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STATE LAND USE PLANNING PROCESS ISSUES

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STATE LAND USE PLANNING PROCESS ISSUES

Abstract

As our society becomes more technology oriented and the scale and intensity of our activities increase, wide spread environmental interdependencies become more evident. This leads to a proliferation of confrontations among competing private and public interest, leading to and involving an increasing role for governmental intervention. Increasingly, the courts are confronted with the fact that conflict resolution via traditional common law doctrines, such as a nuisance doctrine, are increasingly inadequate means of influencing land use decisions. Conflict avoidance becomes necessary and this requires expanded legislative and administrative agency participation in land use conflict situations. The governmental role in land use allocation decision making is shifting from conflict resolution to conflict avoidance--in response to the increased complexity and potential impacts of that decision making process; and in response to new conceptions of the nature of land. Consequently, the federal and state role in land use planning is increasing and the emergence of a statewide land use planning process will occur and will bring forth data and system requirements. The process and its requirements must be anticipated.

Caution is expressed, however, because of the immense expectations that statewide involvement in land use planning will result in the avoidance of land use conflicts. Unfortunately, the basic philosophical conflict between technological optimists and technological pessimists will continue and expectations for land use planning should be modest in providing an effective and equitable form for debate and decision. If we have learned anything from other planning efforts, such as urban transportation planning, we should recognize that the "rational" planning approach will not result in concensus on land use issues. Similarly, if one looks at the urban renewal experience, one sees that an unholy alliance between housing reformers and downtown interests eventually tore the program apart. Similarly, can environmentalist and developer groups backing land use legislation be compatible bedfellows for long?

The major area of concern in identifying the emerging statewide land use planning process is to categorize elements of that process because of the vast difference in analysis techniques, data needs, and system requirements. The statewide land use planning process has been defined as elements:

1. policy planning,
2. program planning,
3. land inventory,

4. impact assessment,
5. land capability.

These elements have significantly different implications with respect to the level of data aggregation, the geocoding options, the computer system requirements, and the analytical modeling capabilities needed.

There are also a number of unresolved issues with respect to the capture and encoding of geographic data that preclude the implementation of the most sophisticated and detailed information systems. Until some of these issues are resolved, the system designers should caution planners of statewide land use information systems of potential for errors, delays, and cost overruns when attempting to encode and replicate a large number of complex coverages. Presently, a manual or coarser automated statewide information system is more appropriate, while at the same time undertaking prototype developments in smaller study areas to test more sophisticated encoding techniques and to develop staff capabilities for eventual extension to larger areas. This implies that working with the U.S. Geological Surveys LUDA System is a viable option to meet initial requirements for land inventory and coarse delineation of critical areas. The manual element of the LUDA system can meet many of the requirements and experience gained with the machine-readable version and will enable the development of staff and systems capability. Parallel development of smaller prototype systems for more detailed and sophisticated analysis is then warranted.

Most system design recommendations for statewide land use systems imply the development of a single system within a single agency. This does not give sufficient recognition to a number of groups working within a state that have developed information system elements that are extremely valuable and applicable to statewide land use planning. Consequently, states should undertake a collaborative system design and emphasize modular elements which draw upon strengths which exist within the state. This allows for more immediate operational status but also places burden on developing and solving compatibility problems and dealing with staged development of the system.

EVOLVING GOVERNMENTAL RESPONSES TO EMERGING LAND RESOURCE ISSUES

As society becomes more technologically sophisticated, urbanized and mobile, effects on environment and among land uses become more critical. Environmental risks--which in a simpler past did not exist or could be comfortably ignored--now cause proliferating social conflicts. These conflicts have led to scrutiny of traditional concepts of land and responsibilities of government. One governmental response has been legislative encouragement of statewide land use planning emphasizing "conflict avoidance" and environmental protection.

It is the intent of this discussion to relate issues of an evolving statewide land use planning process to deployment of computerized systems for information processing--geographic information systems. Information system development, as well as statewide planning, is in a formative stage. Therefore, much of this discussion will be devoted to defining the role of the geographic information system (GIS) within a statewide planning process.

THE EMERGING STATEWIDE LAND USE PLANNING PROCESS

For practical purposes, let us say that the planning process consists of providing information for decision making. Furthermore, this information may be of several types:

1. Results of technical analyses and research--to remove uncertainties about the social, economic and physical context of decisions;
2. Cooperative communication among various governmental agencies--to remove uncertainties about decisions being made in related activities; and
3. Interchange among interested parties and officials--to remove uncertainties about the social importance of effects of decisions.

Because "planning" is such a broad term, we have broken it down into a set of what we call planning functions:

1. Policy Planning represents the making of decisions about public goals, problems and needs. It is an arena of public demand--perceived needs and problems are brought to the attention of government officials by various individuals and groups. Responsible officials may call upon planning

or other agencies to supplement public inputs with "objective" information regarding the issues at hand. Ideally, technical information supporting the policy planning function comprises state and/or county level projections of trends in population, investment, consumption rates, exports, employment, labor force--so that assessment may be made of alternative strategies regarding growth and development within the state.

2. Program Planning (in the present context) is concerned with locational analyses of services provided by government. These services include recreation sites, health services, detention centers, educational facilities, etc. Analyses may also be made of relevant characteristics of the areas enclosed by newly devised boundaries, as in legislative redistricting, fire protection, sanitary and other special districts. Such studies are of special importance. The need to minimize costs of public services motivates efficiently located centers which are properly staffed and equipped to handle the needs of their respective service areas.

3. Land Inventory is the acquisition of data relating to land uses, topography, soils, watersheds, floodplains, type of ownership, jurisdiction, special districts and other items. Initial collection of this information will probably result in maps at scales of 1:500,000, 1:250,000, and 1:100,000; and tabular summaries by town and township and by county. Systematic updating will enable use of the collected data in making trend projections to support policy planning and other planning functions. The collected data will have potential use in "screening" the state to locate areas of critical environmental concern. However, because of the relatively coarse level of detail involved, other means for locating critical areas will have to be employed also. (One way, of course, is to seek "nominations" from the general public and interested groups.)

4. Impact Assessment is defined for our purposes as the evaluation of potential effects of any development project which has significance to a large area, such as a substate region of more than one county. The effects to be evaluated are short- and long-run; localized and wide-ranging; social and physical.

5. Land Capability Study: Certain landscape configurations are totally unsuited for some types of land use. For example, areas in which there are large numbers of sinkholes are unsuited for use as solid waste landfills. Land capability studies would evaluate small areas to determine what uses would be infeasible in which locations. This task bears some relationship to the land inventory but is carried on at a finer level of detail, and involves the "overlay" of inventory data and attributes of the different uses which might be considered for the locations involved. A similar task, Site Suitability Analysis takes the positive side--comparing sites to determine which have the desired characteristics for a given use.

6. Regulation includes the administrative procedures which are implemented to ensure that various development and conservation objectives are being met. It includes the review of development proposals and the issuance of permits. Regulation of land requires access to a land records system--preferably one that can be linked to the land inventory conducted at the state level. This is a challenge because regulation is likely to be carried on by specialized agencies and/or local governments, while land inventory may be undertaken independently.

Figure 1 illustrates the structure of the planning process as we have described it to this point. It shows that several types of information are utilized by a set of planning functions, and that as a result there are produced policies, plans, programs and regulations--all of which are intended to respond in desired ways to present and anticipated problems and needs.

At this point we would like to narrow the scope of our topic to consideration of technical information, as would be supported by a geographic information system. The technical information we have in mind is sought in greater or lesser amounts by each of the planning functions. It is a product of these types of Analytical Tasks:

1. Measurement, association and display;
2. Record keeping and monitoring;
3. Location analysis;
4. Diffusion models;

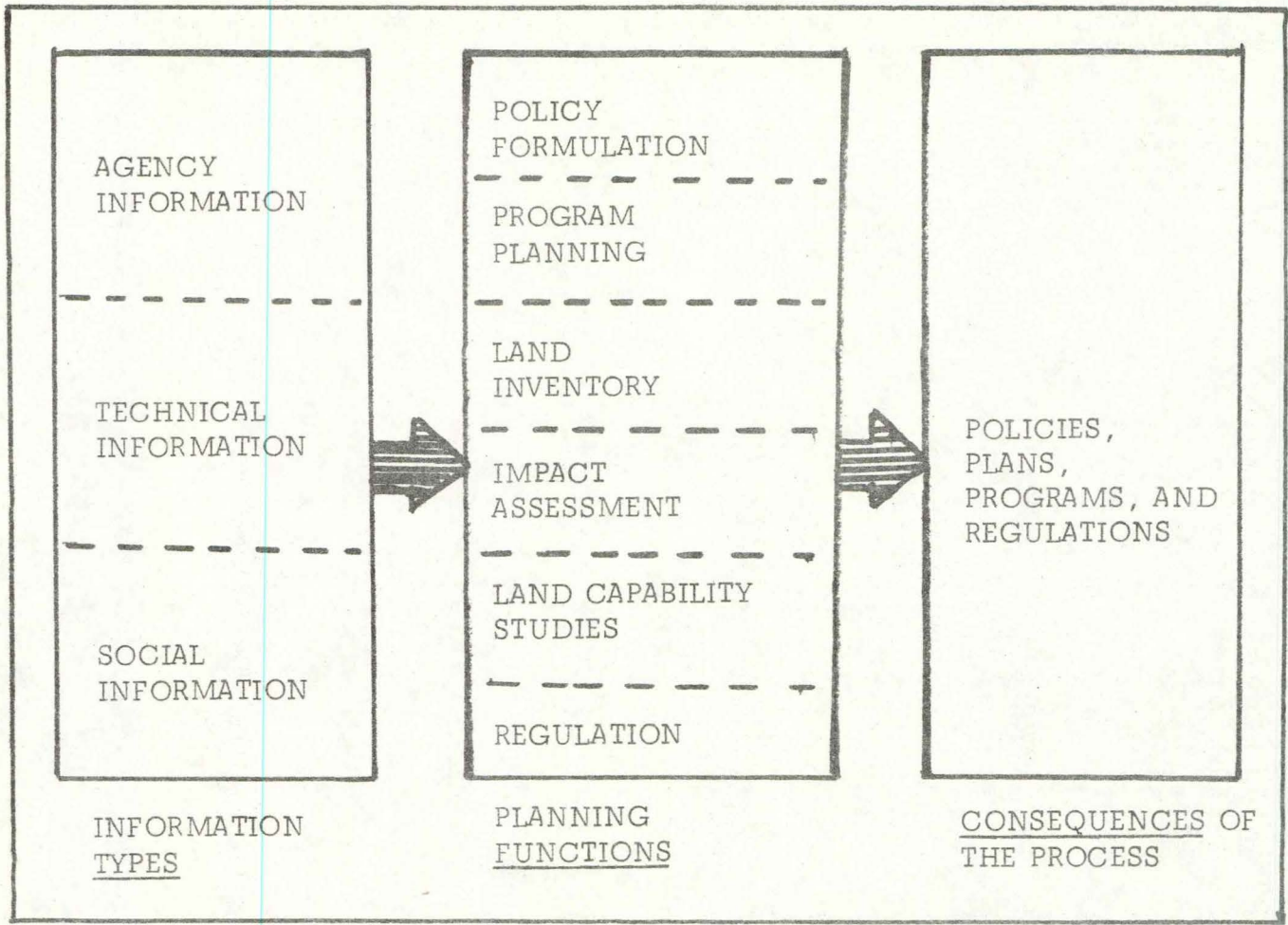


FIGURE 1. The Planning Process Provides Information for Decisions

5. Spatial interaction models; and
6. Trend projection.

We would stress that these analytical tasks may be carried on in a variety of ways ranging from intuitive judgement to the application of sophisticated, computer-based models. The choice of method should be based on relative costs and benefits. Nonetheless, all of these analytical tasks, whether simply or elaborately performed, are intrinsic to the planning functions. As the scope and importance of the planning process develops, data acquisition and analysis support necessarily becomes more systematic and formalized.

DEVELOPMENT AND IMPLEMENTATION OF A GEOGRAPHIC INFORMATION SYSTEM

We remarked that our "analytical tasks" might be performed by intuition or by sophisticated computer models. In defining "geographic information system" that remark is relevant, too. A geographic information system could be a box of index cards or a hand-sketched map. Or it could be a large and complex set of computer programs and storage devices with a large special-purpose computer. The crux of the matter is that a GIS is a systematic set of procedures--manual or machine--which is employed in an ongoing program of data acquisition, analysis and display.

Geographic information systems which are computerized are potentially able to support a number of record keeping and computational tasks which are currently being handled intuitively or by cumbersome manual procedures. The multiplicity of tasks to which the GIS may be applied, and differing levels of sophistication among them, indicate strongly that implementation would not be a "one-shot" process. Indeed, implementation would be a function of time, need, and development effort by the governmental units involved.

Because conditions, needs and organizational constraints vary so much from state to state, any speculation about actual rates of deployment of computerized systems would probably be misleading. However, we are operating on an assumption that all states are experiencing some inclination or need to move incrementally towards higher levels of production of technical information. The scenario of system development we offer below is based partly on anticipation and partly on hope--that is, partly trend projection and partly

recommendation. Normative though it may be, we regard it as responsive to the system design and planning process issues that are introduced later on.

Organizational Approaches to System Development and Implementation

There is no doubt that state governments will have a central role in development. Yet, organizational options and constraints could lead to a wide range of approaches:

1. State-dominant--Through designation of a lead agency or by inter-agency collaboration, the system is developed at the state level and performs a service role to regional and local governments. This would mean that virtually all analytical tasks would be performed by state staff.
2. Decentralized--A state lead agency coordinates a multi-level effort by state agencies, regional and local governments.
3. Division of Effort--Governmental units assume system development responsibilities according to the scale and range of their particular needs. Likely the state government would undertake a coarse-level inventory and program planning, while regional units would focus on impact assessment and land capability studies. Local governments would pursue information needs primarily related to regulation.

We suggest below how the first two of these approaches might progress through three hypothetical stages of development and implementation:

Stage One. The State-dominant approach might initiate development of a system to support land inventory, policy planning and impact assessment. Land inventory would include production of summary data based on large-scale maps such as are being compiled by the Department of the Interior under the LUDA program, at a scale of 1:250,000. Computer support would be by general-purpose computer processing of town/township and county level aggregations of data. Analytical capability would be Measurement, Association and Display. Research and development activities would focus on encoding of data from 1:24,000 scale base maps for machine processing. The purpose of this R & D effort would be to develop the processing system and to train staff in its use. A further R & D effort would be aimed at determining data needs for critical area analysis.

Policy planning would involve evaluation of county-level data and establishment of standards for information to be provided by developers' proposals.

The impact assessment function undertaken in a state-dominant approach during the first stage would entail design of analytical procedures. Research associated with the impact assessment function would work with machine-record data at smaller scales to determine relative merits of manual and machine procedures for relevant tasks.

During Stage One, a Decentralized approach would concentrate on establishment of cooperative and collaborative linkages among agencies and governmental units. Inter-agency and inter-jurisdictional committees would be formed. Communication and collaboration represent a more challenging task for this approach because of the larger number of decision makers involved. It would be necessary to obtain agreement on map data standardization (with particular emphasis on land records systems). Additionally, attention during the first stage would be given the conceptual design of the desired systems to support policy planning; and interjurisdictional relationships would be established in connection with impact assessment procedures.

In the Second Stage of development the State-dominant organizational approach would operationalize the prototype 1:24,000 scale machine-encoded map data for program planning. At this juncture computerized location and service area analyses would be undertaken.

R & D would experiment with alternative technical options for collecting and encoding and processing data. A continuing study would be made of data needs. Automated land records systems would be studied.

Newly operationalized system capabilities would be applied in impact assessment--particularly the capability for extracting data which is aggregated to specified study areas within a region. A prototype system would be utilized to assess data requirements for land capability and site suitability analysis.

Second Stage activities of the Decentralized approach would involve development of a prototype system for encoding from 1:24,000 scale base maps to a fine-cell or polygon record. Standards would be established for compatible

land records systems (under local management.) The decentralized approach would initiate assessment methods which would utilize the prototype system.

Entering Stage Three, the State-dominant approach would be concerned with development of additional modeling capabilities and updating of the inventory data base. Continued evaluation of system and data needs could be expected.

The Decentralized approach in Stage Three would probably be operational for critical area analysis, land capability studies and site suitability analysis. Additionally the land records system would be in process of implementation with efforts ongoing to link this system with state and regional data systems.

It may be observed in the above scenario that the Decentralized approach is expected more time for implementation, with initial efforts devoted to inter-agency and inter-jurisdictional organization and decision making. We regard the Division of Effort as one which might take much longer--at least in terms of developing a state system with the characteristics of collaborative and cooperative inter-agency and inter-jurisdictional linkages, and system compatability.

As was pointed out at the beginning, such a speculative description of the development of the system runs a high risk of being misleading, yet we have offered it anyway. At the very least, it should contribute to the disclosure of assumptions we are making, when we discuss issues associated with the land use planning process and GIS applications.

PLANNING PROCESS AND GIS DEVELOPMENT ISSUES

As we have described it, the planning process and technical information support problem is a complex one, with anticipated involvement of many individuals, governmental units and agencies, and interested groups. Because new developments have widespread effects ranging from changing property rights to increased service costs, a great deal of controversy may be expected even if a newly developed process were not designed to impact on the "status quo" in land use decision making.

While the focus of this discussion is on the development and implementation of a GIS, it should be obvious that a high degree of interdependency

will exist between design elements and the planning process context. For this reason, our elaboration of issues is organized as shown in Figure 2, wherein Design Issues are discussed concurrently with relevant Planning Process; Interjurisdictional and Inter-agency; and Technique and Method Issues. In some cases, past experience in public policy and programming is applied to support our assumptions regarding the nature and needs of the future planning effort.

Planning Process Issues

Two basic areas of concern are reported here, regarding the overall planning process. One has to do with unsatisfactory previous experience in utilization of the "Rational Model". For this, we refer back to the experience of the highway programs of the 1960's. A second concern regards the resistance likely to be mounted against any expanded governmental role in land use decisions. A basis for this resistance is the dissatisfaction felt by some with regard to current methods of land regulation, and also on the basis of beliefs that, currently, nuisance laws are adequate for the protection of those property rights which should be protected.

The Need for a More Effective Process. Perhaps the most visible consequences of planning process may be found in the area of transportation planning, initiated on a large scale in the 1960's. Certainly this is an area where substantial amounts of resources were dedicated to large-scale changes in the physical configuration of large regions.

The highway program was attractive, politically, largely because it made sense in terms of popular economic thinking of the time--it seemed to support a healthy growing economy. It was a boost to employment, especially in the construction industry.

Importantly, to the "rational" planning approach, it seemed that a consensus of policy was present; and that an adequate assessment of the "public will" could be made by evaluation of travel trends.

Unforeseen or neglected side effects which have gained importance to the public since the 1960's include pollution, accident rates, energy con-

sumption, segregation and undermining of mass transit. Further damages include destruction of neighborhood communities and elimination of housing stock, historic sites, and open space.

In the case of transportation planning, the "rational model" does not seem in retrospect to have served us well. The notion of a policy consensus was unwarranted; the evaluation of costs and benefits was overly narrow in scope; and the distributional effects of costs and benefits were ignored.

The planning of regional highway networks leaned too heavily towards demands of people as "consumers" and neglected people as "residents" and "citizens." Further, emphasis was accorded regional benefits (which have not been as fully realized or appreciated as expected) at the expense of localized impacts.

The success of "rationality" in decision making for individuals and its failure for large disparate groups, is mainly due to its requirement of singleness of purpose; unanimous acceptance of the valuation of all feasible alternatives. In an administrative context where these conditions are met, the approach is quite useful.

One lesson from the highway program experience is that public participation and response to large scale projects can be highly instrumental in their success or failure (depending on one's point of view). Another lesson of particular importance to large scale projects is that they require time--and conditions and public attitudes change with time. This aspect of the problem may not be solvable; however, the importance of information exchange between the public and decision makers should be clear. Further, there is a critical need for the general public and decision makers to benefit from accurate, relevant and timely information.

The second area of concern we should address in planning process issues relates to controversy over the potential effectiveness or the need for the expanded governmental role.

Arguments have been advanced which question the appropriateness of state involvement in land use planning. The uncertain effectiveness of zoning

by local governments is frequently cited, along with the question, "If it doesn't work locally how can it be effectively administered at the state level?" It is pointed out that lobbying groups at the state level represent narrower interests than those which are influential locally. Any political pressures which are currently directed at undermining the local regulatory process could just as easily do so at the state level, given time to regroup. Also, it is argued that federal funds have lacked consistency over time, in their requirements regarding distribution of funds and for representation within regions in the management of those funds. And, it is argued, problem areas do not conform to state boundaries any more than they do to local ones.

Other interested groups maintain that "traditional" regulatory approaches--specifically nuisance laws--adequately serve the public needs that "should" be served. Any further involvement, they maintain, would ~~wrongfully~~ infringe on the rights of all property owners.

A major challenge to the states will be to resolve these objections and generate support for the governmental role which best suits state needs.

Among issues to be resolved are, "What organizational and public participation features can effectively resolve conflicts at a reasonable cost?" "How can the mutual interests of ostensibly conflicting groups be brought out, to this end?" Of the latter, we can compare two "strange bedfellows" experiences in public programs, one of which is encouraging and the other, less hopeful.

In Vermont, state legislation was successfully passed which provides for regulation of development in all rural areas of the state--by state government in cases where local government fails to take the initiative. General support for this legislation, following an educational effort by the state, was forthcoming both from environmentalists and developers. While the interests of environmentalists are evident, the developers agreed on the legislation because it has potential for preventing over-development of resort and recreational areas. Over-development would destroy the amenity which contributes to the economic value of rural residences, thus threatening the investment in initial development.

Another "strange bedfellows" example has arisen in many urban renewal projects. In these cases, parties interested in housing reform have joined with downtown business interests and for altogether different reasons have caused delays and obstructions to the reconstruction of urban renewal areas.

Because of the need for public support, some coalition of disparate groups would seem necessary in most states. Thus, a major issue confronting the states is, "Can mutual interests of disparate groups be coalesced into support for programs serving the general public interest?" To accomplish this, all parties would need to benefit from a more effective process for resolving public issues; availability of credible, relevant, accurate and timely information about conditions, trends and problem areas; and enhanced awareness of the public costs of inefficiencies and disbenefits associated with those conditions and trends. To this end, the design of mechanisms--for public inputs and "open" planning--is critical. To some, this can mean a shift from emphasis on administrative procedures to greater responsibility on the part of the legislative branch--in surveying demand and formulating a "public interest" stance. From another standpoint, the mobilization of interest groups aided by an aggressive program of information support and other facilitating measures, is seen as an appropriate approach. It may be anticipated that no matter how much effectiveness can be gained by improving existing decision making mechanisms, increased public participation and the press of new problems could increase costs of the planning process.

Inter-agency and Inter-jurisdictional Issues. Like the highway program, regional comprehensive planning has been encouraged through federal legislation--funding grants with "strings" or guidelines attached. Over time, several housing acts relaxed eligibility requirements and narrowed guidelines in some ways. Pending legislation at the federal level over the past several years has indicated that if passed, a land use policy and planning assistance act would encourage a horizontal (among agencies) and vertical (among levels of government) cooperative effort. It may be supposed that guidelines

and funding would change incrementally--for instance initial funding would support policy analysis and integrative organizational structure. This and other aspects of the scenario of system development, advanced earlier, are partly based on our anticipation of the behavior and effects of the federal legislature.

The issues faced in changing organizational structure, as alluded to earlier, will probably lead to alternative organizational approaches by the different states. Among the prominent issues are, "What division of authority and responsibility for representation will prevail within the new administrative organization?" Resistance to change by agencies and units of government may be related directly to protective instincts at the individual and agency level. The prospect of changing job requirements and staffing, and revising the scope and range of agency responsibilities naturally carries an implied threat to those involved.

Similarly, in an issue related to technical system design, there is the question, "To what degree shall currently-collected data be reorganized for sharing; or, should data collection be undertaken anew (as by a designated lead agency)?" The primary consideration is that sharing data can present costs for re-formatting and screening; while a fresh start would encounter high costs of a possibly duplicative effort. In either case, we urge study of these two choices or some mixture.

Referring back to the set of planning functions we outlined initially: "How are the several planning functions to be allocated among participating levels of government?" While this decision may be a product of compromise, this is an area where clear objective criteria should be carefully considered. A number of factors are relevant when allocating primary responsibilities to levels of government. These include:

1. The incidence and scale of problems to be addressed.
2. Representation: equitable balance of local, regional, statewide, and national interests can be accomplished only with an effective program of public participation.
3. Equity: the ability to ensure uniform application of policy throughout areas with similar needs and problems.

4. Efficiency: conduct of programs on a scale which minimizes per capita cost. Avoidance of duplicative services, and of inter-agency cross purposes.
5. Resource base: computer technicians and environmental scientists are more available to higher levels of government; first hand detailed knowledge of local conditions is more available locally, as are regulatory mechanisms.

There are others, of course, and some will attach more importance than others. From the system design standpoint, the most critical need is for full assessment of data needs and availability.

Issues Relating to Techniques and Methods of Analytical Tasks. The scope of this discussion precludes detailed consideration of methodological issues on a technical level. Yet a basic issue should be highlighted. As mentioned before, the sophistication of methods can vary widely, and adoption of computerized approaches can be in error, if needs do not warrant them. It should be an ongoing responsibility (as indicated in our scenario) to investigate the relative costs and benefits of manual and machine-based methods. This should be a continuing research and development task, as is the continued assessment of data needs. The adoption of new methods should be undertaken with knowledge of impacts on agencies when new skills are required, or old ones (and their holders) made obsolete. Thus, the method issue relates back to problems in changing the organizational structure of the planning process.

CONCLUDING REMARKS

This discussion has passed through what must seem a bewildering array of definitions, categories, a scenario, numerous assumptions, and speculation. Many questions and issues have been raised. We have not presumed to offer solutions, but have offered recommendations in some cases. We recognize unique state-by-state institutional constraints and planning needs, and have attempted to pose a framework which charts goals consistent with common needs.

The geographic information system offers potential for the solution of many tasks, and implementation within each state must be accompanied by due

consideration of the issues posed above as well as many others. The process of system development will probably be incremental, collaborative, and staged over time, as needs and capabilities develop.

While new programs in land use planning should not be regarded as solutions in themselves, they may become useful tools for an effective effort. We hope a continuing dialogue can be accomplished and that this framework will aid in its successful resolution of problems.

