering Experiment Station and is meant to be used by the general public. The information is abundant and applies to water sources, water treatment systems, water catchment, systems design, and water quantity, quality, and pressure. This publication is very good reference material and should be used by both designers and planners.

- 297 Schneider, C. J.
1969. Underwater Berm Expands Lake Uses. Landscape Architecture Quarterly: Vol. 59, No. 2, Jan. 1969, pp. 130-131.

This article describes the design and engineering of a swimming and diving facility within the confines of an existing fresh water lake. The problem of silt accumulation had ruined a portion of the lake for bathers. A design firm developed an underwater berm to restrict the swimming area from sediment and boaters. The plan is rather ingenious in that the natural lake was kept for swimmers rather than spending needless dollars on an alternate swimming facility.

- 298 Bender, W. H.
 1971. Soils and Septic Tanks. Agricultural Information Bulletin 349, Soil Conservation Service, U.S. Department of Agriculture: Washington, D.C., March 1971, 12 pp.

This bulletin supersedes AIB No. 243. This short text provides all the information necessary for the construction of a septic tank and filter field. Bender describes the function and design of successful septic systems by leading the reader through Soil Survey data, geologic data, and engineering data necessary for proper design. This is a very informative study which is not too technical.

- 299 Posey, C. J.
 1973. Erosion-Proofing Drainage Channels. Journal of Soil and Water Conservation: Vol. 28, No. 2, March 1973, pp. 93-95.

This is an interesting and useful study of present methods for erosion proofing drainage channels. The author believes that the preferred method is the use of stone lining. The development of reverse flow wire filters has made this method very successful. This article is informative and of great value to the landscape architect.

- 300 Cooperative Extension
 1973. On-Site Waste Water Disposal for Homes in Unsewered Areas. Agricultural Extension, University of Wisconsin: Madison, Sept. 1973, 16 pp.

This publication is highly recommended to those interested in waste treatment systems for single residences or recreation areas. A very good description of a septic tank system is provided. Alternative waste disposal systems are also described and analyzed. Such systems include various alternative anaerobic systems, aerobic systems and physical chemical systems. Problems associated with waste disposal are discussed and various solutions are recommended. This is a very informative publication.

- 301 Mellen, W. L.
 1973. Septic Systems: Effects of Surface and Subsurface Water.
 Journal of Soil and Water Conservation, Vol. 29, No. 6,
 Oct. 1973, pp. 221-223.

This study offers good insight into septic system failures. The author states that percolation tests are fallable if taken as the sole testing criteria. Test pits should be dug to a minimum of five feet. Hydraulic conductivity is preferable to percolation rates. Such factors as source of water, topography, soils, salinity, and water table data are necessary. Mellen offers seven specific guides to the design of septic systems.

1) Seepage lines should follow contours, 2) Curtain drains must be installed above the filter field when groundwater is moving laterally, 3) soil filled overtrenches should be similar to original soil, 4) must have a minimum of 12 inches of permeable soil (hydraulic conductivity from 0.2 to 0.63 inches), 5) first seepage line should be as long as possible, 6) hydraulic conductivity should be determined in lieu of percolation rates, and 7) subsurface drainage should be provided when rainfall or effluent raises water table.

- 302 Barker, E. L.
 1974. What About Plastic Tubing? Soil Conservation: Vol. 40, No. 1,
 Aug. 1974, pp. 12-14.

This is a report on the success of lightweight, flexible plastic tubing. The use of the tubing proved to be a very viable alternative to the use of drainage ditches or drain tile for farmland in northwest Washington. Ditches cut farmland into hard-to-manage tracts while tile was often prohibitively expensive. The use of laser guided trenches with attached coils of plastic tubing makes underground drainage more practical and popular than ever before. The author also elaborates on certain urban uses of this system.

- 303 Flinchbaugh, B. L. and Armstrong, J.
 1974. Assessment on the Rural-Urban Fringe. Cooperative Extension Service, Kansas State University, Feb. 1974, 8 pp.

This was the first of two studies conducted by Flinchbaugh. It is a good assessment of the status of present tax assessment practices in Kansas. Rural lands in Kansas have been assessed according to their current market value, but now there is a move to ammend the State Constitution to allow differential assessment for rural lands. Flinchbaugh describes three general type of differential assessment: preferential assessment, deferred taxation, and restrictive agreements. Although other forms of assessment have recently come into being, it is only practical that the above three methods be presently considered for the needs of Kansas. This report is very informative and has been approached on an objective basis.

- 304 Alleman, D., Jenkins, S., Hedstrom, W., and Pochop, L.
 1975. Pilot Plant Treatment of Recreation Area Vault Toilet Waste. Water Pollution Control: Vol. 47, No. 2, Feb. 1975, pp. 377-385.

The authors describe the present dilemma of ground water pollution and odorous fumes resulting from vault and "privy" toilets in remote recreation areas. They then describe a system recently tested by the Forest Service which functions as a two cell lagoon waste disposal unit. The system is constructed of three tandem sets of 55-gal drums placed in the ground. The influent is aerated and treated in the first two cells and then transferred into a second cell. After treatment the effluent is then transferred via a sprinkler system onto rangeland. The system was successful and the Forest Service will go with it. This is an interesting study and may have an application to uses other than recreation.

- 305 Flinchbaugh, B. L. And Edelman, M.
 1975. Use-Value Assessment Case Studies. Cooperative Extension
 Service: Kansas State University, Feb. 1975, 7 pp.

This study was the second of two reports by Flinchbaugh. The status of land assessment practices for the State of Kansas is reviewed. Flinchbaugh compares the market value practice used in Kansas with the practices used by the State of Colorado, Maryland, and California. These states were selected for various reasons. Colorado was selected because of its relatively new (1967) preferential assessment law and because its agriculture is similar to Kansas. Maryland was selected because of its system of deferred taxation, and because it is considered to be the "grand-daddy" of use value assessment in the U.S. (1955). California was selected because of its use of the restrictive agreement approach, based on its Land Conservation Act of 1965.

- 306 Yahner, J. and Srinivasan, G.
 1975. Using the Soil Survey for Land Assessment: A Computer Method.
 Agricultural Experiment Station: Purdue University, Sept.
 1975, 16 pp.

Yahner and Srinivasan state that there are basically two ways to determine soil productivity: soil physical properties + climate + management = productivity, or productivity = costs necessary to achieve this yield. Their method defines productivity in terms of costs [PI (productivity index) = Gross return - production costs - conservation costs]. Their rationale is that high yield cost more on some soils than others and all soils cannot be cropped with similar intensity. Their method is as follows: 1) measure and record the acres of soil on each area of land, 2) identify the owernship of each area, 3) multiply the acres times the PI (already determined) for each soil on each farm, 4) divide

the total by the acres on each farm, and 5) record results. Yahner and Srinivasan developed a computer method for mechanizing this process. Basically, three files are used: File-1 identifies soil type for each gridcell, File-2 records ownership of each gridcell (2.5 acres), and File-3 describes soil properties for each soil and computes PI. The printout reads name of owner, number of acres, Avg. PI and an adjusted PI. The process appears to be feasible only if sufficient soil mapping has been carried out.

- 307 Gale, D. E. and Yampolsky, H.
 1975. Agri-Zoning: How They're Going to Keep Them Down on the Farm.
 Planning: Oct. 1975, pp. 17-21.

Suffolk County, Long Island, New York is perhaps facing total urbanization. Farmland acreage has collapsed from 123,000 acres in 1950 to 68,000 acres in 1972. While the eastern part of the country is still farmland, and many of the citizens of this county wish it to remain so. Their rationale? First, it is prime farmland, but mostly because it is nonrenewable -- once developed, forget it. Traditional measures of land assessment will not work -- the land is too prime for development. Therefore the county is proposing a voluntary system that would allow the development rights of certain farmlands to be put up for auction or bid to be purchased by the county. The land would remain in agricultural use and would be assessed as farmed land. It appears to be feasible; however, will the citizenry agree? Preferential tax assessment as well as zoning certainly have not been effective in regulating land use, perhaps this "solution" will succeed, for it affects the landowner where it is most effective -- the pocket.

5.5 ENVIRONMENTAL PLANNING AND DESIGN SYSTEMS: CASE STUDIES

5.5.1 GENERAL

308 Landscape Architecture

1967. Ecology as a Basic Approach for 20th Century Planning and Design.
Landscape Architecture: Vol. 57, No. 2, 1967, pp.

This article is a collection of nine papers, eight of which present very brief summaries of case studies which involve the use of ecological studies to planning and design. This article presents a broad array of varied applications of ecological research and thus would benefit those who may be searching for examples of such studies. This might also prove to be valuable for historic purposes, for most of the cases are comparatively old for this rather recent topic.

309 Nastick, D. and Degenhardt, C.

1970. Shoreline's Ecological Order. Landscape Architecture Quarterly:
Vol. 60, No. 3, p. 228.

This one-page brief describes a master planning process used to plan a 2,000-acre section of the San Francisco Bay shoreline. Eckbo and associates realized the presence of three major constraints: 1) providing 3500 acre feet in flood control basin as a reservoir during times of flood hazard; 2) preserving a wildlife habitat that supports over 80 percent of the birds on the Pacific Flyway; and 3) providing a much needed recreation area to support a projected 100 percent increase in recreation demand within the next ten years. This article describes the adaptation of the multiple use planning concept in establishing hierarchies of land use for the three constraints mentioned above.

- 310 Fabos, J. G.
 1971. How to Handle Environmental Threats: The Great Meadows of the Connecticut River. Landscape Architecture: Vol. 60, No. 4,
July 1971, pp. 301-302.

The Landscape Architecture Department of the University of Massachusetts conducted a study for the Great Meadows of the Connecticut River. Their objective was to determine a means to maintain the character of these meadows and yet to provide a means for development to occur. The following inventories and analyses were conducted for this area: historical settlement, relationship of the area to its urban center -- Hartford, natural resources, cultural features and resources, urban expansion, effectiveness of present land controls, opportunities and limitations, present planning efforts, and development alternatives.

- 311 Juneja, N.
 1974. Medford. Center for Ecological Research in Planning and Design,
 University of Pennsylvania: Philadelphia, 64 pp.

This is a socio-environmental assessment of the natural resources in Medford Township. Just as the McHarg study of the Woodlands development, this booklet could equally qualify as a text for studies in Landscape Architecture. The reader should gain a better understanding of each natural resource, and should begin to understand how the natural resources relate to one another. I highly recommend the reading of this publication.

5.5.2 URBAN/SUBURBAN PLANNING AND DESIGN

- 312 McHarg, I.
1967. Where Should Highways Go? Landscape Architecture Quarterly:
April 1967, p. 179.

McHarg briefly describes a project to develop a method for highway alignment using his least social cost and maximum social benefit approach. He lists four major criteria for maximizing public and private benefits. This article offers a brief summary of his methods but by no means is descriptive of the actual work that went into this particular project.

- 313 Landscape Architecture
1969. Ecological Basis for Planning A New Campus. Landscape
Architecture Quarterly, Vol. 60, No. 1, Oct. 1969, p. 31.

The method used in the planning of the University of Wisconsin's Parkside Campus was primarily based on ecological studies. Soil data was a base used in this study to determine the distribution and succession of the vegetative continuum. Representative ecosystems were planned and included twenty-one major plant communities. The ecosystems represented include: boreal forest, northern forest, lake, prairie, and southern forest. By using natural vegetative complexes, considerable savings were anticipated through the elimination of certain improvements and the reduction of maintenance.

- 314 Landscape Architecture Quarterly.
1970. Flood Control on a Mini-Scale. Landscape Architecture Quarterly:
Vol. 60, No. 3, April 1970.

This article concerns a project designed by Robert Goetz and Associates in St. Louis, Missouri. It is an ingenious design of a residential

landscape planned to conform to severe drainage problems. By using plants which naturally occur in wet areas and by designing a dry creek to channel runoff, the plan seems to be a success.

- 315 McNeely, H.
 1970. Self-Imposed Limits to Development in The Carolina Tidewater. Landscape Architecture Quarterly: Vol. 60, No. 4, July 1970, pp. 309-312.

This is a study conducted by a landscape architectural firm in a tidewater area of South Carolina. The author takes the reader through a brief historical study of the area and then describes the methods used in the design of what was to be called the Litchfield Plantation. This is an informative article on the how and why of development methods in tidewater areas.

- 316 Rahenkamp, J., Sachs, W., and Wells, R.
 1971. A Strategy for Watershed Development. Landscape Architecture Quarterly, Vol. 61, No. 3, April 1971, pp. 227-234.

This article outlines the project development for a watershed unit outside of Philadelphia, Pa. The steps used in this development included: 1) Mapping the watershed in terms of conservation demand; 2) evaluating the development demand; 3) plotting conservation needs on a computer grid map; 4) printing-out allowable coverage on land units and computing gross acreage and number of acres to be covered; 5) determining use-density-return; and 6) evaluating the ease of approval, net return, and marketability. The method was only feasible by forming an association which could buy land, put conservation control of the valley lands, resell upland properties to developers, and thus acquire funds for park maintenance. This plan is a good example of how private enterprise can succeed where government control may fail.

- 317 McHarg and Associates
 1972. An Ecological Planning Study: Far the Regional Transportation District, Denver, Colorado. McHarg and Associates, Philadelphia and Development Research Associates, Los Angeles, Jan. 1972.

This study was conducted to provide base data for a transportation plan for central and north central Colorado. The data is adequately represented; however, the synthesis of the data on a regional scale and metropolitan scale is not easily transferrable to a plan. Any environmental information, however, is surely welcome to this area. Denver is, without doubt, one of the poorest planned metropolitan regions in the U.S.

- 318 Marks, B. D.
 1972. Fitting Development to the Environment. Urban Land: Vol. 31, No. 7, July 1972, pp. 8-14.

This article presents the planning phase of a 4,000 acre development on northern section of Padre Island, Texas. At first, one asks if this land should be developed at all. However, as the story progresses you begin to understand how a development can succeed if proper care and understanding of environmental factors exist. The two prevailing factors are vegetation for stabilization and water. Through experimentation of grass and tree species, understanding of marine and coastal ecosystems, and groundwater relationships, this development got off the ground and may very well succeed.

- 319 White, P. J. and Kresse, E. J.
 1972. Planning to Save Natural Resources in Residential Development Journal of Soil and Water Conservation: Vol. 27, No. 4, July 1972, pp. 152-155.

This article describes a typical ecological design process. Although the site is real and the development was planned, little emphasis was

placed on the synthesis of natural resource data. Not that it did not occur, only that the method used in going from inventory to design is not fully explained. This article would be good reading for those who are relatively inexperienced with the natural design process.

- 320 Tourbier, J.
 1972. Environmental Protection in Urban Growth Areas. Urban Land:
 Vol. 31, No. 8, Sept. 1972, pp. 14-20.

Tourbier explains why the use of overlay systems for resource analysis can be hazardous. As project director of the Christina River Basin Study, the author describes an approach to segregate land types into site classes, e.g., a poorly drain soil on less than a 12% slope in a wooded marsh on a floodplain with surface water over an aquifer recharge area. Following the classification of site classes the author then proposes to answer the following questions. 1) What is the degree of degradation wrought by urban development? 2) How do types of urban development relate to site characteristics? 3) What kind of protection or improvement can be used to ameliorate the damage? 4) What is the cost of neutralizing the damage? Tourbier further states that urban development can cause three basic problems: 1) Removal of vegetation and earth during construction; 2) increase of impermeable surfaces; and 3) increase in waste treatment requirements. This is a very informative study that is highly recommended for land planners and designers.

- 321 Wallace, McHarg, Roberts, and Todd
1973. Woodlands New Community. WMRT: Philadelphia, 1973.

WMRC has compiled much of their documentation for a new town plan into four separate booklets. 1) "An Ecological Inventory" describes the methods and presents the results of seven resource inventories: a) geology and groundwater hydrology, b) surface hydrology, c) limnology, d) pedology, e) plant ecology, f) wildlife, and g) climatology. 2) "Phase One: Land Planning and Design Principles" describes a planning method, design issues, and design synthesis for the planning of the Woodlands town center. 3) "An Ecological Plan" discusses all phases of the Woodlands project. 4) "Guidelines for Site Planning" presents the data necessary to insure the developers follow the design intent of WMRT's master plan for the Woodlands. These four booklets are a very valuable reference, for they explain in detail the design process of McHarg and Associates. This may one day be cited as a landmark study.

- 322 Blomquist, A.
1973. Implementing the Products of Comprehensive Planning: The Pueblo Experience. Journal of Soil and Water Conservation: Vol. 28, No. 1, Jan. 1973, pp. 25-31.

Blomquist attacks the traditional concepts involved in comprehensive planning, he states "the plan is only a handy document... always done and therefore not current." The text of this article is primarily a case study of the planning process and function of the Pueblo Regional Planning Commission. The typical HUD 701 planning approach did not work; therefore, the commission began to revamp. Their rules of the game were few in number (10), but the sweeping changes which they brought about were the direct result of their means of implementation and community and regional support. This article should be read by

those who have ever asked themselves why planning is so often associated with the ivory tower and so seldom associated with community action.

323 Clinkenbeard, H. E.

1973. Integrating Natural Resources into Areawide and Local Planning: The Southeastern Wisconsin Experience. Journal of Soil and Water Conservation: Vol. 28, No. 1, Jan. 1973, pp. 32-35.

This article illustrates the value of natural resources in local and regional planning. Clinkenbeard describes the rationale, organization, methods, and importance in developing a planning process which uses natural resource and land use base data. Of prime importance was the successful implementation of Soil Survey data for Southeastern Planning Region. A major portion of funding was earmarked for a detailed soil survey, for the planning commission understood its value not only for land use development but also for its stability and widespread use and acceptance. The article also describes other resources and land uses which were mapped. This data was converted to 160 acre grid cells and completely automated.

324 Anderson, R. C.

1973. Golf Course -- Homesite Developer Revamped Plan to Fit the Land. Soil Conservation: Dec. 1973, pp. 107-110.

This article is a testimonial to the use of the soil survey by an Illinois developer who was finding zoning restrictions more strict and enforceable. Through the use of the soil survey the author, as developer, saw the light. Before changes were made, a significant portion of a 525 acre tract lay beneath a perennially high water table. To compound problems, many of the roads were designed on organic soils and many of the proposed fairways had been designed on ideal homesite locations. The Soil Survey proved to be a lifesaver for this development. This article is not so informative as it is inspirational.

- 325 MacKintosh, E. E.
1974. The Hanlon Creek Study: An Ecological Approach to Urban Planning.
Journal of Soil and Water Conservation: Vol. 29, No. 6, Nov.
1974, pp. 277-279.

MacKintosh presents a study conducted by students under the tutelage of Dorney of the University of Waterloo. The study area is a 7,300 acre watershed near Guelph, Ontario. Two phases were undertaken: 1) impact of Hanlon expressway on the Hanlon Creek Watershed, and 2) impact of long-range urbanization on the watershed. MacKintosh describes the second phase--the effect of urbanization on the Hanlon Creek watershed. Unfortunately only the framework for this study was described. Experts in stream biology, terrestrial wildlife, vegetation, hydrology, surficial geology, soils, sociology, and landscape architecture made up the study group. The author takes the reader through the inventory, analysis, and recommendation stages. The recommendations involve recreation, wildlife, sewage disposal, revegetation, relocation of utilities, sediment control, and open space. This is a good case study and is recommended for planners and landscape architects.

5.5.3 RECREATIONAL PLANNING AND DESIGN

- 326 Lewis, P. H., Jr. and Oertel, R. W.
 1963. Landscape Planning for Regional Recreation. Journal of Soil and Water Conservation: Vol. 18, No. 3, March 1963.

Lewis discusses an approach to defining and locating recreation areas. He uses his patented "cooridor approach" to locate potential areas. The corridors in the Illinois study were described as being "always found in the immediate vicinity of rivers, lakes, wetlands, and significant ridge lines." Lewis conducts a perceptual inventory, soil survey, soil survey interpretation, synthesis of surveys, and alternative plans for development.

- 327 MacConnell, W. P. and Stoll, P.
 1969. Evaluating Recreation Resources of the Connecticut River. Photogrammetric Engineering: Vol. 35, No. 7, 1969, pp. 686-692.

MacConnell and Stoll used the following eight procedures to determine the recreational potential without degrading aesthetic values of the Connecticut River Valley. 1) Obtain recent aerial photos (1:12,000) of the river. 2) Obtain earlier aerial photos (1:20,000) of the river. 3) Develop a classification system for measuring potential land and water recreational areas. 4) Interpret aerial photos and denote land use, new structures, scenic overlooks, secondary roads, shore line classification and other features. 5) Transfer data to USGS maps. 6) Produce composite maps of entire river for planners. 7) Produce statistical summaries for political units. 8) Make recommendations. The classification system is very interesting in that it is very comprehensive and yet all data is obtained by photo interpretation. This study should be of great value to planning agencies and all disciplines concerned with land classification.

- 328 Austin, R. L.
 1975. A Technique for Leisure Resource Analysis. Theraplan, Inc.:
 Manhattan, Kansas, 1975, 31 p.

The author presents a method of resource analysis for recreation planning. The system is comprised of seven steps. 1) Gathering, verifying, and surveying natural, historic, and economic resource data. 2) Delineation and overlay-comparison of natural, scenic, and historic values. 3) Delineation of development values (soils and topography), and their composite values. 4) Delineation of lesser conservation values and greater development values. 5) Delineation of recreational values. 6) Overlay-comparison of steps 4 and 5. 7) Development of recreation master plan. This text is easily comprehensible and is a very good example of the overlay technique for planning.

- 329 McHarg, I.
 1975. Pardisan. Wallace, McHarg, Roberts and Todd: Philadelphia,
 1975, 90 p.

This is one of the author's latest projects. It is an attempt to create a "total environmental park." McHarg states that there is a dual theme: "On the one hand it is concerned with history of the earth in its galactic context, and with a range and a variety of animals and wildlife, plant life and physical and geological formations. On the other hand, it seeks to place man within its environment, and to represent in various ways the interaction between man and nature." The park will allow Iranias to view, first hand, the rest of the physical and cultural world while it will also let them better understand their own environment that they may become better husbands of their resources.

330 Orr, H. R.

ND Design and Layout of Recreation Facilities. Recreation Symposium Proceedings. U.S.D.A. Forest Service, N.E. Forest Experiment Station: Upper Darby, Pa., p. 23-27.

Orr claims that the design and layout of recreation facilities must deliberately engage newly acquired knowledge concerning people and natural resources. The more you understand the problem the better your design solution will be. He further states that the results of poor solutions will range from a vacant site (no use) to a failing site (too much use, and in the wrong places). No use results from poor understanding of users or user market. Failure of the site usually results from a poor understanding of the site. In this paper, Orr is primarily concerned about overuse or carrying capacity. He develops a system using a ground cover index. Through multiple regression techniques he discovers six independent variables which significantly effect the ground cover index. Orr then develops an equation to determine the ground cover index. The use of this data during the site selection phase will, according to Orr, aid in determining the ultimate carrying capacity. It will also aid in the site analysis and site design phase, insuring that the layout will withstand the designed carrying capacity. Although this work is very inticing it would appear to be overly simple in contending with such a complex subject as carrying capacity. Also, one should be suspect of his "independent variables."

APPENDIX

Major Index Sources

The following list includes published indices and data files*. With the exception of two data files, the remainder of these references were used and proved to be of great value during my literature search. Not included in this list are published bibliographies, all of which are included in the bibliographic section of my thesis.

1. 1969 to 1975 Air University Library Index to Military Periodicals.
Air University Library: Maxwell Air Force Base,
Alabama.
2. 1967 to 1975 Books in Print: An Author-Title-Series Index to
the Publisher's Trade List Annual. R. R. Bowker
Company: New York.
3. 1861 to 1976 Comprehensive Dissertation Index. Xerox University
Microfilms: Ann Arbor, Michigan.
4. 1900 to 1971 Cumulative Subject Index to Monthly Catalog of
United States Government Publications. Compiled by
Buchanan, W. W. and Kanely, E. W. Carrollton Press:
Washington, D.C.
5. 1967 to 1974 Index of Selected Outdoor Recreation Literature.
Bureau of Outdoor Recreation: Washington, D.C.
6. 1973 to 1974 Index to IEEE Publications. Institute of Electrical
and Electronics Engineers: New York.
7. 1961 to 1975 Monthly Catalog of United States Government Publica-
tions. U.S. Government Printing Office: Washington,
D.C.

8. 1962 to 1975 Science Citation Index: Citation Index, Source Index, Permutem Subject Index. Institute for Scientific Information: Philadelphia.
9. 1970 to 1975 Selected U.S. Government Publications. U.S. Government Printing Office, Washington, D.C.
10. 1967 to 1975 *Datrix II: Ph.D. dissertations from selected universities. Xerox University Microfilms: Ann Arbor, Michigan.
11. *CAIN: Publications concerning agriculture and related areas. National Agricultural Library.
12. *NTIS: Government-sponsored research and development reports. National Technical Information Service.

*The above data files (10-12) are commercially available through SDC (Systems Development Corporation) and Dialog. Basically, the procedure is to instruct a specific data file to search for sources pertaining to specific keywords you have selected. It is possible to access sources by author, titles, subjects, and to limit those sources by dates and geographical areas. Files 12 and 13 were not used in my literature search, as they were first available through the K.S.U. library during the 1976 spring semester.

AN ANNOTATED BIBLIOGRAPHY OF SELECTED LITERATURE:
A DEVELOPMENTAL APPROACH TO A SYSTEMS STUDY FOR
ENVIRONMENTAL DESIGN AND PLANNING

by

LESTER L. LINSKOTT

B.S., Outdoor Recreation, Colorado State University, Fort Collins, 1970

AN ABSTRACT OF A MASTER'S THESIS

submitted in partial fulfillment of the
requirements for the degree

MASTER OF LANDSCAPE ARCHITECTURE

Department of Landscape Architecture

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Manhattan, Kansas

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ABSTRACT

The planning and design potential of both students and practitioners is frequently limited by the lack of adequate background information and by the continued replication of their planning or design approach to specific projects and studies. Consequently, the objectives of this thesis are: 1) to provide background information concerning land use, natural resources, and systems approaches to environmental planning and design; and 2) to provide a holistic approach to the review of literature that would necessarily lead to the development of a systems approach to a particular project or study.

Two organizational structures are used in the annotated bibliography. The bibliography, as a whole, is organized by sequential topics and based upon a holistic approach to the review of literature. The work is divided into three sections: 1) selected literature pertaining to land-use and environmental issues, 2) selected literature concerning the study of natural resources, and 3) selected literature concerning systems and methods for environmental planning and design. These three sections should be considered as phases of research, each fulfilling a requisite for a following phase. A second organizational structure was applied within each subdivision of the annotated bibliography. Because of the wide diversity of related topics in each subdivision, it was necessary to arrange the annotations in chronological order. This sequential approach has certain favorable spin-offs. For instance, the reader is able to follow the historical development of a topical area and also able to follow a trend in an author's thinking when more than one of the author's works appear in a subdivision.

As was previously mentioned, it is recommended that an individual have the necessary background information prior to the development of an approach

to a project. In the planning and design professions, such a background is necessarily interdisciplinary. The planner and designer, however, are often remiss or inept in accepting research in fields wherein they may lack "expertise." Essentially, one should maintain a sense of skepticism in researching data or methods employed in a field other than one's own; however, such research must certainly be encouraged. The landscape architect, in particular, must understand that practically every discipline imaginable has, to some degree, adopted certain basic tenets which are ecological in principle. Cause and effect, conservation of energy, natural order, heirarchial states, and diversity/complexity breeding stability are examples of such principles and are totally analagous to a systems concept. As disciplines become more diverse and continue to fulfill additional niches in both a professional and educational sense, the more these disciplines will realize their shared interests and the necessity for interaction. The individuals who make up this interdisciplinary realm will find the paths from one disciplinary community to another both accessible and rewarding.

Should this thesis succeed in expanding the vision and interests of its users, its objectives will be realized.