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LAND USE GUIDANCE SYSTEM PLANNING FOR ENVIRONMENTAL QUALITY*

EDWARD J. KAISER** and PEGGY A. REICHERT***

The burgeoning environmental consciousness is challenging traditional land use planning consciousness. Environmental quality and ecological integrity of the natural environment is assuming more importance alongside the traditional concern for the quality of the man-made built environment and efficiency in the urban development process and the day-to-date urban activity patterns of people and organizations. For example, projections of economic and population growth may be accompanied by, or even challenged by, a corresponding projection of environmental quality.

Among the several so-called "quiet revolutions" in land use planning and controls is one that Constance Perin has described as "the noiseless secession from the comprehensive plan," long the basic consciousness framework for land use planning.[1] One new consciousness toward which some of the secessionists are gravitating is a planning/implementation approach which John Frieden has called an "action-planning model"[2] and which we have called "guidance system planning."[3] In these approaches the focus of planning is shifted away from improving the comprehensive rationality of plans and toward improving the quality of action.

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1. Perin, "A Noiseless Secession from the Comprehensive Plan," 33 *J. of the Am. Institute of Planners,* 336 (1967).

2. Friedmann, "Notes on Societal Action," 35 *J. of the Am. Institute of Planners,* 311 (1969).

3. E. Kaiser, K. Elfers, S. Cohn, P. Reichert, M. Hufschmidt, and R. Stanland, Jr., *Promoting Environmental Quality Through Urban Planning and Controls,* Washington, D.C.: Environmental Studies Division, Washington Environmental Research Center, Office of Research and Development, U.S. Environmental Protection Agency (1973); and Kaiser, "Planning Urban Development Guidance Systems for Local Government." A paper prepared for presentation at Confer-IN West, Annual Meeting of the American Institute of Planners, San Francisco, California, October 1971; mimeographed. The term was used as far back as 1963 by F. Stuart Chapin, Jr., "Taking Stock of Techniques for Shaping Urban Growth," 29 *J. of the Am. Institute of Planners,* 76 (1963). He featured the comprehensive plan as a higher level instrument implemented by the other instruments of the system.

The purpose of this paper is to illustrate the "cutting edge" of current attempts in land use planning at the local level to wrestle with the increasing application of environmental goals and information as well as the increasing emphasis on carrying planning directly through to action.

LAND USE GUIDANCE SYSTEM COMPONENTS: ACTION INSTRUMENTS, DECISION GUIDES, AND PLANNING ACTIVITIES

The land use guidance system is a term applied to the package of governmental activities which influence the urbanization process. For purposes of explanation we have divided this package into three parts—action instruments, decision guides, and the planning activities which lead to decision guides and action instruments—as shown in Figure 1. Although we will concentrate only on the local level in this

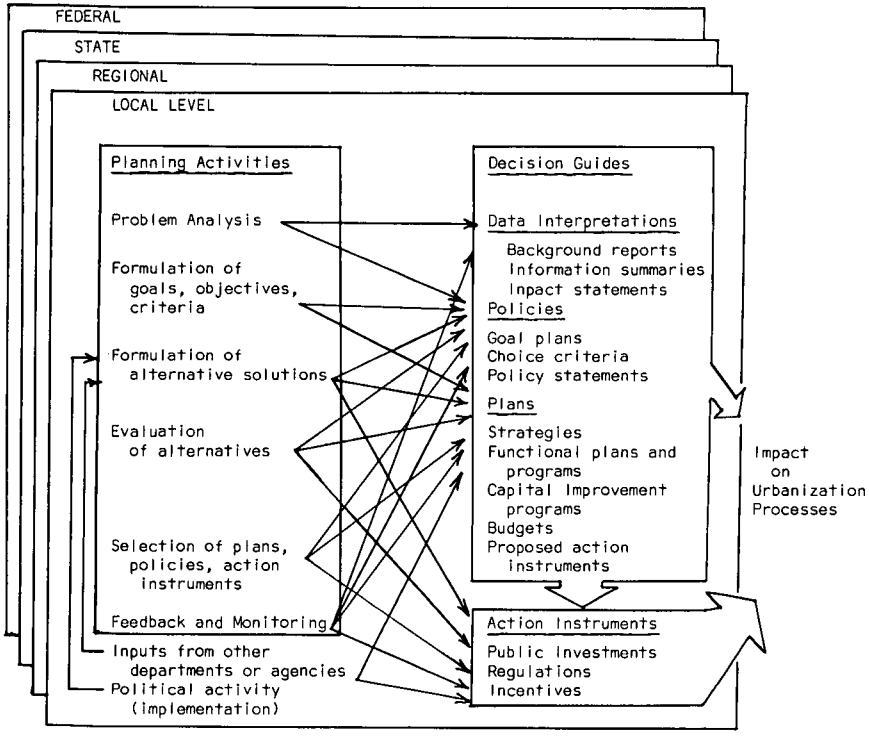


FIGURE 1

Land Use Guidance System

paper, the Figure suggests the existence of guidance systems at the Federal and state levels which have a significant impact on the local guidance system and on local environmental quality.

The most important of the three parts of the guidance system is the action instrument component; the primary purpose of the planning activities and decision guides is to improve the quality of the action instruments.

Action Instruments are those instruments of governmental powers by which local government intervenes in the urbanization process on behalf of the public interest. Public investments (the power to spend) contribute directly to urban change. They include public housing, schools, recreation facilities and programs, open space, streets and other transportation systems, water and sewer facilities, urban renewal, and other investments in capital improvements and services. These public investments merge with private investments to provide facilities and services to the community. In addition, they exert influence on later urbanization decisions.

Equally important as interventions in urbanization processes are regulatory instruments and incentive/disincentive programs. Regulatory instruments include zoning, subdivision regulations, housing codes, health codes and other regulations utilizing the police power to affect development and decay processes and the type, location, and density of land use activities. Subsidized housing programs, taxation policies and allowances, and utility service and connection charges are examples of incentive/disincentive instruments in this framework of rules in which urbanization occurs.

Decision guides, the second major component of the guidance system, include background studies, goal plans (such as the traditional master plan), program plans, policy statements, budgets and capital improvement programs, environmental impact statements and other guides to legislative and executive actions in government as well as actions in the private realm. They become part of the decision guide component of the guidance system to the extent that they are actually used in the formulation, revision and administration of action instruments or otherwise influence development decisions in the private and public realm. If a decision guide is not used to guide such action decisions, if it merely collects dust on the shelf, then it should not be considered part of the guidance system for all practical purposes.

Planning activities form the third component of the land use guidance system. Hopefully, planning activities are major inputs to the formulation of decision guides and action instruments, though not the only ones. Political activities and activities of other agencies

of government are also important. Planning activities are not limited to plan making but are addressed to the formulation and implementation of the full range of decision guides and action instruments. Planning activities include problem identification and analyses; formulation of goals, objectives and criteria; formulation of alternative solutions in the form of policies, plans, and other forms of decision guides as well as action instruments; impact analyses and other forms of evaluation of alternative solutions; and finally, participation in the decision processes by which action instruments are adopted and administered.

THE LAND USE GUIDANCE SYSTEM PLANNING PROCESS: RELATING PLANNING ACTIVITIES TO EACH OTHER AND TO DECISION GUIDES AND ACTION INSTRUMENTS

The land use guidance system planning process is a conceptual model which enables us to relate the various planning activities to each other and to their outputs—usable decision guides and action instruments—and to illustrate these relationships with examples from planning practice around the country. The planning process depicted in Figure 2 is an extension and elaboration of the guidance system concept outlined in Figure 1. It may be viewed on four levels: first, as a theoretical rational planning process; second, as a series of planning activities; third, as a set of planning outputs in the form of suggested decision guides and action instruments; and finally, as government's adopted course of action by which urbanization processes are influenced.

At any level, each stage evolves from and builds on prior stages. But the outputs of any stage feed into the next level as well as the next stage. Guidance system planning represents an attempt to operationalize the rational planning process in which a problem is identified, goals are specified as objectives and evaluative criteria are formulated. Alternative solutions are then generated and evaluated, and finally, a choice among alternative actions is made and feedback is obtained over time. Most importantly, the process may also be viewed at a more operational level in terms of land use planning activity and output and examples can be cited. The activities and outputs at the operational level parallel the theoretical planning process stages. The activities and outputs finally accumulate in the form of the community's land use guidance system—the decision guides and action instruments adopted and followed by the legislative and executive branches of local government.

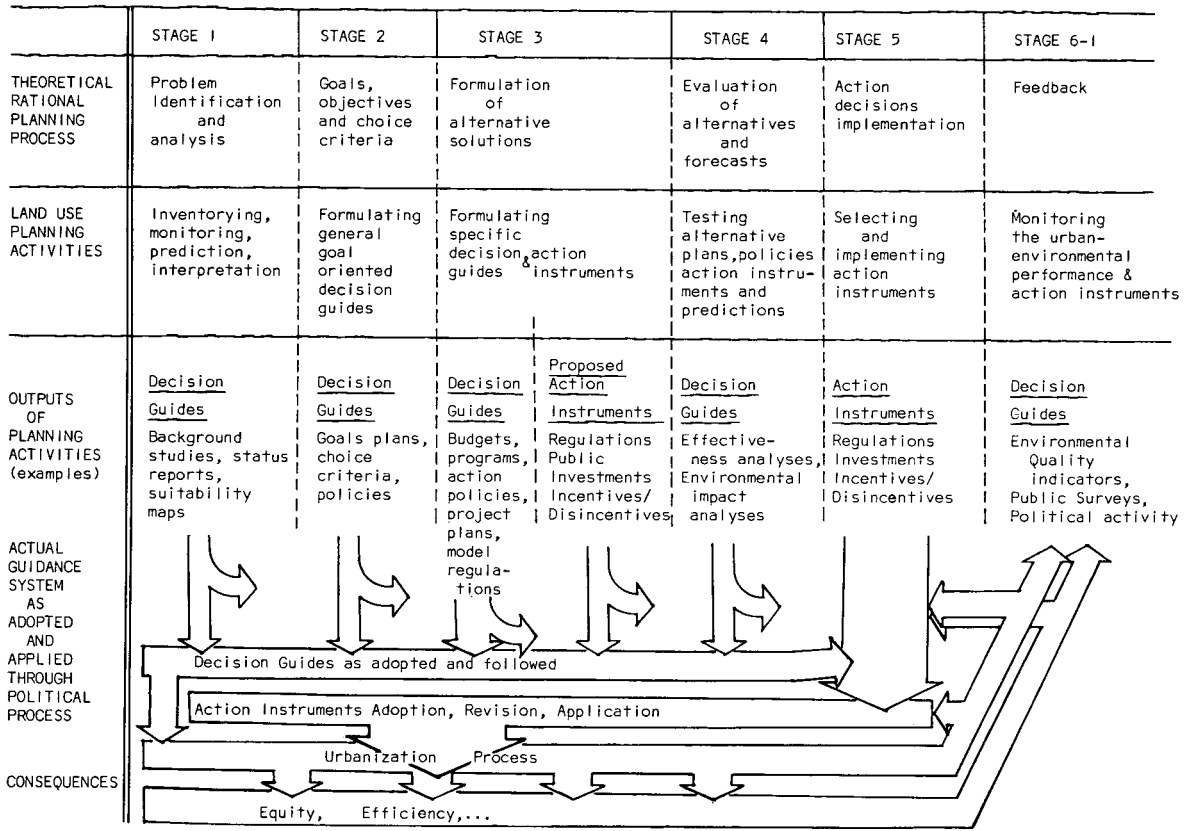


FIGURE 2

Land Use Guidance System Planning Process

STAGE I: PROBLEM IDENTIFICATION AND ANALYSIS, PRODUCING INFORMATION ORIENTED DECISION GUIDES

The first stage in the guidance system planning process involves definition of the problem. As part of this task, inventories of natural systems in the area, existing land use, and many other factors are traditionally analyzed as informational input to land use planning. In addition, indicators of urban and environmental system performance may be monitored to explore current trends and predict future system performance. The output at this stage comes primarily in the form of background studies and status reports which define key urban growth, land use and environmental problems.

There has been much recent emphasis on developing better methodologies for inventorying natural systems as an input to land use planning. The central operating principle of these inventories is that specific features of the natural environment are more suitable for some land uses than for others. Common environmental subsystems inventoried include geology, pedology (soils), hydrology, meteorology, climatology, plant associations, and fish and wildlife. Although most environmental resources inventories touch on some aspect of all of these subsystems, they vary in their specific focus and interpretation, depending on the reason for which the information is gathered. At present, there appear to be two fundamentally contrasting objectives: first, determining environmental constraints to development; and second, protecting the environment from development. The first and more traditional objective places the highest priority on urban system demands, partially excluding some environmental system demands. It views the natural environment as it poses constraints, particularly in economic terms, to urban development. The second objective places highest priority on nature and its demands. In this view, nature has a logic of its own and this natural balance in processes can not be unduly disrupted by man's activity if the environment is to continue to provide essential life resources.

The Natural Systems Inventory Analysis

The study, *The Natural Features of the Washington Metropolitan Area,* prepared by the Metropolitan Washington Council of Governments is an example of an inventory conducted to determine environmental constraints to development.[4] The study focuses on seven natural features: geology, minerals, elevation, slope, soils,

4. Metropolitan Washington Council of Governments, *Natural Features of the Washington Metropolitan Area* (Washington, D.C.: Metropolitan Washington Council of Governments, January 1968).

streams and drainage basins, flood plains, ground water, and woodlands. Features were selected because of, and evaluated with respect to, their impact on urbanization. Woodlands are the only plant associations identified, and its inclusion is justified on the grounds of aesthetics and amenity, conservation, and direct economic values as a commercial product. Fish and wildlife are not assessed. All land uses postulated involve some type of human activity or production. In this approach, no area is restricted for nature alone. The information is synthesized into a "natural features composite" showing areas where public policy should reflect the "limitations or opportunities (primarily for economic gain) inherent in the physical environment: areas of shallow depths to bedrock; poor drainage areas; areas having mineral resources potential and areas where landslides, flood plains, and severe slopes occur."[5]

This type of resource inventory which stresses major conflicts between natural features and urbanization is still useful as well as realistic. Furthermore, such information is necessary to insure sound development practices. This has been the emphasis in the traditional approach to use of environmental data. It is significant, however, that such information on environmental constraints to development is being increasingly taken to heart by communities. The public is learning that if it develops with nature, the cost of urbanization can be reduced (for instance by using natural drainage ways and wetlands rather than extensive cut and fill and storm sewers).

Since the publication of *Design with Nature* in 1969, the name Ian McHarg has become associated with the second and somewhat contrasting approach to environmental systems analysis—an approach emphasizing the protection of natural processes.[6]

McHarg's environmental analysis of the Twin Cities Metropolitan Areas, one of his early projects, serves to illustrate an inventory and analysis of key natural systems for the primary purpose of their protection.[7] The list of phenomena inventoried are similar to those

5. *Id.*, p. 42.

6. I. McHarg, *Design with Nature* (1969).

7. Wallace, McHarg, Roberts and Todd, *An Ecological Study of the Twin Cities Metropolitan Area* (St. Paul: Twin Cities Metropolitan Council, 1969).

The inventory and analysis for the Twin Cities area represents one of the earlier studies by the McHarg group. Since then, the specific methodology for interpretation of data as well as the data collection process has been revised and improved.

For further studies by this group, see: Development Research Associates, Inc. and Wallace, McHarg, Roberts and Todd, Inc., *An Ecological Planning Study for the Regional Transportation District, Denver, Colorado* (Denver: Regional Transportation District, January 1972); Wallace, McHarg, Roberts and Todd, Inc., *An Ecological Planning Study for Wilmington and Dover, Vermont* (Wilmington: Windham Regional Planning and Development Commission and Vermont State Planning Office, April 1972); Wallace, McHarg, Roberts and Todd, Inc., *A Report on the Master Planning Process for a New Recreational*

identified in the Washington study although plant association and fish and wildlife are given specific attention.

The primary distinction between the two inventory approaches appears in the interpretation phase:[8]

> The basic proposition employed (during the interpretation phase) is that any place is the sum of historical, physical, and biological processes, that these are dynamic, that they constitute social values, that each area has an intrinsic suitability for certain land uses, and, finally, that certain areas lend themselves to multiple co-existing land uses.

Major environmental systems inventoried are evaluated with respect to suitability for four major land use groups, each of which includes several land uses, the first two of which are not traditional urban land uses:[9]

1. *Production.* Land uses related to production on the land and include: agriculture, forestry, wildlife propagation, and mineral extractive industries.
2. *Protection.* Land uses having primary purposes to preserve, protect, and conserve those elements of the natural environment considered to be unique, scarce, or vulnerable or constitute a hazard to life and health. Such resources may include erodable slopes, flood plains, and recharge areas.
3. *Recreation.* Land uses with primary purposes for the constructive use of leisure time in an active or passive manner.
4. *Urbanization.* Land uses, related to residential, commercial, institutional, and industrial developments.

Overall intrinsic environmental suitability of each specific land use is mapped for the study area. These maps are finally synthesized into a single map suggesting the most appropriate use for each location.

The Twin Cities study is only one example of the approach to environmental systems inventory and analysis which places a priority on the protection of natural features determined to be of value because of their scarcity, uniqueness, historical significance, or importance in sustaining other processes or elements. But in practice, the value given to natural features must be weighed against and even compromised with urban system demands. This would be true even in the case of a new town.

Many other examples of studies conducted by local planning agencies, private consultants, and academicians would need to be

Community, Amelia Island, Florida (Hilton Head Island, South Carolina: The Sea Pines Company, 1971).

8. *Id.*, at 2.
9. *Id.*, at 36.

described to present a complete picture of subtle variations to this approach which have been developed.[10]

A third approach to environmental system inventory and analysis is now emerging, although it is barely in operational form as yet. It differs from the first two in the degree of integration of the separate natural systems into an ecological whole and of stress on biological components. The ecosystem approach to environmental inventory stresses the interrelationships among components rather than treating each natural phenomenon as a separate characteristic of the landscape.

One of the primary advantages of an ecosystem approach to land use planning is the emphasis put on natural processes as characteristics of whole systems. These processes can be considered as services provided to human communities by natural ecosystems at no cost.[11] Such services as water and air purification, runoff control, soil formation and stabilization, climatic amelioration, and control of pest populations are performed by natural ecosystems in their normal operation.

The following guiding principles to methodology development for ecosystems-based planning have been summarized from proposals by the ecologist Dr. James E. Wuenscher in an ecologically based land use plan for the Eno River Valley in Orange and Durham Counties, North Carolina.[12]

1. *Logical ecosystems units should be used as basic planning units to the greatest extent possible.* One of the more significant aspects of ecosystems is that they are both real functional units of the natural world and can be identified on the grounds and clearly

10. See, for example: Regional Field Service, Harvard Graduate School of Design, Department of Landscape Architecture, *Problem Recognition Study, Central New Hampshire Planning Region* (Cambridge: Harvard Graduate School of Design, 1972); Marin County (California) Planning Commission, *Nicasio: Hidden Valley in Transition* (Marin County: The Department, no date); Redmond (Washington) Planning Department, *Optimum Land Use Plan* (Redmond: The Department, 1970); Chattanooga-Hamilton County Regional Planning Commission, *Land Capability Study for Hamilton County* (Chattanooga: The Commission, 1972); Ecology and Resource Management Research Group, University of Waterloo, *Hillborn Conservation Area Study: Resource Inventory Development of the Site, Preston, Ontario* (Waterloo: Division of Environmental Studies, University of Waterloo, July 1971); Atlanta Regional Commission, *Chattahoochee River Corridor Study* (Atlanta: The Commission, July 1972). Some of these are discussed below. Two general references on resource analysis methods can also be recommended: Steinitz's *A Comparative Study of Resource Analysis Methods*, and *Three Approaches to Environmental Resource Analysis* by Belknap and Furtado.

11. E. P. Odum and H. T. Odum, "Natural Areas as Necessary Components of Man's Total Environment" (Transactions of the 37th North American Wildlife and Natural Resources Conference, Wildlife Management Institute, Washington, D.C., 1972).

12. J. Wuenscher, "Environmental Considerations in Land and Water Use Planning in River Basins" (Duke University, School of Forestry, 1972; mimeographed).

surrounded by boundaries. Thus, they form logical operating units for a land use and environmental plan or guidance system.

2. *Important natural processes should be identified as they occur in ecosystems.* For illustrative purposes, taking a river system as an example, the following process might be identified: the use of water by vegetation; runoff regulation by vegetation and litter; aquifer recharge by soil percolation; aquifer discharge to maintain stream flow during dry periods; soil stabilization by vegetation to present stream siltation; filtration of urban runoff by vegetation.
3. *Specific land areas and biotic communities most important to the continued operation of these processes should be identified and located on the ground.* These may then be examined in more detail with an eye toward their stability in the face of land use related perturbations. In the river basin illustration above, the critical areas might include floodplains, riparian plant communities, vegetation and soil of steep slopes, aquifer recharge areas, and vegetated strips at the edges of roadways and other paved areas.
4. *Environmental goals should be set for each ecosystem.* Communities or planning departments at the local or regional levels must decide which of the natural functions they wish to take advantage of by protecting. One guiding principle should be maintenance of as many diverse species and habitats as possible. Ecologists have found that the diversity of species and environments usually found in natural ecosystems has great value in maintaining system stability. As human development encroaches upon naturally diverse ecosystems, the usual effect is to simplify them, thus decreasing their natural resistance to breakdown.
5. *Policies and action instruments to protect critical natural processes and achieve environmental goals must be developed and enforced.* (see Stage 3 below)

Regardless of which approach to inventorying environmental characteristics is taken, the output generated serves as the basic information system for decisions about plans, policies and action instruments in addition to the land use plan. For example, in the preface to the *Problem Recognition Study for Central New Hampshire Planning Region,* the authors, state:[13]

> This study is not intended to produce a master plan for the growth of the region. . . . It is our intent to give to the Planning Commission a methodology for evaluating future development in terms of its effects on natural systems and the environment. . . . It is also the

13. Regional Field Service, Harvard Graduate School of Design, Department of Landscape Architecture, *Problem Recognition Study for Central New Hampshire Planning Region* (Cambridge: Regional Field Service, Harvard Graduate School of Design, Department of Landscape Architecture, 1972).

> intent of this study to apply the methodology to "recognize problems" and establish issues in the present development pattern of the region.

In a further development, the information system for environmental systems may be combined with an analysis of current urban growth patterns or a prediction of potential growth patterns to highlight probable points of conflict between urban development demands and natural system demands.

The "Early Warning System" developed for the Santa Cruz Mountains area illustrates one approach to developing such a prediction capability.[14] Essentially, the model is a predictive tool for locating potential development/land dynamics conflicts:[15]

> The system includes a comparison of a mapped expression of developer interests in terms of physical potential with a mapped expression of the natural dynamic systems of the same area. . . . With the use of an Early Warning map the planner could easily identify the areas which are likely to have potential impact problems in advance of actual development. The nature of additional information which is required can be identified through an impact analysis process and land use policies can eventually be developed to avoid or at least minimize further environmental degradation.

The terms, "problem recognition study," "establishment of issues," "hot spots," and "early warning systems" are appropriate descriptions of useful outputs from this first phase of the guidance system planning process. It facilitates the conversion of general environment and land use goals and problems into more specific objectives and more specific understanding of problem structures.

STAGE 2: FORMULATION OF GOALS, OBJECTIVES, AND CRITERIA

Goal oriented plans and policies are developed to aid local governing bodies in their policy-making capacity. Such goal oriented decision guides create a framework in which more specific policies and decisions affecting land use will be made. As such, they are an attempt to pin down the decision-making process by making explicit the goals and objectives otherwise implicit in the myriad of day-to-day public decisions. The aim is to reduce arbitrariness as well as establish criteria for evaluating implications of seemingly discrete public decisions.

14. T. Patri, D. Streatfield, and T. Ingmire, *Early Warning System; The Santa Cruz Mountains Regional Pilot Study* (Berkeley: Department of Landscape Architecture, College of Environmental Design, University of California, August 1970).

15. *Id.*, at 3.

Traditionally, the land use plan and comprehensive plan have served as the major decision guides. The land use plan is a generalized vision in map form of the desired future physical characteristics of the urban area in terms of location, intensity, and amount of land which will be developed for various space-using activities. In this sense, the plan has been viewed by decisionmakers as a synthesis of information on the optimal physical development pattern for the community. Insofar as the land use plan presents a long range general goal form, it has not always been the most effective format of in formation and objectives to guide short range, day-to-day decisions affecting land use. Thus, the land use plan is often supplemented by detailed policy and program plans focusing on more specific issues within a shorter time horizon than the ten-to-twenty-year reference of the traditional land use plan.

Adding an Environmental Element to Goal Plans

An example of adding new environmental objectives to the comprehensive planning approach occurs in Los Angeles. There the Department of City Planning is adding a new sector to the General Plan—"An Environmental Conservation Element."[16] It should be noted that this element is mandated for cities and counties by the State of California in its Planning and Zoning Law.[17]

The Environmental Conservation component of the General Plan represents a compilation of data from technical reports and interviews with personnel from various city agencies involved in environmental questions. Environmental issues are divided into six categories: air pollution; water quality; noise control; conservation of land and resources; solid waste disposal; and pesticides.

The report, while providing the basis for the new element of the General Plan, is also intended to serve several other functions in the guidance system framework:[18]

> These include (1) serving as a comprehensive framework through which the multitude of governmental and private agencies, citizen groups, etc. can perceive the interrelationships between various aspects of the environmental problem, (2) providing the specific policy recommendations needed for the formulation of additional standards and legislation pertaining to environmental quality, (3) presenting guidelines for the modification of City procedures so as

16. Los Angeles Department of City Planning, *An Environmental Conservation Element for the Los Angeles General Plan,* Draft report (Los Angeles: Department of City Planning, 1970).

17. G. Murphy, ed. (Legislative Council) *Laws Relating to Conservation and Planning* (Sacramento, California: Department of General Services, Documents Section, 1969 ed.).

18. Los Angeles Dept. of City Planning, *supra* at 6.

to minimize the negative impact of City operations on the environment, and (4) as a general and comprehensive data source for information pertaining to various environmental questions in Los Angeles.

Until recently, the California Environmental Quality Agency also has required that all cities and counties, "make a finding that any project they intend to carry out, which may have a significant effect on the environment, is in accord with the conservation element of the general plan."[19] Such a requirement is illustrative of the new emphasis on closely linking planning to implementation.

In the additive approach, illustrated by the Los Angeles example, environmental objectives are examined separately from other community objectives. In a sense, they are simply added to existing community objectives. No explicit attempt is made to reassess other community objectives related to social or economic goals which may, by their very nature, frustrate the achievement of environmental quality. The inherent conflict among objectives, while perhaps made visible, is not defined.

Integrating Environmental Goals and Information in a Land Use Plan, but without Questioning Growth

The *Optimum Land Use Plan* for Redmond, Washington, is an example of a land use policy guide which emphasizes development based on congruence with natural land features.[20] Land capacity was evaluated, in terms of surface geology, current pollution levels (air, water, noise), physiographic features (surface water, marshes, 100 year flood plain, aquifer recharge areas, slopes), climate and hydrology, vegetation and wildlife. Development principles appropriate to the conservation or improvement of each factor were recommended.

Natural land characteristics were interpreted in terms of development constraints and potentials. Especially careful management was recommended for floodplains, steep slopes, and marsh areas. The suitability of land for gravel extraction, heavy building sites, homesites, recreation, agriculture, and conservation was examined. Policy recommendations for each type of land use were presented.

Some areas were considered suitable for several land uses, but while two different land uses may not produce an adverse impact on land quality, they may prove incompatible with each other. Thus,

19. Cal. Pub. Resources Code, Ch. 1433, Section 21151 (1970). In 1972, this section of the California Environmental Quality Act was deleted apparently because of the implications of the California Supreme Court decision determining that the law applied to private, as well as to public, development (Assembly Bill 889, 1972).

20. Redmond Department of City Planning, *Optimum Land Use Plan* (Redmond: Department of City Planning, 1972).

prior to the design of the "optimum" land use plan, the compatibility of one land use with another (for example, camping with suburban residential development) and land use with the nature of the land (commercial activity with slopes exceeding 30 percent) was assessed as being incompatible, moderately compatible, or fully compatible. In addition, each type of land use was rated as severe, moderate, or minimal in terms of its potential adverse environmental consequences. The resulting matrix of "land use intercompatibility" served as a decision guide for designing a plan. Other inputs to design included evaluations of the economic base, projected land absorption, population growth, housing needs, development pressures (including parcel size and distribution and the prevalence of land speculation), and existing and projected land use distribution. Given these evaluations, it was concluded that:[21]

> The land use allocation in the Land Use Plan can accommodate all the land uses dictated by market demand. This allocation also strives to conserve the most important natural features of the Planning Area. It can therefore be called the Optimum Land Use Plan.

Integrating Environmental Goals with Broader Quality of Life Goals and Questioning the Growth Assumptions Normally Accepted in Land Use Planning

A further extension of the integrative approach to environmental goals involves an even more fundamental realignment of the total array of community objectives as well as basic assumptions about economic and population growth in the light of environmental implications. In this more ambitious approach, environmental quality is viewed as an integral facet of broader goals related to the "quality of life," therefore requiring an exploration of all community objectives and their long-term environmental implications. Economic growth and population growth, long held to be either inherently desirable or inevitable in the traditional approach to land use planning, are now reconsidered as either inherently undesirable, or at least not inevitable. Growth becomes a planning variable rather than a given.

The "growth is inherently undersirable" school of thought sees population growth as the root cause of most urban problems, especially environmental pollution and social problems, such as rising crime rates, increased welfare caseloads, and mental illness. This school of thought assumes that population growth implies an automatic decline in the quality of life, higher per capita costs of government and a higher cost of living, and perhaps, eventually doomsday.

21. *Id.*, at 35.

The "population-is-a-planning-variable" school of thought views growth as a dependent variable to be influenced in pursuit of a desirable quality of life. Therefore, it becomes essential to consider whether and what type of growth ought to be encouraged or discouraged to facilitate achievement of "quality of life" objectives.

Orange County, California, just south of Los Angeles, is an example of the "growth is a variable" school of thought. It grew from 216,000 in 1950 to 1.4 million in 1970 with the philosophy that "more is better and most is best." Now the county planners are proposing a new philosophy, set forth in the introduction to a preliminary draft of their *Orange County Population Growth Policy and Development Strategy:*[22]

> It is the fundamental premise of this study that population growth is a variable which can and should be influenced by local public policy in pursuit of a higher level of environmental quality.

Orange County is basing the need for a growth study, and possible control, on loss of agricultural production, increasing water pollution, declining air quality, deteriorating health, increasing demand for governmental services and regulation, increasing crime and increasing noise.

In another example, the Albuquerque-Bernalillo County Planning Department redefined its comprehensive planning goals in *The Comprehensive Plan, Metropolitan Framework* published in 1972.[23] The plan assesses past and future trends in environmental quality and poses two alternative growth strategies. The first is aimed at modifying the trends in degradation to a more acceptable degree by limiting population growth to a 3 percent annual increase. The second approach suggests a population ceiling based on the local resource capacity and implies a more fundamental alteration of growth trends to insure optimum long range environmental quality. Like the Orange County study, the Albuquerque report is fundamentally an attempt to interject both an environmental consciousness and a consciousness of non-growth options into the evaluation of community goals. These studies try to develop a sense of community purpose about a future urban life style and *then* develop its implications for economic and population growth and action programs rather than accepting growth as inherently desirable or undesirable or inevitable.

22. General Planning Program, Orange County, California, *Orange County Population Growth Policy and Development Strategy* (The author, 211 West Santa Ana Boulevard, Santa Ana, California, 1971).

23. Albuquerque-Bernalillo County Planning Department, *Comprehensive Plan, Metropolitan Environmental Framework* (Albuquerque: Albuquerque-Bernalillo County Planning Department, 1972).

STAGE 3: FORMULATION OF ALTERNATIVE ACTION ORIENTED SOLUTIONS:

In stage 3, the emphasis shifts away from problem investigation, i.e., the analysis of problem structure and the exploration of objectives, and moves toward formulation of solutions. Solutions are explored in the form of decision guides and/or action instruments.

Decision Guides

The line between the goal oriented decision guides of stage 2 and the more action oriented decision guides of stage 3 is perhaps a fine line. Many decision guides, for example land use plans, include elements of both goals and suggested actions. Nevertheless, adequate specification of general action strategies, specific policies about one or more action instruments, program plans or specific action proposals are not always evident in the outputs of the traditional comprehensive planning process. Thus we feel it is useful to highlight the distinction between decision guides which are essentially goal statements (e.g., the traditional master plan) and those decision guides that are more directly linked to action, which will be discussed in this section.

The Huntington, New York *Environmental Planning Program,* is an example of an action policy strategy approach.[24] No future land use design in map form is presented. Rather, specific management actions, evolving from an inventory of the natural systems, are recommended and would apply generally throughout the area (for example, the prohibition of nitrogen-carrying fertilizers). In addition, certain parts of town are singled out for one of three alternative strategies: *remedial action* (for example, installing a tertiary sewage treatment system for existing development where cesspools and septic tanks exceed one per acre); *redevelopment* or urban infrastructure to restore ecological equilibrium (for example, redesigning the storm drainage system into the local harbor); and *protection* of natural resources (for example, public acquisition of open spaces).

An action oriented policy plan may also focus on a more limited facet of the land use-environmental quality interface but be multipurpose in its objectives. For example, the Southeastern Wisconsin Regional Planning Commission has developed a *Soils Development*

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24. J. T. Atkins, *et al., Huntington Environmental Planning Program* (Philadelphia: Department of Regional Planning and Landscape Architecture, University of Pennsylvania, 1972).

Guide.[25] The *Guide* was prepared for distribution to local jurisdictions within the seven county region to achieve three purposes.[26]

> First, to provide an understanding of the detailed soil survey and its accompanying interpretive analysis; second, to illustrate how such a survey and its interpretative analysis can be used in local, as well as regional planning and development; and third, to present suggested land use regulations that may be enacted by local units of government and that utilize and incorporate such survey and interpretations to better adjust both rural and urban development to the ability of the natural resource base to sustain such development.

Only the third of these objectives is related directly to formulating action instruments. The first two objectives are aimed more at improving the information input to other decision guides.

The "problem" assessed in a policy plan also need not be related to a single resource, such as soils. The Atlanta Regional Commission recently completed a policy plan for an area-wide resource, the Chattahoochee River Corridor.[27] The plan examines the use of a forty eight mile stretch of the river north of Atlanta and the adjacent land 2,000 feet from each bank. The report recommends a comprehensive land development plan for the adjacent areas, development guides, (some of which are posed for countywide adoption, e.g., soil erosion, sediment control and flood plain development regulations; others for adoption only within the 4,000 foot corridor, e.g., general development standards, a "River Buffer Zone," Flood Hazard Zone, PUD standards; and a voluntary protection zone), and a program for public acquisition of certain areas vital to public recreation or the ecological health of the corridor.

Action Instruments

Until this point, the discussion has covered examples of decision guides only. But all the land use plans and even the more specific policy and program plans serve only as preliminary solution proposals. Formulation of specific action instruments is also a necessary part of this stage in the guidance system planning process.

Since much of land use planning is aimed at creating a framework of regulations and incentives within which private development can occur in keeping with public objectives, the new objective of environ-

25. Southeastern Wisconsin Regional Planning Commission, *Soils Development Guide* (Waukesha: Southeastern Wisconsin Regional Planning Commission, 1969).

26. *Id.*

27. Atlanta Regional Commission, *Chattahoochee River Corridor Study* (Atlanta: Atlanta Regional Commission, July 1972).

mental quality has fostered a search for and development of new types of regulations and incentives. To a large extent, this search has been characterized by simply a new evaluation of rather traditional guidance instruments resulting in their modification, expansion, redirection, or more intensive application. The discussion of land use guidance instruments here focuses on the control of urban fringe development and is centered around two fundamental objectives:[28]

1. control of the spatial location and timing of development, and
2. control of spatial design characteristics at the site.

Action Instruments for Controlling Spatial Location and Timing of Development for Environmental Objectives

Assuming that environmentally sound land use plans and policies have been developed for the area, there are three general categories of implementation tools to guide development into suitable locations—zoning, taxation, and major public investments such as transportation, water, and sanitary sewer systems. Although these are traditional guidance tools, their application to the implementation of environmental quality objectives has elicited innovative variations on a traditional theme and a more strident attitude toward their application. Although discussed separately, these action instruments, to be effective, must be designed to operate in a synergistic manner to guide growth. The need for an effective strategy to coordinate regulations, taxation, and public investments has elicited the development of a fourth type of action instrument—*the development sector strategy.*

Innovation in zoning has been characterized primarily by the creation of new types of zones or districts.

Large Lot Zoning. This zoning technique involves designating areas, which are deemed valuable for their natural resources, agricultural potential, or simply as open space, for very low density (minimum one lot to five acres) single family or agricultural use. This approach is legitimately useful for areas which are difficult to service with public water and sewer, at least in the near future, and/or which would become environmentally degraded through high density development.

Often this type of zoning is applied to stave off development until some future time when adequate public services may be provided;

28. This pair of objectives has long been the dominant theme in plan implementation literature. See, for example: P. Green, Jr., *et al.*, "Clinic: Development Timing," *Planning 1955,* 81 (Chicago: American Society of Planning Officials, 1955); D. Heeter, *Toward a More Effective Land Use Guidance System: A Summary and Analysis of Five Major Reports* (Chicago: American Society of Planning Officials, 1969).

however, it has disadvantages if used for such a purpose. After a period of time, low density scattered development usually leads to increased demands for additional services. This places added pressure on the local communities to re-zone areas and allow additional development in order to build up the tax base even though more intense development would be premature. Thus, while large lot zoning may be environmentally sound in particularly fragile environments, it has the disadvantage of resulting in the inefficient use of land through scattered development. Five acre lot minimums have not been effective as a development deterrent in many parts of the country. It may be necessary to raise minimums to 40+ acres. Large lot zoning is also under fire as a form of exclusionary zoning in the name of environmental protection.

Exclusive Agricultural Zoning. The Village of Harristown, Illinois, *Zoning Ordinance* states that:[29]

> The Agricultural Zone is established as a zone in which agriculture and certain related uses are encouraged as the principle uses of land. The specific intent of the Agricultural Zone is to facilitate the long term use of lands best suited to agricultural production by preventing a mixture of urban and rural uses which often create incompatibilities and conflict with agricultural pursuits, which place unbalanced tax loads on agricultural lands and which may result in speculative or inflated land values which encourage the premature termination of agricultural pursuits.

Three comments on effective agricultural zoning should be made. First, the tax assessment policy on such land is a crucial factor. Too often, development pressure in urban fringe areas brings a rise in the property tax on agricultural lands, agriculture becomes uneconomical, and the land is sold prematurely to developers or speculators regardless of the zoning. (More on this under "taxation" below.) Second, exclusive agricultural zoning is intended to promote agricultural activity. Therefore, it should be applied only to prime agricultural land. Special agricultural soil suitability maps can provide the data necessary for delineation of such districts.[30] Third,

> . . . many farmers will resist such a zoning classification, unless reassured that their property will be re-zoned when they want to sell at speculative values. Thus, it is ironic that the very device designed

29. Harristown, Illinois, Zoning Ordinance, Section 3.1 (1972).

30. See, for example: Southeastern Wisconsin Regional Planning Commission, *Soils Development Guide* (Waukesha: Southeastern Wisconsin Regional Planning Commission, 1969).

> to "save" agricultural land is likely to be resisted by many farmers.[31]

A similar drawback has been observed in Santa Clara County, California:[32]

> To divert some of the population growth from agricultural land, Santa Clara County has zoned 100,000 acres for exclusive agricultural use. However, only the land of willing farmers is zoned for agriculture, and the land may be removed from this classification upon annexation to an incorporated area. This is the procedure often chosen by farmers wishing to free their land from agricultural zoning so as to sell it for development. Since 1954 (i.e., between 1954 and 1964) approximately 83,000 acres of agricultural land has been annexed to cities.

Often officials of proliferating cities in Santa Clara collaborated with farmers, speculators and developers by annexing and taking over all zoning controls of areas where developers wanted to build.[33]

Conservation Zones. Borrowing again from the Harristown, Illinois, *Zoning Ordinance:*[34]

> The Conservation Zone is established to prevent the construction upon or alteration of rural or natural environments which have natural conditions of soil, slope, susceptability to flooding or erosion, geological condition, vegetation or an interreaction between the aforesaid, which makes such lands unsuitable for urban development. Further, this Zone is established to protect areas of the environment, that, if altered, would cause health, or pollution problems and environmental deterioration. The Conservation Zone will also insure adequate areas for future conservation and recreation pursuits.

A conservation zone, like an agricultural zone, may be subject to pressures for rezoning to a more intensive use due to development pressures unless local government is strongly committed to a protection policy and reinforces it through appropriate tax assessment and public investment policies. Furthermore, such a protection policy should be region-wide and supported by all localities since "rezoning of conservation areas by one municipality can be detrimental to its neighbors."[35] Conservation districts are intended primarily for con-

31. Isberg, "Development Problems in the Urban-Rural Fringe: Need for Unified Plans and Programs," 7. Presentation at Confer-In 72, Annual Meeting of the American Institute of Planners, Boston, October 1972; mimeographed.

32. Strong, "Urban Growth. Techniques for Guiding Development in the Philadelphia Region," *Issues,* 8 (Philadelphia: Philadelphia Housing Association, March 1964).

33. Downie, "Misplanned Suburb," *The Washington Post,* December 30, 1973, at C5.

34. Harristown, Illinois, *supra.*

35. Strong, *supra* at 8.

servation use alone although agriculture is often permitted. For example, the Coon Rapids, Minnesota, City Code establishing a Conservation District cites the following permitted uses:[36]

(i) Outdoor recreational uses operated by a governmental agency or conservation group, homeowners or private association. . . .
(ii) Open space areas connected with residential, commercial, and industrial planned unit development.
(iii) Conservation uses including drainage control, forestry, wildlife sanctuaries.
(iv) Agricultural uses.
(v) Nature study areas and aboretums.

A number of more specific conservation oriented zoning and other development ordinances have been developed: flood plain zoning;[37] coastal plain zoning;[38] wetland zoning;[39] stream bank zoning;[40] shoreland zoning;[41] steep-slope zoning (or hillside ordinances)[42] and natural resources districts. Often a special use permit is required for any construction in environmentally sensitive areas or for certain types of development with high impact potential. Special use permits allow for a greater degree of detail and flexibility in controlling the quality of development and its impact on the environment.

Impact Zoning. This innovation dispenses with traditionally more rigid (but perhaps capricious) zones designed for particular land uses. In place of traditional zoning practices, an ordinance prescribes criteria for impermeable coverage of sites, services required to be within a given proximity, and compatibility among land uses. The aim is to minimize the impact of urban development on the natural environment and infrastructure and encourage desirable site planning *without* being arbitrary or inflexible.

John Rahenkamp and Walter S. Sachs of Rahenkamp, Sachs, Wells and Associates originated the impact zoning system.[43] They claim that their Development Impact Model serves as both a performance

36. Coon Rapids, Minn. City Code, Ch. 11-300 as a,ended by Ord. 378 (1972).
37. See J. Kusler and T. Lee, *Regulations for Flood Plains,* Planning Advisory Service Report No. 277 (Chicago: American Society of Planning Officials, February 1972).
38. See Hite and Stepp, eds., *Coastal Zone Resource Management* (1971).
39. See J. Turner, "Preservation of Wetlands: A Critical Evaluation of Connecticut's Approach," (Presentation at Confer-In 72, Annual Meeting of the American Institute of Planners, Boston, October 1972).
40. See Atlanta Regional Commission, *supra.*
41. Southeastern Wisconsin Regional Planning Commission, *Floodland and Shoreland Development Guide* (1969).
42. See American Society of Planning Officials, *Hillside Development,* Planning Advisory Service Report No. 126 (Chicago: American Society of Planning Officials, September 1959).
43. Stimson, "Impact Zoning May Be a Way Out of the Land-Use Impasse," *House and Home,* 59, August 1972.

standard and a method of computation by which any development proposal can be measured for its potential impact on the natural, social, and economic environments.[44] It thereby serves a dual function as action instrument and decision guide. A local government and the developer can measure any proposed project on any proposed site against performance standards. An analysis will rate the proposed project as meeting or not meeting each of those standards.

An impact development model can provide other information about the impact of a proposed project on a proposed site, for example construction costs of a project for alternative sites; revenue produced; and cost of services which a project will demand. Such information might help a government to know where to give or withhold incentives for construction and which projects to discourage until beneficial concessions have been made by the developer. Or it may provide cities, who are taking "fair-share" low-income housing, with a case for collection of a subsidy from higher government.

Taxation. Innovations in taxation policy to control the timing and location of development have been closely related to attempts to establish and retain conservation and agricultural zones. The Southeastern Wisconsin Regional Planning Commission notes that:[45]

> Under present Wisconsin Constitution and Statutory Law, the most satisfactory way to relieve the owner of lands zoned for exclusive agricultural or conservancy use from unrealistically high property assessment and taxation is to remove the development potential. This may be accomplished in one of three ways:
>
> 1. The property owner may voluntarily grant an easement to a local unit prohibiting development for a period of at least 20 years.
> 2. The property owner may voluntarily place restrictive covenants upon the lands enforceable by a governmental unit in perpetuity or for some substantial period of time.
> 3. A governmental unit may purchase the development rights.
>
> Such private or governmental actions will serve to permit the local assessor to assess open lands at their fair market value for agricultural and conservancy uses and not on their potential value for urban type uses.

Minnesota's "Green Acres Law"[46] authorizes owners of agricultural land to receive deferments on property taxes. Agricultural land is assessed according to its market value as agricultural land until it is

44. Rahenkamp, Sachs, Wells and Associates, Inc., *Land Use Controls: Development Impact Model*, 4 (Philadelphia: Stetson House, 1971).

45. Southeastern Wisconsin Regional Planning Commission, *supra*, at 118.

46. Ch. 60, Extra Session Laws of 1967.

sold or converted to urban use. At that time, the owner must pay the difference between the taxes paid under an agricultural assessment and that of an urban use assessment plus interest for the previous three years. Special local assessments on improvements are deferred until the property is converted to urban use. The Minnesota law requires no commitment by land-owners to future agricultural use. The provision has been criticized as encouraging speculation and leap-frog development since land owners may hold property until prices increase without penalty of increased taxes.

California and Hawaii have similar assessment policies, although a commitment to agricultural use is required for a minimum of ten years. A recent study of preferential tax assessment on agricultural lands in New Jersey suggests that if such policies are not coupled with a required commitment to future agricultural use, they may simply encourage speculative purchase of farmlands.[47]

Pennsylvania's Act 515, passed in 1965, is also based on the incentive of tax abatement or deferral. Act 515, however, differs from some other state laws in that it is applicable to a wider range of natural resource areas than simply agricultural ones. Act 515 "enables certain counties of the Commonwealth to covenant with land owners for the preservation of land in farm, forest, water supply or open space uses."[48] The provision is currently used by Bucks County which defines the four categories of land for preservation as follows:[49]

1. *Farm Land.* Any tract or tracts of land in common ownership of at least 50 acres in area used for the raising of livestock or for the growing of crops.
2. *Forest Land.* Any tract or tracts of land in common ownership of at least 25 acres in area used for the growing of timber crops.
3. *Water Supply Land.* Any contiguous land area of ten acres or more, described as having naturally formed slopes greater than 20% or subject to flooding at any average frequency of once every 50 years or the highest flood of record, whichever is greater.
4. *Open Space Land.* All lands in Bucks County held in common ownership which have 3% or less site coverage (including structures, roads, and paved areas) except those lands ineligible under the provisions of Article III of this plan.

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47. Center for the Analysis of Public Issues, *Misplaced Hopes, Misspent Millions* (Princeton: Center for Analysis of Public Issues, 1972).

48. Bucks County Planning Commission, "Plan for Implementation of Provisions of Act 515 of 1965," (Doylestown: Bucks County Planning Commission, February 3, 1971).

49. *Id.*

The covenant involves a twofold commitment for ten years: (1) by a landowner to maintain his land as open space; and (2) by the county to assess the property at fair market value given the restrictive covenant. The covenant is automatically renewed each year and the ten-year period is extended by one year unless either the landowner or the county decides to terminate it. The county may terminate the covenant on the sole ground that the designation of the land parcel is no longer in keeping with the adopted municipal, county, or regional plan. Experience with Act 515 in Bucks County has been somewhat limited, although 2000 landowners have applied to utilize the act. Landowners, even speculators, may sign a covenant. The 5 percent fine on back taxes for a five-year period makes this act only a holding measure—it does not permanently protect. But it does buy time.[50]

Public Investment. Innovations in the area of *public investment* to control the location and timing of urban development have been characterized by an increased recognition and use of public utility and transportation systems to shape urban growth patterns. A recent survey of twenty-nine planning directors in ten states stretching from North Carolina to Wisconsin conducted by the Water Resources Research Center at the University of Tennessee reports that 96 percent of the respondents evaluated the location of major highways and improvements as a successful implementation device; 58 percent reported that the location of trunk water lines was an effective control strategy; and 70 percent found the location of trunk sewer lines a successful strategy.[51] The report cautions, however, that "while various plan implementation techniques are generally given high scores, the planning function in urban government is widely recognized as generally not having been very successful in implementation of land use plans except where those plans have merely extrapolated present trends.[52] This is because about a fifth of the jurisdictions had no plans to be implemented and of the others with plans, only a minority specified the desired *sequence* of development."[53] As planners become more oriented to implementation, we can expect temporal aspects of policies and plans to take on more importance.

The Metropolitan Council of the Twin Cities, Minnesota, in its *Metropolitan Development Guide,* provides an example of a policy

50. Interview with L. Kendig, Planner, Bucks County Planning Commission, in Chapel Hill, December 20, 1972.

51. Kenney, *Urban Water Policy as an Input in Urban Growth Policy,* 40 (Knoxville, Water Resources Research Center, University of Tennessee, September 1972).

52. *Id.,* at 39.

53. *Id.,* at 39.

dealing with sanitary sewers as a device to implement a growth strategy;[54]

> –Phase interceptor extensions to promote orderly and economic development.
> –Extend interceptors into communities only when the residents are assured of governmental capability to provide a full range of urban services and to exercise adequate planning and control.
> –Prohibit extension of sewer systems into areas where development should not occur, such as flood plains, airport clear zones, major groundwater recharge areas, and areas designated for open space use.

Similarly, open space, transit service, and thoroughfares will also be used as means to implement the development plan.[55]

Isberg notes, however, that it may be too early to evaluate the success of these policies and offers important insights into the problems which the Metropolitan Council has encountered in attempting to effect these policies.[56]

> For one, the Council has not firmly determined which areas in the Metropolitan area should be encouraged to develop and which areas should be "saved" for agricultural production or simply left in an existing open space. . . . As a consequence, the Council has been reluctant to turn down sanitary sewer extension requests by many of the suburbs.
>
> Secondly, the Metropolitan area is currently planning a "catch-up" game in relation to expansion of the major public utilities, especially sanitary sewer facilities. That is, most of the facilities being planned for and constructed at the present time are to serve a need developed by past and existing ongoing development. Until such time that the metropolitan areas has reached the position of serving all existing needs, it will be very difficult to use utility extension policies to purposely "shape" development with any great degree of effectiveness.
>
> Third, there still is basically a lack of agreement and coordination between different agencies responsible for the provision of sanitary sewers. At the present time, there are a host of agencies involved in the planning, construction and financing of these facilities, . . . it is no secret that the aims and policies of many of these agencies conflict.

54. Metropolitan Council of the Twin Cities Area, *Metropolitan Development Guide. Major Diversified Centers–Policies, System Plan, Program* (St. Paul: Metropolitan Council, February 1971); Metropolitan Council of the Twin Cities Area, *Metropolitan Development Guide. Sanitary Sewers–Policies, System Plan, Program* (St. Paul: Metropolitan Council, 1970).

55. Metropolitan Council of the Twin Cities Area, *Metropolitan Development Guide. Major Diversified Centers–Policies, System Plan, Program,* 30.

56. Isberg, *supra,* at 11-12.

> Fourth, the Metropolitan Council does not have adequate control over the use and construction of private sanitary sewer systems such as septic tanks and drainfields. Unless control can be exercised over private sanitary sewer systems in the urban-rural fringe, it will be difficult to use sanitary sewer policies to control development.
>
> Fifth, the Metropolitan Council has not achieved complete coordination in the policies and programs for the different functional areas such as highways and sanitary sewers. . . . A major sanitary sewer plan and interceptor is currently being constructed for the north-central portion of the county which will "open up" development in this area, yet the proposed transportation plan . . . indicates that major highways will not be constructed in this area until sometime in the distant future.
>
> Finally, "political factors" have complicated the use of utility extension policies. That is, land speculators, developers and officials of many local communities have put a great deal of pressure on representatives of the various public agencies, especially the Metropolitan Council, to approve extension of sanitary sewer systems.

It appears that in order for public investments to serve as an effective implementation device for a land use development plan, such a plan must be stipulated in some detail, with respect to both location and timing of development and it must have the support of those who will be implementing it.

Various financing techniques, such as differential user charges for utilities, may also be effective.[57]

Coordination of Several Action Instruments

It may be generally stated that no single tool is effective in and of itself. The essence of guidance system planning is the design of a coordinated series of action instruments which, operating in concert, create a new set of conditions and rules for urban development. The *development sector strategy* is one approach to coordinating regulations such as zoning, tax policies, and public investments. Two basic approaches to achieving an interface between public investment planning and land use planning have been offered. The first, termed Framework or Development District Zoning, is a technique for utilizing comprehensive capital improvement planning as well as the police power to control the location and timing of development. For example, Bucks County, Pennsylvania, has proposed the use of a development district concept in which four types of development areas are proposed: *Urban* areas where few parcels remain undeveloped;

57. For a discussion of utility financing techniques to complement a growth guidance policy, see Kenney, *supra*, at 4-8.

Development areas where growth pressures are intense; *Rural Holding* areas where much land is still in agricultural or forest, and development pressures are not intense; and *Resource Protection* areas where development would jeopardize natural, recreational and historic resources. Included in this latter area are flood plains, precipitous slopes, and areas of outstanding historic or scenic interest.[58] The fundamental aim of the development sector policy is to "prevent scattered development and urban sprawl without discouraging development in general." It recommends that growth be encouraged in designated development areas through provision of full public services and utilities based on a five-year capital improvement program and through more intensive zoning. Simultaneously, growth would be discouraged in rural holding areas by withholding public service, large lot zoning (minimum 5 acres), low tax assessments under Act 515 (discussed above) prohibition of development on sites exhibiting unfavorable percolations, agricultural management and assistance programs for farmers, and public education.

The Bucks County framework zoning approach places less emphasis on goal forms than does an orthodox land use plan, although it does not ignore objectives. It also puts more emphasis on development dynamics which are characteristics of the different districts and on action strategies which are suitable both to a sector's particular development dynamics and to objectives (which might be stated in a separate land use design plan).

An additional dimension may be added to the development sector strategy through use of a development timing ordinance. Although this type of ordinance is not entirely new,[59] its recent revival by the town of Ramapo, New York, has created a great deal of interest.[60] In 1969, Ramapo[61]

> amended its zoning ordinance to create a new kind of "Special permit" use labeled the "Residential Development Use." Anyone wanting to use land for residential development cannot do so without a special permit. And a special permit is granted only if standards are met for minimum facilities and services available to the new development. The required services include sewerage, drainage, parks or recreation, schools, roads, and firehouses. The ordinance sets up a point system of values assigned to these services. A Special

58. Bucks County, Pennsylvania Planning Commission, *The Urban Fringe: Techniques for Guiding the Development of Bucks County* (Doylestown, Pennsylvania: Bucks County Planning Commission, 1970). Excerpts reprinted in American Society of Planning Officials, 4 *Land Use Controls Quarterly*, 34 (Chicago: American Society of Planning Officials, 1970).

59. See, for example: Green, *et al.*, *supra.*

60. See "Ramapo," 38, *Planning, The ASPO Magazine*, 108 (1972).

61. *Id.*, at 108.

> permit requires a proposed development to satisfy at least 15 development points. The town, for its part, is pursuing an overall development plan and a capital improvement program drawn from that plan. If services needed for residential development are missing, Ramapo proposes to include them within its 18-year program of capital improvements, of which the first six years are specified in a capital budget.

A developer may at his own expense install sufficient improvements to overcome any deficiency in points and thus achieve the 15 points necessary to acquire a development permit. Preferential tax status is granted to land which can't be developed currently.

The Ramapo approach differs from the Bucks County approach in several important ways. The Ramapo Timed Development Ordinance approach starts from a master plan on which are based a zoning ordinance, a capital improvements program and finally, a regulation calling for a development permit. The development district framework zoning of Bucks County forms only a general framework which individual communities and the county would hopefully use as a guide to develop land use plans regulations such as zoning, and capital improvement programs. Thus, while the framework zoning of Bucks County *suggests* coordination of land use plan, regulations, tax policy, and capital improvements, the Ramapo Timed Development Ordinance uses the police power, in the form of a requirement for a development permit, to literally enforce, not suggest, the logic of a coordinated master plan, zoning ordinance, and capital improvement program. Hence, the Timed Development Ordinance carries planning through to action much more certainly than does the Development Sector Framework Zoning of Bucks County.

The coordinated provision of public services, regulations and tax policies according to a scheme outlined in a general land use plan, whether or not the plan is supported by development district zoning and/or more strictly by a development timing ordinance as in Ramapo, would direct growth only to general areas. This may help prevent urban sprawl and the flagrantly inefficient use of land resources and it may channel growth away from large areas not yet impacted by urbanization. However, even within designated growth areas, development must still be steered away from critical sites (for example, hillsides and stream banks) and controlled to reduce the potential for environmental degradation which urbanization carries with it in any location. Hence, there is a need to consider the guidance of site design as well as the location and timing of development.

Action Instruments for Controlling Spatial Design Characteristics at the Site

Basically, there are three techniques for controlling site design characteristics to protect the environment: use of density zoning or planned unit development ordinances; inclusion of critical environmental provisions in zoning, subdivision, building, or health ordinances; and requirement of environmental impact analysis on proposed development as a prerequisite to granting rezoning, subdivision plats, or building permits.

Density Zoning and Planned Unit Development. The literature has offered a rather extensive discussion of the relative advantages and disadvantages of density zoning and planned unit development.[62] Essentially, both density zoning and planned unit development offer the developer flexibility in designing the site as long as an overall density restriction and other requirements for improvements are met. This flexibility offers the potential for promoting environmental quality, since development may be clusters on more environmentally tolerant parts of a site while sensitive areas are retained as open space.

Most density zoning or planned unit development ordinances require submission of a site plan as a prerequisite to approval. Through site review, assurance can be made that optimum site design and construction practices, from an ecological perspective, have been achieved.

Bucks County has proposed a rather innovative addition to standards for cluster developments; not only would density requirements be stipulated but so, too, would an open space ratio and an impervious surface ratio (a ratio of all surface area impervious to rain, such as buildings, parking areas, driveways, roads, sidewalks to the gross site area).[63]

An expansion of this idea is the concept of Environmental Characteristics Planning.[64] ECP suggests a kind of "environmental PUD"—a prescription and their allocation of appropriate districts in the plan-

62. See, for example: D. Mandelker, *Controlling Planned Residential Developments, ASPO Planning Advisory Service Special Report* (Chicago: American Society of Planning Officials, 1966).

63. Bucks County Planning Commission, "Proposed Amendment to Middletown Township Zoning Ordinance," (Doylestown: Bucks County Planning Commission, 1972).

64. J. Kaminsky, *Environmental Characteristics Planning: Physical Development Standards for Character Control* (Baltimore: Regional Planning Council, 1969); Kaminsky, *Environmental Characteristics Planning: An Alternative Approach to Physical Planning* (Baltimore: Regional Planning Council, 1972).

ning area. Development types would be delineated using the same criteria proposed in Bucks County—an open space ratio and an impervious surface ratio (called a natural-to-manmade-surfaces ratio)—and others, including a floor area ratio and a parking space ratio. Also suggested are a density ratio (the maximum number of people in residence, or the number of employees in a place of work allowed per square foot of floor area); a landscaped space ratio (a minimum square footage of nonvehicular outdoor space required for each square foot of floor area); and a height-distance relationship (the relationship between the height of a building and its distance from other buildings).

For each criterion, standards vary among development districts types. A prospective development must meet the standards of the development district in which it will be located. ECP could be incorporated into zoning regulations and a development district map could supplement the zoning ordinance.

Environmental Provisions within Traditional Land Development Regulations. A second means for controlling design characteristics is inclusion of critical environmental provisions within zoning, subdivision, building, or health (for example, septic tank) ordinances. For example, the Buffalo County, Wisconsin, Zoning Ordinance includes wet soils, steep soils, and suitable soils districts as overlay to all general zoning districts. These districts carry supplemental controls over land use in addition to the regulations of the respective primary zoning districts.[65] For instance, wet soils overlay districts imply periodic high water tables; although any use permitted by the primary zoning district is allowed, basements or subsoil disposal are not allowed in the wet soils overlay district portion of the primary zoning district.

Similar special soil regulations for incorporation in local zoning ordinances are suggested by the Southeast Wisconsin Regional Planning Commission's *Soil Development Guide.*[66] The *Guide* also offers model soil regulations (appropriate for southeast Wisconsin) to be included in subdivision ordinances, building ordinances, and sanitary, health, or plumbing ordinances. The primary purpose of such provisions is to control pollution of sub-surface groundwater but, along with construction ordinances, they could also limit erosion and siltation by prohibiting development on particularly erodable soils.[67]

65. Buffalo County, Wisconsin, *Zoning Ordinance* (Alma, Wisconsin: Buffalo County, 1965).

66. Southeastern Wisconsin Regional Planning Commission, *supra.*

67. Fairfax County, Virginia, *Erosion-Siltation Control Handbook* (Fairfax: Fairfax County, 1972).

Environmental Impact Evaluation. The third approach to site control is to require developers to submit an environmental impact evaluation on proposed development. Although such requirements are normally limited to disclosure requirements only, they tend to shift the ultimate responsibility for environmentally sound development practices to the developer. Furthermore, such public disclosure provides a "pressure point" for public officials to suggest necessary remedial action to be taken by the developer. Huntington, New York, for example, now requires impact statements for any subdivision of more than five lots and all industrial site plans, and reviews all rezoning and variance requests with respect to environmental impact. However, their "word is far from final and the review authority is informal."[68]

The Rocky Mountain Center on Environment has proposed a Model Environmental Subdivision Regulation which would extend the impact statement requirement concept beyond disclosure. No subdivision permit would be granted unless the "Environmental Inventory and Analysis" was adequate and insured that the development essentially would not adversely impact on water quality, water supply, soil erosion, air quality, highway congestion, scenic areas, and wildlife; would not unreasonably burden public services such as schools, fire, police, hospital and the like; and conforms with a duly adopted master plan.[69]

STAGE 4: EVALUATION OF ACTION ALTERNATIVES

The assessment of environmental impact is often separated from a test of effectiveness of the proposal in attaining its primary objectives, which may not be environmental.

Evaluating Effectiveness

The Bucks County, Pennsylvania, Planning Commission has initiated a planning process which involves each of the planning process stages outlined thus far including the evaluation of effectiveness. The "Computerized Guidance System" represents a major revision in planning process, characterized by a "shift in emphasis away from maps toward issues and policy as the key elements of the plan, an automation of plan generation and testing, and greater flexibility."[70]

68. Letter from M. Pawlukiewicz, Environmental Planner, Department of Environmental Protection, Huntington, New York, to Peggy A. Reichert, December 28, 1972.

69. Rocky Mountain Center on Environment, *Land Use Packet No. 1*, p. 34 (Denver: Rocky Mountain Center on Environment, November 1, 1971).

70. L. Kendig, "Computerized Guidance System as Developed in Bucks County," 1, presented at Confer-In-West, Annual Meeting of the American Institute of Planners, San Francisco, Calif., October 24-28, 1971; mimeographed.

A variety of land use and natural inventory data is organized on a 22.95 acre, 1000 x 1000 foot square grid basis, and placed in a computer file. (Stage 1 of the guidance process.) Various development policies (Stages 2 and 3 of guidance systems planning process) are then translated into model form in order to "relate the effect of a set of policies to assist the County commissioners in establishing and following policies to achieve the desired end."[71] For example, a series of policies were combined to produce a County Park Plan using this system of data and modeling links. Seven major policy areas were defined in relation to open space objectives: maximum utility, site quality, accessibility, proximity, land value, supply and demand, and threat. For example, in terms of maximum utility, the operating policy was that "the park site which is suitable for the greater number of recreation activities is a better site than one suitable for fewer activities." Each policy was then converted into a model:[72]

> Some of these models are sets of overlays, to determine suitability for parks. The Site Quality Map is illustrative of this type model. The accessibility model is a behavioral model, based on a formula derived from a survey of county residents. Its basis is the observed effect of distance on frequency of park visitation. The urbanization threat model is a simulation model. Variables were: population growth by municipality, vacant land by municipality, presence of sewer, proximity to highways, and existing urbanization.

The models for each objective were given a priority weighting and the combined model then applied through use of a computer to each cell, obtaining an evaluation score for each. The outcome is a priority listing to park acquisition sites.

The approach is also being used to develop a Natural Resource Plan for Bucks County.[73] The entire plan will include a land use intensity plan based on a comparison of each planning cell's natural features and its sensitivity to development. But it will also include a set of implementation policies and an integration of the Natural Resources Plan with other elements of the comprehensive plan. The Natural Resources Plan, still in the first stages, involves three major steps:[74]

> The first step . . . is to establish operational definitions for the various natural critical features of Bucks County. . . . Evaluation and weighting of critical natural features is the next step. Priorities for

71. *Id.*, at 6.
72. *Id.*, at 6.
73. Bucks County, Pennsylvania Planning Commission, *Natural Resources Plan* (Doylestown: Bucks County Planning Commission, 1971).
74. *Id.*, at 4.

> protection are established. . . . The last phase in plan development is the setting of priorities and targets. Major policy issues are tested. For example, one policy might be to protect the most threatened resources. A conflicting policy would be to protect areas where land values are low and the most land could be preserved for each dollar spent. Both are valid planning concepts. A weighting system can incorporate the two into a single plan which may be pre-tested by computer, whereas intuitive discussions of conflicting policy issues often lead nowhere.

Evaluating Environmental Impact

In addition to testing the potential effectiveness of a plan, policy, or regulation, there is now a trend toward testing the environmental impact of alternatives. This may be especially significant when the alternatives generated were not specifically related to environmental quality objectives, for instance, alternative highway routings. The trend has been spurred by the requirements of the National Environmental Policy Act of 1969, Section 102 (C) requiring that all agencies of the federal government:[75]

> (C) include in every recommendation or report on proposals for legislation and other Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on—
>
> (i) the environmental impact of the proposed action,
>
> (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,
>
> (iii) alternatives to the proposed action,
>
> (iv) the relationship between short-term uses of man's environment and the maintenance and enhancement of long term productivity, and
>
> (v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

In keeping with this requirement, all federal agencies now require an analysis of the environmental impact of any plan, program, or project sponsored by federal monies. For example, the Department of Housing and Urban Development's *Comprehensive Planning Assistance Requirements and Guidelines* for a Grant (the 701 Program) now include a requirement for "environmental assessment."[76]

In some states and localities, environmental impact analysis is

75. 42 USC Sections 4321-47, Pub. L. 91-190, 83 Stat. 852.

76. U.S. Department of Housing and Urban Development, *Comprehensive Planning Assistance Requirements and Guidelines for a Grant,* 3 (Washington, D.C.: U.S. Government Printing Office, March 1972).

applied at the project level. Thus far, however, no state or local requirement includes an impact analysis on long range, comprehensive plans. The federal requirements as well as most state and local requirements for environmental impact statements simply provide for disclosure of assessed impact. The methodologies which have been developed for such analysis, however, could be used to choose between alternatives on the basis of their respective environmental impacts.

Most evaluation methodologies developed thus far are applicable at the project level and are not suited to evaluation of a general plan such as a land use plan. These methodologies focus on producing an information display matrix for the decision-maker. For example, Luna B. Leopold, *et. al.* have developed a display matrix in which the proposed actions that are part of the project—land transformation and construction activities—are related to a range of possible environmental impacts—physical and chemical characteristics of land and water.[77] Wherever a relationship between the action and the environmental elements exists, it is scored on two factors: first, in terms of the magnitude of the impact, and second, in terms of the importance of the impact, and hence of the importance of the environmental element of subsystem, to the total environment. Steinitz, Rogers, Inc. followed a similar approach in an environmental impact analysis of ten alternative highway corridor routings in Rhode Island.[78]

The information display matrix approach is useful because, although models of environmental subsystems have been developed in which the various elements of single subsystems have been weighted in terms of importance to the system function, there is not yet an accepted model available for summing impacts across subsystems. To a certain extent, the relative importance varies depending on the objectives of the given community involved. Thus, air quality effects may be given more attention than other environmental impacts in Los Angeles, for example. Given this aspect of relativity and the technical problems in comparing unlike impacts, methodologies for evaluating environmental impact currently focus on describing and listing the separate impacts, relationships, and interactions so that the decisionmaker can infuse his own perception of relative importance of each impact type into the final analysis.

77. L. Leopold, *et al., A Procedure for Evaluating Environmental Impact,* Geological Survey Circular 645 (Washington, D.C.: U.S. Geological Survey, 1971).

78. Steinitz Rogers Associates, Inc., *Potential Environmental Impacts of Interstate 84 in Rhode Island: A Summary* (Mimeographed, unpublished, February 1972), and an interview with Carl Steinitz, Associate Professor, Department of Landscape Architecture, Harvard University, and partner in the consulting firm of Steinitz, Rogers, Inc., in Chapel Hill, November 9, 1972.

STAGE 5: SELECTION AND IMPLEMENTATION OF ACTION INSTRUMENTS

The fifth stage of the guidance system planning process involves the political process in making decisions about or choices among the alternative decision guides and action instruments, especially action instruments. Guidance system planning activities must eventually come to the adoption and administration of action instruments if planning is to contribute to the community's guidance system for urban land use, land development and redevelopment, and hopefully to preserving environmental quality. This is the stage where land use planning can contribute to the unfolding reality of present actions and thereby exercise some influence over the future.

Since implementation is the focus of the guidance system planning concept, most analyses and designs in earlier stages should be conducted with conscious and perhaps direct reference to this crucial implementation stage. Political and economic realities of implementation should be among the factors considered in analysis and design activities. The agenda of issues before the legislative body or scheduled for their consideration and the issues emerging in the minds of decision agents in the public-private development process are important stimulants to the planning agenda—perhaps more important than the idealized comprehensive planning process.

STAGE 6: FEEDBACK AND MONITORING

The final stage in the guidance system planning process, feedback and monitoring, brings the process full circle. Evaluation of urban system performance is obviously necessary to maintain an adequate information system for ongoing planning. With respect to environmental quality objectives, some indicators of system performance may be formally designated and monitored: air quality; water quality; open stage acreage; and public accessibility to open space. Yet the objectives themselves change over time as public demand for a high quality environment increases. For example, the Environmental Development Agency of San Diego County, California, is currently developing a regional environmental quality information system.[79] In addition to establishing indicators that are scientifically sound, they propose to interview selected officials of city and county government to determine their views as to the relative importance, the format and the frequency of distributing environmental quality

79. 1, County of San Diego, Environmental Development Agency, *Environmental Quality Index–A Feasibility Study. County of San Diego Regional Issues* (San Diego: Environmental Development Agency, June 1972).

information.[80] The purpose of such interviews would be to insure that the information system was geared to the actual needs of decisionmakers as they respond to public concerns. They would be asked to rank various type of environmental degradation, expressed in terms of issues rather than scientific measurements.[81] They would also be asked to rank factors that may contribute positively to environmental quality (e.g., "to what extent does the region satisfy man's desire for a varied landscape?").[82] Questionnaires of this sort could also be sent to a random sample of the public to periodically monitor their concerns with and perceptions of environmental quality.

SUMMARY

The increasing emphasis on carrying planning activity directly through to implementation and the corresponding decreasing emphasis on the comprehensive plan and the land use plan design as the major mechanism for land use planning; the redefinition of comprehensive goals to include new environmental objectives and non-growth alternatives; and the quiet revolution in land use control and (perhaps) the land ethic—all of these trends have spawned the development of new methodologies and new outputs in land use planning in local and metropolitan agencies.

Most innovating local planning agencies across the country have focused their efforts on perhaps one or two of the six stages of the planning process depending upon which link in the process appears weakest or seems to offer the most potential for creating an effective planning operation. As a result, innovations with respect to reorienting land use planning to include environmental quality objectives are quite varied, and only a few examples of cutting edge approaches could be presented here. Nevertheless, although widely scattered across the country and never integrated in one location, these scattered innovations signal a dramatic potential for a more comprehensive innovation in land use planning. This prospective synthesis points to a land use planning process which we have termed guidance system planning.

There is no consensus at the present on the most appropriate approach to guidance system planning for urban land use. There is no single inherently correct planning proces to define land use problems, establish objectives, design alternatives and assess consequences. The appropriate character of guidance system planning for a given urban

80. *Id.*, at 111.
81. *Id.*, at 112, 113.
82. *Id.*, at 113-115.

area should depend on the problems encountered, the goals of the community, the needs of the decision-making body, the degree to which public intervention in land development is accepted, and the general level of planning resources available.

Hopefully this discussion has illustrated that environmental considerations in land use planning have progressed beyond the general calls to action by editorialists, keynote speakers and distinguished national advisory committees and that planning practice is reflecting these concerns in methodological innovations. Hopefully also, this paper illustrates that guidance system planning is not simply an abstract planning concept. It is in fact a reality which is emerging in "bits and pieces" through the efforts of numerous planners and academicians working semi-independently. The guidance system concept merely argues for the desirability and the feasibility of bringing together these independent innovations in methodology and implementation techniques into a wholistic land use planning and control system—a system which doesn't yet exist in any specific place.