PAPERS ON NATIONAL LAND USE
POLICY ISSUES

PREPARED FOR THE

COMMITTEE ON INTERIOR AND
INSULAR AFFAIRS

HENRY M. JACKSON, Chairman

UNITED STATES SENATE

BY

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
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The coastal counties in the United States account for 15 percent of the land area and support 33 percent of the population, four-fifths of it in urban areas. These urban areas constitute 15 percent of the estuarine zone. * * * With such dense population, estuarine regions have many use-conflicts. * * * The estuary is an extremely valuable, nonrenewable resource, and land uses which modify the estuarine environment should be strictly examined and controlled.

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B. W. TRIPP, MASSACHUSETTS INSTITUTE OF TECHNOLOGY

A salt marsh is an integral part of the estuarine system which it borders. * * * [It] is of vital importance to man and this can be readily seen when commercially important organisms and their relationships to salt marshes are studied. The coastal fishery has its beginnings in the marsh. * * * The salt marsh serves man in other ways besides supplying most of the seafood that is consumed by him. It serves as a buffer zone that protects the upland against disastrous flooding and erosion. * * * If the marsh is destroyed, sediment normally deposited here becomes available for deposition in channels, harbors, and other navigable areas.

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JOE MACILVAINE, WOODS HOLE OCEANOGRAPHIC INSTITUTION

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KENNETH MOPPER, WOODS HOLE OCEANOGRAPHIC
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The land-sea interface has greater biological diversity and productivity than any other area in the world. * * * It is exactly at this interface that pollution and exploitation by man is causing severe and perhaps irreversible destruction to one of his major food supplies. Also, the potential for cultivating coastal regions to feed future generations can be greatly diminished by the continued practice of dumping highly toxic materials in the form of industrial and agricultural wastes into these waters. It is easy to say that the ocean can handle pollutants, even resistant ones such as chlorinated hydrocarbons (DDT and its derivatives) and radionuclides (plutonium-239, strontium-90, cesium-137) by its great dilution powers. However, such statements ignore the fact that there are processes in nature which can concentrate diluted pollutants to a point of being lethal to the organisms involved.

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DENNIS W. DUCSIK, MASSACHUSETTS INSTITUTE OF
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It is estimated that, by 1980, the electric power industry will require about one-sixth of the total available fresh water runoff in the entire Nation for cooling purposes and this demand for water will continue to grow. While cooling towers and cooling ponds are technically feasible, they can involve cost increases of up to 20 percent of the capital cost of an installed generating plant * * * (The offshore concept) provides a viable alternative to land based power stations and can eliminate some of the most serious problems * * * faced in meeting our Nation's increasing demands for electric power.

MEMORANDUM OF TRANSMITTAL FROM THE CHAIRMAN

To the members of the Senate Committee on Interior and Insular Affairs:

A major cause of discouragement in contemporary society has been the lack of adequate opportunity for serious and responsible young people to make meaningful contributions in important public decisions. I am concerned that advanced university students particularly have expressed frustration over the limited opportunities for such involvement. It frequently happens that after they have invested time and energy in the acquisition of skills and knowledge, and pursued their advanced academic work they are obliged to apply their talents in esoteric research and analyses which go largely unnoticed and unused beyond the classroom. This situation gives substance to the complaint that much of formal education is not relevant to the pressing problems of our times.

There is no lack of able young people with good ideas to call upon. In my view, it is wasteful to allow many man-years of the best intellectual efforts of trained graduate students—tomorrow's leaders—to be focused on exercises which lack relevance to today's concerns. We must find the means to better utilize this valuable and scarce resource.

In the activities of the Senate Interior and Insular Affairs Committee there are many occasions when scholarly and in depth research, analysis, and innovative thought by persons trained in a wide variety of disciplines and unshackled by institutional attitudes and conventional wisdom could be of immeasurable assistance. The committee's professional staff can, of course, give only limited time and bring only a few disciplines—law, engineering, public administration—to a particular study. These limitations are shared by all congressional committees and are even more pronounced in the State legislatures.

Recently, the Interior Committee participated in a preliminary experiment which was intended to focus the work of several advanced students on the information-gathering and research needs of the committee in a particular subject area. In December of 1969, faculty and student representatives of the Massachusetts Institute of Technology visited with the staff of the committee to discuss a proposed seminar. This discussion led to an agreement that students representing a wide variety of academic disciplines would be presented with a policy issue of current interest to the committee. The students would perform research and prepare papers which, while fulfilling academic requirements of the institute, would also provide meaningful and timely background information for the committee's use and consideration. During the course of the studies, it was agreed that opportunities would be provided for discussions among the participating students and professors, the committee staff and, if possible, committee members.

On December 16, 1969, I wrote to Prof. Carroll L. Wilson of MIT's Sloan School of Management indicating my willingness to cooperate in the development of such a seminar.¹ During the ensuing spring term, the program was initiated. National land use policy was selected as the issue to be studied, because at that time the committee staff was preparing draft legislation (S. 3354) to establish a national policy and a nationwide program for land use planning.

Although there was insufficient time to prepare a carefully directed program for that semester, a number of professors and students who were engaged in programs related to the general issue expressed interest in the committee's activities. Members of the committee staff met with the participants at MIT twice during the school term to discuss the legislation. Mr. Michael Telson, representing the MIT group, visited the committee on several occasions and acted as project coordinator.

A number of students prepared papers which directly relate to problems of land use policy and land use management. I have ordered the texts, or in some cases appropriate excerpts from the texts, of those papers printed for the use of the committee, the Congress, the executive branch, and others who have an interest in land use management. Together with the hearings on S. 3354 these papers provide a thorough and recent compilation of materials dealing with the need for a national land-use policy. They will be of value to scholars and students of public administration in evaluating alternative policies and strategies for future management of the Nation's land resource base.

I am hopeful that this unique association between the committee and university faculty members and students will provide experience for further refinement, expansion, and development of similar cooperative projects. Based on this current experience, I feel certain that the contribution of the university community to the ongoing work of this committee can be greatly increased. The potential benefits of such activities to the committee, the students, and perhaps ultimately to other schools and legislative groups, I believe, warrant our further efforts.

HENRY M. JACKSON, *Chairman.*

DECEMBER 16, 1969.

Prof. CARROLL L. WILSON,
Sloan School of Management,
Massachusetts Institute of Technology,
Cambridge, Mass.

DEAR PROFESSOR WILSON: As you are aware, Messrs. William H. Matthews and Michael L. Telson of M.I.T. met with the staff of the Senate Committee on Interior and Insular Affairs to discuss your interest in organizing a seminar at M.I.T.

As I understand it, the seminar would provide advanced students of various disciplines with an opportunity to participate in studies which are relevant to a current issue of interest to the Committee. The particular area of interest to the Committee. The particular area of interest which was discussed as a topic for a seminar in the spring term of 1970, and perhaps the following summer, was national land-use policies.

¹ The text of the letter is printed at the conclusion of this memorandum.

The committee has a strong interest in national policies for the development of natural resources, and, of course, the use of our land resource underlies all resource development planning and decisions. We have recently seen a very serious example of a failure in effective land-use planning at the Federal, State and local level in connection with the Everglades National Park.

In the next few months, the committee will be considering alternatives to improve the way in which land-use decisions are currently being made. We will particularly be concerned with measures which may be taken to insure that Federal progress and policies are consistent with sound land-use planning, to encourage and assist the States in implementing land-use planning efforts, and to protect the Federal investment in public lands and resources from degradation caused by unsound development decisions.

It appears that there would be an excellent opportunity for a group of students with appropriate faculty participation to explore this issue and to make significant contributions. The results of their studies might be of value to the committee and to others who will be participating in Federal decision on land-use policy.

Some examples of the kinds of studies which might contribute to these decisions are:

Annotated bibliographies of the recent literature on land-use policy or planning or portions of such literature, particularly with the alternative ideas and recommendations set forth.

Commentaries on the broad problem of land-use planning drawn from the viewpoints of various disciplines such as law, political science, engineering, architecture, resource development, and sociology.

Examinations of existing National and State plans which involve substantial land and related resource use to see what conflicts may be involved as the plans are implemented to see what major areas of land-use are not covered by existing plans.

Surveys of typical existing State and local land-use planning entities to analyze the impact of Federal policies upon their efforts.

Surveys of State land-use planning agencies and policies both existing and proposed.

There are certainly other kinds of studies which might be suggested according to the interests and backgrounds of the students who would be involved.

If you decide to proceed with the seminar, I will be pleased to offer whatever cooperation is possible. The Committee staff will try to arrange suitable meetings for consultation to assist in orientation of the participants, in the development of study topics, and in discussion of the results.

If the studies prove to be useful, it is possible that the papers or suitable summaries could be incorporated in committee prints and hearing records to provide background on the issues. If there are significant findings, it is possible that they might be presented at committee hearings or at an informal meeting with committee members.

I appreciate having this opportunity to assist in your efforts. Please keep me advised of the progress of your work.

With best regards,
Sincerely yours,

HENRY M. JACKSON, *Chairman.*

LETTER OF INTRODUCTION

The MIT national land-use policy project was created in the spring of 1970 as a vehicle to involve students and faculty at MIT and neighboring universities including Boston University, Tufts University, and Woods Hole Oceanographic Institution in—

(1) A broad interdisciplinary study that would borrow from many fields of study, promote their interaction, and try to integrate their expertise at the interface relating to land-use policy.

Our groups included biologists, ecologists, physicists, civil engineers, mechanical engineers, electrical engineers, management and operations research students, political scientists, and lawyers. This interaction was particularly valuable since it seems to us that interdisciplinary teams will in the future play a greater role in the formulation and solutions of our Nation's, indeed the world's, increasingly complex problems. There is a strong need for us as a Nation to develop a team capability in order to devise effective and comprehensive systemwide solutions to our problems. We welcome the National Science Foundation's interdisciplinary problem research program and are hopeful of its contributions toward developing this capability.

(2) An opportunity to become involved in an interactive fashion with members and staff of the Senate Interior Committee and the Congressional Research Service on a major issue of national importance, the development of national land use policies with special regard given toward building environmental criteria into such policies.

We would like to point out the project's timeliness in that the Senate Interior Committee had introduced preliminary legislation, referred to as the National Land Use Policy Act of 1970, on January 29, 1970, so that our project had a focus which provided a clear sense of urgency. We also feel that the project was particularly useful and interesting to both parties because of the high degree of close interaction that developed between the student-faculty group and the Senate committee and staff as witnessed through Boston visits of the committee staff on two separate occasions, through Washington visits by the student study director, Michael L. Telson, to three sets of hearings on the legislation, and through very frequent telephone and mail contacts.

We feel that on both of the above counts the project was an excellent learning experience for those involved. We hope that the project will serve as a model for future cooperative efforts.

We have included for publication within some of the papers that were written for the project. We have taken the liberty of freely excerpting from them when appropriate and have broadly classified the papers into areas involving aspects of land use management problems.

The papers by Mr. Dennis W. Ducsik have been obtained through the courtesy of the MIT Press that will publish the papers in full as part of the book "Project NECAP" to appear in the fall of 1971. Project NECAP (New England Coastal Area Planning) involved an

interdisciplinary graduate study at MIT during the spring of 1970 and was carried out under the sponsorship of the MIT Sea Grant project office.

The project was very inexpensive; we owe a debt of gratitude to those who made it possible: the Senate Interior Committee, its professional staff, particularly Mr. Daniel Dreyfus, and its chairman, Senator Henry M. Jackson of Washington, and the Environmental Policy Division of the Congressional Research Service of the Library of Congress and its assistant chief, Mr. Wallace Bowman, for their freely extended cooperation and advice.

We should also like to thank those faculty and students who participated in the project in addition to those whose names appear in the excerpted articles appearing within. The faculty members include: From MIT, Professors J. Clarkeson, J. Devanney III, M. Driscoll, W. Matthews, L. Rodwin, J. Schaake, W. Seifert and D. Wilson; from Boston University, Prof. W. Ryckman; from Woods Hole Oceanographic Institution, Prof. J. Teal; and from Tufts University, Prof. R. Dowd.

CARROLL L. WILSON,
*Professor, Sloan School of Management,
 Massachusetts Institute of Technology, Cambridge.*

PART I.—PUBLIC INVOLVEMENT IN NEW COMMUNITY DEVELOPMENT

This part includes excerpts from two papers concerning the appropriate role of State government in assisting in and regulating the development of new communities. Clearly, many of the most frequently noted and most urgent of land use problems are those involving the metropolitan areas and the influences of uncontrolled urban sprawl. The predictable population increases of the foreseeable future can be readily translated into requirements for homes and services in an urban setting. Many of today's most serious planning problems center around the projections of this unavoidable urban growth.

We have included in this section only parts of the papers written by our authors. As the overview statement indicates, the original papers contain significant additional discussion and data of interest to students of the new community concept.

OVERVIEW

The need for effective State involvement in the urbanization process has never been more critical. Constitutionally, the States are the ultimate holders of the police power. Politically, State governments are at least one step removed from the interjurisdictional conflicts which so often impede areawide planning for metropolitan growth. For these and numerous other reasons, any rational policy allocating responsibility for the development of urbanizing land and lagging regions would more than likely assign a wide range of powers to the State governments.

State governments need to decide what strategy they will adopt to insure balanced regional development and what types of incentive-control systems they will employ to foster efficient, equitable, and ecologically sound land usage. Should the States charter nonprofit corporations empowered to acquire land and plan and develop new towns or new communities? Should they authorize groups of cities and towns to acquire, purchase, or take by eminent domain non-contiguous tracts of land for open space, transportation corridors, utility purposes or for private community and environmental development? Should the exercise of such powers be subject to the approval of regional planning and development agencies? Should the States designate land areas in which the public has a special interest? Could State planning agencies prepare and administer direct land use and development controls which would insure that future development would meet State objectives? These kinds of questions are fundamental to the formulation of a State urban growth policy. Each State will have to wrestle with these questions if we are to establish a coordinated, overall national urban growth strategy.

One strategy—the new community development strategy—holds out great promise for effective land utilization and for meeting the pressing needs of those presently trapped in decaying cities. After weighing the economic, social, political, and physical/technological considerations embodied in this approach to urban development, we are prepared to advocate this approach instead of many others that have been suggested. Two detailed studies of the potential role of State governments in planning and developing new communities as part of unified State land use planning efforts have been completed. The first paper, “Guidelines, for State Involvement in the Development of New Communities in Massachusetts: Toward a State Urban Growth Policy,” was written by Mr. Lawrence E. Susskind, a recent graduate of the MIT Department of Urban Studies and Planning. His paper is concerned with the role of State government in the planning and development of new communities. Using Massachusetts as a case study, Mr. Susskind explores a variety of techniques for selecting sites for new community development and explores the potential economic impact of developing new communities as growth centers in metropolitan urban regions. The second, “Public Involvement in New Community Development: Justifications, Problems, and a Proposal” was carried out by Mr. R. Stephen Browning. Mr. Browning is a lawyer and a recent graduate of the Department of City and Regional Planning at Harvard University. His paper examines the significant legal and political issues which underlie many of the present obstacles to public development of new communities. In addition, he offers a proposed model statute which seeks to reformulate and reconcile many of these issues into a new political structure for the development of new communities at the State government level. There is some overlap between the two studies, but the political strategies recommended by the two authors differ markedly.

These two papers should serve as an introduction to the political, economic, legal, and social problems of new community development. The annotated bibliography that appears as the end of both papers should help to identify other studies and readings that would be of interest.

A. GUIDELINES FOR STATE INVOLVEMENT IN THE DEVELOPMENT OF NEW COMMUNITIES IN MASSACHUSETTS: TOWARD A STATE URBAN GROWTH POLICY

(By Lawrence Elliott Susskind, M.I.T.)

Editor's Note: This is an excerpt of Mr. Susskind's paper; from which we include the introduction, Chapters I, III and IV.

This paper is concerned with establishing guidelines for State involvement in the development of new communities in Massachusetts. State planning for urban growth, specifically State involvement in the planning and development of new communities must be undertaken within a systematic and carefully defined intergovernmental framework. State policies and plans expressed in the form of public works, the allocation of resources, the use of taxing and borrowing powers, the development of transportation linkages and the sum total of all actions taken by various State agencies can "make or break" new community development in the Commonwealth of Massachusetts.

At present no State policy exists which can reconcile the competing interests which play a role in directing urban growth in the Commonwealth: (1) the developers worried about their ability to control, program, and profit from urban development; (2) the residents of urbanizing areas concerned about State intervention in local decisions relative to community and environmental development, and (3) the wider regional interests concerned about the quality, scope and phasing of development.

Chapter I offers a definition of new communities and establishes the theoretical rationale for the development of new communities in metropolitan urban areas as part of a State urban growth policy. Chapter II measures the potential for the development of new communities of approximately 50,000 persons each throughout Massachusetts, and indicates those areas which are ripe for such development. Chapter III examines three alternative new community development strategies indicating the political and financial feasibility as well as the public benefits of each strategy. Chapter IV concludes with a discussion of alternative incentive-control systems for guiding urban growth, with an outline for an intergovernmental planning-implementation framework for new community development and a series of questions which need to be considered by State officials and the public at large prior to the implementation of a State program for new community development.

INTRODUCTION

THE ROLE OF STATE GOVERNMENT IN GUIDING URBAN GROWTH AND DEVELOPMENT

Each of us pays for the inefficient and inequitable patterns of urban development that currently mar the landscape. As metropolitan areas throughout the United States continue to grow, the social and economic costs associated with poorly planned urban growth will come to represent extremely important political and governmental problems. There is no simple way of dealing with these mounting social and economic costs. Even though the rate of technological achievement has accelerated, the problems that beset our cities and towns still tend to proliferate. We must face up to the issues raised by unchecked and uncontrolled urban development:

As our population grows and our technology advances, the decisions about the use of land and of public revenue become increasingly complex. The governmental machinery to make these decisions and the governmental influences on private market decisions have not kept pace with this complexity. As a result, we are faced with traffic congestion, blight in our central cities, unequal burdens of suburban expansion, duplication of public facilities, and an inefficient use of public and private resources.¹

At every level of government there are important actions to be taken if we are to confront these issues successfully. State government, in particular, has an indispensable role to play in addressing the problems of urbanization; to a great extent the ability of local governments to cope with urban growth and development depends on the attitude and organization of State government (e.g., its willingness to allocate resources and decisionmaking powers to lower levels of government). The tools available to localities, the money they spend, and the powers they exercise are to a great extent determined by a wide assortment of State constitutional, statutory, and administrative regulations. Even given the authority and the independence afforded localities by such provisions as home rule, the State government still controls and delimits local governmental functioning.²

Even if an overall urban growth policy had been formulated at the Federal level, planning for future urban development would still be primarily the responsibility of State governments. It is unfortunate that the Nation as a whole has not established a consistent policy with respect to the management of the country's land resources or with respect to the many Federal programs designed to assist, influence, or regulate the process of urban development at the State, regional, and local levels.³ Increasingly there are instances where Federal programs are in conflict with each other. Federal agencies involved in the preparation of highway plans, and air transportation plans, water resource development programs, and community facility improvement programs, plans to redevelop industrial areas and depollute rivers are often found to be working at cross purposes. Most of the plans and

¹ Guiding "Metropolitan Growth" (New York: Committee for Economic Development, 1960), p. 14.

² Norman Beckman, "Our Federal System and Urban Development: The Adaptation of Form to Function," *Journal of the American Institute of Planners*, (JAIP), vol. XXX, August 1964, p. 155.

³ In January 1970, Senator Jackson introduced a bill in Congress to amend the Water Resources Planning Act (79 Stat. 244) to include provision for a national land use policy by broadening the authority of the Water Resources Council and river basin commissions and by providing financial assistance for statewide land use planning. In March 1970 a bill was introduced into the House of Representatives (H.R. 16547) by Mr. Ashley "to provide for the development of a national urban growth policy, and to encourage and support the rational, orderly, efficient and economic growth and development of our States, metropolitan areas, cities, counties, and towns, with emphasis upon the development of new communities and upon inner city development." In 1969 Florence Dwyer of New Jersey introduced a bill into the House of Representatives (H.R. 13217) to "provide for the balanced urban development and growth of the United States."

programs are necessary and desirable. However, to date, these plans have not been synchronized, nor have they been analyzed to insure that they are consistent with each other or compatible with local goals and aspirations. Thus, because many agencies and departments at the Federal level are pursuing separate programs without adequate coordination, State governments are in a difficult position. They are forced to deal with a variety of separate agencies, each with its own programs and priorities and each with its own needs and objectives.

Although several proposals have been made to impose a somewhat greater degree of organization on Federal programs and agencies involved in planning for urban growth and development, support for these measures is far from assured in the near future.⁴ If a national urban growth policy is not adopted, State government will probably remain the only level of government sufficiently well structured to exert control over and bring order to conflicting local and private interests; or if one of the several national urban growth policies that has already been proposed is adopted, State government will still have a crucial role to play since most of the recent proposals rely heavily on State involvement. In any case, it seems that State governments will continue to bear most of the responsibility for guiding and directing urban growth.

State governments possess several critical qualifications that allow them to play a particularly constructive role in urban development. States have the power and the financial resources to move broadly on several fronts simultaneously. States have had experience with far-ranging programs (highways, recreation, water resources development, and welfare programs, to name a few) that have had, and will continue to have, a significant impact on the development of urban areas.⁵ Moreover, "the State occupies a unique vantage point, broad enough to allow it to view the details of development within State boundaries as part of an interrelated system, yet close enough to enable it to treat urban problems individually and at firsthand."⁶

In the past, the extent to which local governments, especially in metropolitan areas, have leapfrogged the State to seek Federal assistance for urban renewal, planning and area redevelopment purposes, suggests that many State governments have been unable or unwilling to play a major role in guiding urban growth and development.⁷ It would probably be foolish to suggest that all State governments are presently equipped to deal with the complexities of the urban development process. However, because State governments already possess the legal, administrative, and political powers necessary to guide urban development, and because the political and

⁴ For a discussion of national urban growth policy in the United States, see Lloyd Rodwin, "Nations and Cities: A Comparison of Urban Growth Strategies" (Boston, Houghton Mifflin Co.), 1970.

⁵ The impact of state agencies in Massachusetts on urban and regional development is described in "State Agencies and Regional Development," a study prepared by the Area Development Center, Boston University, for the Massachusetts Department of Commerce and Development through the Massachusetts Regional Planning Project, October 1966. For an inventory of Massachusetts State programs affecting urban development see "Inventory of State programs," Massachusetts Executive Office of Administration and Finance, October 1963, 3 volumes.

⁶ Council of State Governments, "State Responsibility in Urban Regional Development" (Chicago: Committee on State Planning of the Governors Conference), 1962, p. 18.

⁷ The present degree of Federal participation in State and local affairs reflects previous failures to anticipate needs. This failure in a sense created a vacuum into which the Federal Government moved. Since World War II, the growth of direct relationships between the Federal Government and cities, counties, and other units of local government has been of increasing concern to State Governors and legislatures. The tendency of Federal agencies and of local governments to bypass the States has been "deplored." On the other hand, the Congress has contended that inaction on the part of State governments should not be permitted to deprive a local government of Federal aid. (Channelization of Federal Grant Programs for Urban Development," 1966 State Legislative Program of the Advisory Commission on Intergovernmental Relations, Washington, October 1965.)

financial problems of creating new institutional structures with powers equal to those of State governments are almost insurmountable, it is important to seek ways in which the leadership potential which State governments already possess can be realized.

OPTIONS FOR STATE INVOLVEMENT IN THE URBAN DEVELOPMENT PROCESS

Many recommendations have been made regarding the need for State action in the field of urban development.⁸ Most of the recommendations can be grouped under four general headings:

1. The State should provide local and regional governments with remedial services and assistance when called upon to do so.

2. The State, when it thinks it advisable, should undertake a variety of direct actions to assist and strengthen local governments in the exercise of their responsibilities.

3. The State should impose certain controls on the activities of local governments and private interests in those cases where localities acting independently of one another cannot reach agreement, or in those instances where private developers seem intent on taking actions which are not in the "public interest."

4. The State should assume an active role in the planning and implementation of new urban growth and/or the redevelopment of existing cities and towns through a far-ranging program of public investment and, where necessary, through the creation of new instrumentalities.

State involvement in the urban development process will necessarily vary from area to area within a State, as well as from State to State. In some instances it may be most appropriate for the State to delegate a wide assortment of permissive powers to local governments which can be utilized as the need arises. In other cases, more direct assistance of a technical or financial nature may be warranted. In some instances, stringent State regulation or control coupled with the expansion of State assistance programs in such areas as housing, industrial development, transportation, recreation or open space preservation may be required.

The State's role vis-a-vis local and Federal Government is changeable. Actions and approaches will vary widely. In one sense the options available to State government can be viewed on a continuum extending from relatively indirect to markedly direct action. In another sense, the range of State actions can be arrayed on the basis of how permissive or how regulatory they are. Seven options available to State government in its dealings with municipalities and private developers are described below:⁹

1. The State may enable existing cities and towns to plan, spend money, raise funds, acquire land, and construct projects for urban development purposes. The State has a responsibility to make certain that localities have the basic powers with which to move intelligently toward solutions to urban problems. In most instances, localities have these powers, although authority to plan or raise funds for a specific

⁸ See the Advisory Commission on Intergovernmental Relations, annual reports, 1968, 1969, 1970 for a summary of the most recent recommendations. Also see the "Proceedings of the National Governor's Conference," 1960-68, including the special reports of the Committee on State-Urban Relations, 1967 and 1968, published by the National Governor's Conference, Chicago, Ill.

⁹ These options were presented in "State Responsibility in Urban Regional Development," op. cit., pp. 19-20.

function may not always be included within the general statutory authorization.¹⁰

2. The State may enable localities to collaborate, join together through cooperative arrangements, or consolidate to provide services that are difficult for any one town to handle independently. This would encompass making provision for voluntary municipal mergers, the transfer of functions from city to special district or vice versa, the establishment of metropolitan study commissions or multipurpose functional districts; the creation of metropolitan planning agencies, regional planning agencies, or metropolitan councils of government. The State's aim is usually to foster the enlargement or consolidation of local government so that municipalities become more capable of controlling metropolitan and regional growth. Local governments are usually responsible for taking the initiative themselves in these matters.¹¹

3. The State may provide technical assistance to localities to help them fulfill their development responsibilities. An arrangement whereby a State planning agency provides staff service to a local government to help prepare comprehensive physical plans or special planning studies is only one of the many ways in which such technical aid can be utilized. The State usually requires localities to meet minimum standards of performance as a condition for receiving technical aid.¹²

4. The State may extend financial assistance to localities in the form of loans, grants-in-aid, or tax concessions, in order to broaden the fiscal base the localities may draw upon in their efforts to combat urban problems. Financial assistance takes various forms. New Jersey, for example, has a program of issuing grants-in-aid to communities over a 5-year period to help carry out continuing planning. Several Northeastern States, including Massachusetts, provide funds to cities to help them meet their share of urban renewal costs.¹³ A growing number of States are taking a more active part in metropolitan open-space planning programs by authorizing funds which localities can use to purchase the fee or an interest in the fee on land. In most cases an adequate standard of local government performance is a quid pro quo for State financial aid. Grants-in-aid, therefore, provide State government with substantial bargaining power.

5. The State may regulate or administer certain local activities that have areawide implications. The State may move directly to resolve disputes among local units of government in a metropolitan area, especially disputes that cannot be resolved at the local level by mutual agreement, or are of such moment as to impede the effec-

¹⁰ For an explanation of this situation relative to Massachusetts law, see memorandum from James Powers, principal research assistant to Daniel O'Sullivan, Director of the Legislative Research Bureau, on "Devolution of Powers: Features of Self-Executing Constitutional Home Rule in Massachusetts," June 26, 1968.

¹¹ For an explanation of this situation relative to Massachusetts law, see report relative to regional government of the Massachusetts Legislative Research Council, Jan. 26, 1970, and report relative to voluntary municipal merger procedures of the Massachusetts Legislative Research Council, Mar. 11, 1970.

¹² The department of community affairs has responsibility for the administration of statewide planning aid programs. Local planning groups collaborate with community affairs and 11 regions participate in regional planning programs. Through 1969 these cooperative planning projects had an aggregate project cost of about \$6 million of which the Federal Government was supplying about two-thirds.

¹³ On redevelopment projects for which contracts for Federal capital grants have been signed, the Department of Community Affairs is authorized to make a grant from State funds up to one-half of the local share required by the Federal contract. In 1969 the limit on aid authorized to be granted from State taxes was \$40 million with annual payments not exceeding \$2 million. These limits will probably be doubled in the next few years. On projects to redevelop commercial or industrial areas for which no Federal aid is available State grants of 50 percent of the net cost to the community are authorized up to a limit of \$20 million. There is little redevelopment in Massachusetts in this second limited class.

tive performance of governmental functioning in the area.¹⁴ Another form of direct State action includes the establishment of rigorous statutory standards for the creation of new municipal corporations within the geographical boundaries of metropolitan areas, and to provide further for the administrative review and approval of such proposed new incorporations by an appropriate State unit.¹⁵ This form of State action is based on the assumption that it is difficult for localities to take effective measures in these matters, and that the State must step in to protect the interests of the greater "regional community."

6. The State may expand the scope of its activities and subsume many of the responsibilities traditionally belonging to local governments. The acquisition of land or the purchase of easements for open space are examples of this form of direct State action. Such measures may be precipitated primarily by the inability of localities to act quickly enough in the face of rapid growth.¹⁶

7. The State may itself exercise local functions—it might wish to do so if local resources are inadequate or if certain functions cannot be performed efficiently by the locality even with State financial aid. For example, the State might act as a developer of new low- and moderate-income housing or entire new communities.¹⁷

How far and in what direction a State should go depends on several factors. One factor is the State government's past experience in dealing with urban development problems. Some State highway departments, for example, have traditionally left many decisions to the discretion of counties and cities. Since this pattern has been well established, the States continue this arrangement, rather than assert more direct control over highway development. The historical pattern of State financial aid to localities often is correlated with the degree to which local initiative has become a tradition. Some States have long-standing policies of granting considerable funds to localities for general operations. Since State standards governing the use of these funds must be met, State control over local policy is often achieved through the distribution of funds to localities. In Massachusetts, the traditional strength and independence of cities and towns must be taken into account in the formulation of any public policy to deal with urban growth. This is not to say that the State, if it wished, could not recoup much of the power that it has delegated to localities, but it is quite clear that any program designed to reduce the power and authority of local government in Massachusetts would face stiff opposition.

¹⁴ A unique example of this in Massachusetts is ch. 774 of the Acts of 1969 (H. 5581) which provides for the construction of low or moderate income housing in cities and towns in which local restrictions hamper such construction. Should a local zoning board of appeals deny a permit to build subsidized low or moderate income housing and such housing does not then exist in the community in minimum quantities established by the general court, then after a hearing into the facts and a review of the local decision, the State housing appeals committee can issue a permit. For a complete summary of the regulations see department of community affairs memorandum, summary of 774, September 1969.

¹⁵ See Massachusetts General Law, ch. 121A, dealing with the establishment of municipal development corporations.

¹⁶ See an act establishing a State land development agency submitted by the department of community affairs to the general court in 1969 and 1970.

¹⁷ See pending legislation relative to the proposed replacement housing and community development corporation (discussed further in ch. 111 of this thesis).

Another key factor in determining the appropriate course of State action in the area of urban development is the relative intensity of metropolitan urban problems. For example, if the supply of metropolitan open space were being devoured too quickly, or if the transportation system were not meeting areawide needs for the distribution of people and goods, then the State might conclude that local government was responding too slowly, and that more direct State action was appropriate. In Massachusetts it may well be that the increased pressures of urban growth and development brought about by the recent development of Route 128, Route 495, Interstate 290, and the Massachusetts Turnpike may have become sufficiently severe to suggest that more direct State action is required than would otherwise be acceptable.¹⁸ State government, if it is to avoid permanently impairing local autonomy, must decide what the limits are beyond which it cannot go. At what point would State intervention be excessive? Under what circumstances can local governments be considered incapable of providing solutions to areawide problems?

Each State, including Massachusetts, needs to adopt a set of development objectives which can unify the many supervisory and regulatory actions of the administrative agencies and the State legislature. Too often State agencies work at cross purposes to one another and to local governments. But the growing number of States which have adopted comprehensive planning programs testifies to the heightened awareness of the need to provide some overall direction to the pattern of development in each State.¹⁹ Through the establishment of long-range development programs, the States can implement recommendations for orderly, coordinated growth. Policies thus established serve three purposes: local governments have a benchmark against which to chart the success of their own development programs, the work of many State agencies in development programing can be more effectively integrated; and Federal programs can be utilized to maximize the benefits of public investment through efficient and equitable use of land to meet State priorities.

In exercising leadership, the State must decide how aggressive it is going to be in intervening to redirect the development policies of public agencies and private institutions. This thesis will examine the implications of an extremely vigorous State policy which calls for direct State intervention in the urban development process. Specifically, criteria for State investment and guidelines for State involvement in the development of new communities will be discussed.

¹⁸ See "The Social and Economic Impact of Highways: Demographic Patterns in the Interstate Route 495 Area" prepared by the Bureau of Socio-Economic Research, Inc., for the Massachusetts Department of Public Works, 1963.

¹⁹ State responsibility, *op. cit.*, p. 22.

CHAPTER I

NEW COMMUNITIES AS PART OF A STATE URBAN GROWTH POLICY

INTRODUCTION

The objectives of this chapter are: (1) to offer definitions of the various types of new communities; (2) to outline many of the problems involved in planning and building new communities; and (3) to examine several critical assumptions about the feasibility and desirability of developing new communities as part of a State urban growth policy.

Exactly what are new communities? Planners and developers offer different definitions. Most seem to agree that a "complete" community is implied, but some projects, not intended to be complete communities, have also been dubbed new communities. To clarify matters, the National Association of Home Builders has adopted an umbrella term—"Open Space Communities." Under this rubric they recognize three categories of development: clusters, planned units, and new communities. A large-scale residential development, because it includes no commercial or industrial property, is classified as a cluster development. Projects that combine residential uses with commercial facilities, and perhaps some institutional uses, are termed planned unit developments. The simple definition then for a new community is that it has a full range of urban community uses: housing, industry, and institutions scaled within a reasonable balance of one another.¹

There are a variety of types of "new communities" or "new towns" as they are sometimes called.²

The real estate salesman's "new town."—This is usually a sales gimmick, an attempt to capitalize on an increasingly popular term in order to help sell housing in a development which sometimes is a planned residential community—that is, a development which includes at least schools, recreation facilities, and shops for food and other everyday needs—but, too frequently, is merely a residential subdivision which includes no provision for neighborhood or community facilities.

The isolated "new town" or "new city."—No area in Massachusetts is sufficiently isolated, in terms of distance or traveltime, from other population centers for an isolated and quite independent new town or city to be possible.

¹ Craig Noren, "New Towns of the United States" (Washington, D.C., National Association of Home Builders Land Use and Development Department), 1967, mimeo, page 4. An even more specific definition is provided by the Advisory Commission on Intergovernmental Relations: New communities are large-scale developments constructed under single or unified management, following a fairly precise, inclusive plan and including different types of housing, commercial and cultural facilities, and amenities sufficient to serve the residents of the community. They may provide land for industry or are accessible to industry, offer other types of employment opportunities, and may eventually achieve a considerable measure of self-sufficiency. With few exceptions, new communities under development today are within commuting distance of existing employment centers.

² Jeanne Davis, "A Review of the Problems Involved in Planning and Constructing a New Community," in *New Towns*; proceedings of a symposium held in Newark, Del. (sponsored by the Delaware State Planning Council), July 1, 1969, pp. 12-24.

The relatively self-sufficient new community with a diversified economic base.—This should include provision for a variety of industries and offices, so that a high proportion of wage earners living in the town would have the opportunity to work there. In addition, this type of new community includes all needed educational, recreational, and commercial facilities; housing of various types and prices; some health facilities; and should include a public transportation system. This definition implies that the population size of a relatively self-sufficient new community is fairly large; it is unlikely to be less than 25,000 and probably would be 75,000 or more. The community may be self-governing, or may be within the jurisdiction of a local government.

The relatively self-sufficient new community based primarily on a single industry.—This type of new community, also, would include job opportunities for many of the wage earners living in the town. It, too, would include the needed educational, recreational, commercial and health facilities; housing varied in type and in price; some cultural facilities; and should include a public transportation system. A relatively self-sufficient new community with only one type of industry as its primary economic base is likely to have a smaller population than one with a more diversified economic base.

The satellite new community.—This type of development contains many of the facilities of the relatively self-sufficient new town, but has strong ties (hopefully including rapid transit) with an existing city. It depends on the existing city for governmental functions and services as well as many of the employment opportunities needed by its inhabitants.

The planned expansion of an existing town, or group of towns.—Expansion around small cities, towns, or a group of towns can be planned and built to provide all needed facilities and services for a much larger than the original population, the community surely deserves to be included in the category of "new" communities.

The restructuring of existing suburban sprawl to create communities.—With very careful planning for the location of needed new facilities—such as schools, parks, recreation places, shops, and rapid transit stops—some suburban areas could be reconstructed as satellite communities, with a minimum of urban renewal and the resulting economic and social costs.

The "new towns in town," through urban redevelopment.—Harvey Perloff apparently was the first to articulate the concept of building "new towns in town" rather than urban renewal projects which have usually produced only one or a few portions of a community—high, medium, or upper priced housing, for example.³

RECENT PROPOSALS CALLING FOR THE DEVELOPMENT OF NEW COMMUNITIES IN THE NEW ENGLAND AREA

Proposals for the development of new communities in Massachusetts and the rest of the New England area have come from several sources.⁴

³ The "New Southwest" in Washington, D.C., an example of public planning and private construction, and Universal City, in Los Angeles, an example of private planning and construction, might be considered as steps toward "new towns in town" but neither really meets the requirements of a new community.

⁴ Including members of the general court, State agencies, private developers, local officials, and even the Federal Government.

The New England Regional Commission in its recently released regional development plan proposed to—

Identify, develop, execute * * * four model demonstrations of new communities in New England. These demonstrations will meet housing needs in a form appropriate to the selected areas and will emphasize the development of communities within the fabric of existing metropolitan areas * * *.⁵

In a study undertaken for the New England Economic Research Foundation it was reported that:

A new community * * * in a suburban area of Springfield, and drawing on the Springfield area for a sizable measure of infrastructure facilities and services, might be plausible. This would be a new community with a sizable share of its own economic base and infrastructure. Similar cases could be made for the Bridgeport, New Haven and Worcester areas, and perhaps, one or two others.⁶

Several legislative resolves have recently been introduced by members of the general court calling for an investigation by a special commission relative to the establishment of new communities in Massachusetts.⁷ Thus, there is a significant and substantial interest in the potential role new communities could play in meeting some of the current needs as well as anticipating many of the future needs of the Commonwealth.

In the past several years, a variety of proposals to develop new communities in Massachusetts have been introduced:

There are proposals to create small, modern towns in depressed rural areas as a means of providing a superior urban infrastructure, facilities, and services at an economic scale, to depressed rural populations, living in surrounding settlements too small, too dilapidated, too deficient in services to provide a base for growth and development. There are new resort communities, with second vacation homes, springing up with the boom in New England's greatest export industry—recreation and tourism. There are large-scale urban development projects, serving middle-income families, under construction in the suburban cities and towns in some of the more rapidly growing metropolitan areas of the region. There are detailed proposals to create new towns-in-town on manmade or newly cleared land in the harbors of some of the very large central cities of the region, to provide new industry and a new urban environment, in part for urban poverty neighborhood residents. There is an elaborate design for a full-blown new town, with its own economic base, fashioned to give urban poverty neighborhood residents an opportunity for better jobs and a superior environment in a new city to be built on the outer fringes of an expanding metropolitan area.⁸

The suburban cities and towns of New England's metropolitan areas may experience a population growth of three-fifths in 20 years' time. Can new communities address some of the problems that can be expected to develop as urbanization continues?

NEW COMMUNITY DEVELOPMENT IN METROPOLITAN AREAS: "THE GROWTH POINT THEORY"

The issue is not whether metropolitan growth and expansion will occur, but rather how, where, and when it will occur.⁹ Although some

⁵ New England Regional Commission, Recommended Regional Development Plan (Washington, D.C.) July 1969, p. 33.

⁶ Alexander Ganz, et al. "New England's Urban Development: Emerging Patterns and Issues," ch. IX, "Potential Role of New Communities as Growth Centers," (New England Economic Research Foundation), January 1969, p. 23.

⁷ Bills numbered H. 4554, H. 2258, S. 184, spring session, 1970 of the Massachusetts General Court.

⁸ Ganz, op. cit., p. 2.

⁹ In response to this need, several of New England's States are already involved in some stage of planning promotion, and development of new communities. Connecticut's interregional planning program outlines four alternative patterns of urban growth emphasizes communities with a high degree of self-sufficiency, and accommodates new community development. Rhode Island's comprehensive transportation as a land-use planning program presents five alternative land-use plans, including two which lend themselves to new community development. Vermont is actively engaged in planning for new rural communities as well as resort communities. In Massachusetts, the Department of Administration and Finance, Office of Planning and Program Coordination, has the question of new communities on its agenda; but as yet there has been no interagency effort made to consider the question carefully.

relatively isolated, semiautonomous, or economically specialized new communities might be built in outlying rural areas (and certain arguments have been made in support of a few such developments in certain lagging regions of the country), the overwhelming orientation of new communities has been and probably will continue to be toward metropolitan locations where the major population gains and the primary economic growth are taking place.¹⁰ New communities stand a better chance of being economically feasible and socially and politically acceptable if they are developed as part of the "metropolitan regional system, related directly to the metropolitan social and cultural structure, its economy, its transportation system, its open space and land development patterns, and the full range of its market systems."¹¹

There are a number of important economic considerations that need to be considered in selecting sites for new communities. The hope is that it will be possible to identify growth points in communities and subregions. Available public funds would then be concentrated in those areas offering special promise for growth in order to bring about self-sustaining momentum for future development.

A growth point may be defined as the nucleus of sustained growth from which the impulses of development are transmitted to other places, especially the immediate surrounding area. It may be that impulses of growth transmitted by one nucleus to others get a feedback from other growing points. "The center should have one or more economic activities that have shown signs of sustained growth over a period of time, that could be reinforced to create capacity for further development in the region, and that might even provide the impetus for growth in the entire State, or for a major portion of it."¹² A leading French advocate of this hypothesis, J. R. Boudeville, defines a regional "growth-pole" as "a set of expanding industries located in an urban area and including further development of economic activity throughout its zone of influence."¹³

In order to locate appropriate growth points, it is necessary to specify criteria that must be satisfied. These criteria help to determine whether a given area or subregion has sufficient potential for development to be classified as a nucleus. According to a study by Mirza Beg, these potential growth points should satisfy criteria pertaining to (1) sources of stability; (2) sources of reinforcement; and (3) possibilities of a breakthrough.¹⁴

(1) *Sources of stability.*—There should be one or more industries or institutions that provide sources of stability to the economy of the general area and to the particular community. Employment should be free of pronounced seasonal fluctuations. Examples of industries or institutions providing stability to the local economy would be a large governmental administrative unit; a school, college, or university with several hundred persons on the payroll; or a sizable manufacturing or commercial establishment. A steady and relatively large rate of population increase may foster economic stability in the area. Such a community may be already well developed and likely to grow at an above-average rate if development projects are located in the vicinity.

¹⁰ Robert Gladstone, "New Towns Role in Urban Growth Explored," from *Journal of Housing*, XXIII (January 1966), pp. 29-35, reprinted in "Urban Renewal: People, Politics, and Planning," edited by Jewel Bellush and Murray Hausknecht (New York: Doubleday, 1967, p. 536.

¹¹ *Ibid.*, p. 537.

¹² "Profile and Analysis of Economic Data for Massachusetts" (Commonwealth of Massachusetts: Office of Planning and Program Coordination), October 1968, p. 51.

¹³ J. R. Boudeville, "Problems of Regional Economic Planning" (Edinburgh: Edinburgh University Press), 1966, p. 11.

¹⁴ Mirza Amjad Ali Beg, "Regional Growth Points in Economic Development," *Economic Development Series No. 8* (Morgantown: West Virginia University), December 1965.

(2) *Sources of reinforcement.*—To qualify as a potential growth point the community or area should possess additional sources of strength. Superior means of communication, a major highway passing through the area, an intersection of interstate highways and toll roads, financial institutions, recreational and cultural attractions, a good public school system, freight terminals, available land for industrial parks, and many other factors provide reinforcement to the growth point. The traditional locational considerations, such as availability of raw materials, nearness to markets, access to skilled labor, and agglomerative advantages due to urbanization, are also relevant and will provide some communities with a higher than average potential for growth.

(3) *Possibilities of a breakthrough.*—There should be some potential in the area for a major breakthrough into rapid regional growth. Expansion in the volume of total opportunities must occur if steady growth is to be maintained. Aggressive leadership in the area may be the crucial variable here. Each growth point must be strategically located to consolidate the existing position of the community and to attain maximum returns from the developmental effort, in order to spread the stimulus into the surrounding regions. The selection of a relatively more progressive and better developed area, with a greater degree of stability and immediate possibilities for expansion, is rather important. Progress at the growth point may inspire confidence within the region and motivate surrounding areas to duplicate the development. The existence of local initiative on the part of responsible leaders in business, professional, and community circles seems to be a critical factor in the successful implementation of programs of development.

In theory, a regional economic growth point should serve a dual purpose. It should create the infrastructure for consolidating existing advantages and stabilizing the base from which the plan for sustained development; also, it should be integrated with smaller cities in the region to activate them to launch their own plans for development, if possible.

The concept of a growth center or a growth point is related to a notion, though difficult to define, of an optimum size production and population center at which maximum advantage is gained from scale and external economies without incurring serious diseconomies of agglomeration.¹⁵ Growth points have a critical minimum size which permits scale economies and promotes development over the growth area as a whole, and an optimum size beyond which net diseconomies occur.

New communities as growth points argue for centralizing economic resources at certain key locations rather than spreading them thinly over a whole region.

This case rests upon spatial differentiation in resources, a given uneven distribution of population and markets that can only be changed in the long run, indivisibilities in production plants and in public investment projects, scale economies in manufacturing, "central services," and public utilities and upon external economies of interindustry linkages. But the growth point concept, particularly its justification as a policy tool, also involves the hypothesis that centers of agglomeration have zones of indifference around them and that income will be maximized in the growth areas as a whole by concentrating development at the growth point. This is the argument used to justify disproportionate allocations of public investment for infrastructure purposes at the growth point itself.

The existence of a growth point or a new community must involve a certain degree of structured imbalance over the region as a whole. If a new community means, among other things, a new industrial complex, then this complex will be heavily concentrated in or around the growth point itself. The growth point philosophy is that such areas are bound to stagnate in any event,

¹⁵ Harry Richardson, *Regional Economics* (New York: Praeger Press), p. 423.

and that the structural imbalance that results from concentrating expansion at the growth point will result in higher average income per capita for the region as a whole.

Secondly, the key industries emphasized in growth point discussions are, since their function is to accelerate growth within the region, probably export industries (i.e., industries serving a national market).

Thirdly, the growth point will, in time, service its surrounding area by providing the population of that area with supplies of goods and services that need a high minimum population threshold for viability. Such goods and services will include: physical commodities, such as consumer durables supplied by department stores or specialty stores; services supplied by the private sector such as the professional services of lawyers and accountants, or entertainment and leisure facilities; public services that lend themselves to economies of scale (technical colleges and special hospital services).

Finally, the growth point or new community has a socio-economic function to apply, that is to affect prevailing attitudes toward the desirability of economic growth. In regions with a slow growth record, one of the objectives of importing an advanced technological industrial complex to the growth point is to transform social attitudes and to make economic growth more likely in the future. This is achieved by the incentives of higher wages making local workers more productivity-minded and by the growth industries showing local entrepreneurs the possibilities of growth and highlighting the existence of investment opportunities.¹⁶

In summary, agglomeration economies make concentrations of production and population more efficient than dispersal. These economies include increasing the return to scale within firms, external technological economies and economies of scale in the supply of urban services. Even in a free market economy there is unbalanced growth spatially. Industrial activity, establishments supplying public utilities and other services that require a high population threshold for viability, and population expansion itself will cluster around certain focal points. The operation of market forces will have selected these focal points because they have special locational advantages—access to raw materials or markets, unique nontransportable facilities, or favorable topological features. These growth centers have influential effects on activity in the region where they are located. Their expansion may divert activity from peripheral areas which may lose population and fail to gain a proportionate share of capital and entrepreneurial talent, but from the point of view of the region as a whole this diversionary tendency will be more than offset by the induced economic expansion in the “zones of indifference surrounding each center.” These induced benefits will include:

Provision of employment for the zone's population and markets for input-supply and primary industries. The assumption behind growth point analysis as a planning tool is that the agglomeration that proves profitable for the private investor and entrepreneur also results in benefits to society as a whole (especially in the

¹⁶ *Ibid.*, p. 425.

sense that the region is better off than if economic activity were dispersed). This assumption is more reasonable if we recognize that there are limits to the build up of activity at the focal points i.e., that there is some optimum size beyond which net diseconomies emerge.¹⁷

NEW COMMUNITIES AND THE PLANNED EXPANSION OF EXISTING TOWNS

This thesis is concerned with strategies for creating relatively self-sufficient new communities (with a diversified economic base) in presently sparsely developed areas within metropolitan urban regions and with strategies for the creation of new communities through the planned expansion of existing towns or groups of towns. Both options coincide with the growth point hypothesis. In Massachusetts the two options may in fact be one and the same. Since all land in the Commonwealth is incorporated into one of 351 cities and towns, then a new community developed anywhere in the State is in fact really an expansion of an existing city or town. (There is another case where a new community can be developed within or across the borders of several existing towns.)

Across the State there are over 150 towns with a population of less than 6,000 people. Only 25 cities have a population of 50,000 or more people. So the creation of new communities expected to grow to an estimated 50,000 people will certainly alter the population distribution throughout the State in a significant way. A town that grows from less than 6,000 people to an estimated 50,000 people over a period of roughly 15 years will undoubtedly be changed substantially; so much so that the planned "expansion" of existing towns in Massachusetts is very much the same as creating relatively self-sufficient new communities.

The centralization of metropolitan economic activities in urban growth centers or new communities and the inevitable gravitation of population to these centers will help to solve many urban problems. The development of new communities will enhance the economic development of entire metropolitan regions. They will create higher average incomes per capita for entire regions, thus enhancing the purchasing power of the areas and ultimately of the State. Secondly, they will improve the level of productivity per worker by facilitating the use of more highly productive methods of production. Third, new growth centers will attract export-oriented industries which draw on markets and sources of capital outside the area. Fourth, they will allow for the provision of services which require a high population threshold, and finally, the creation of new communities will help create a more positive attitude toward growth throughout the Commonwealth—adding the incentives of higher wages and a higher standard of living.¹⁸

The development of new communities as growth centers that are integrated with the transportation and communication network of a metropolitan area makes a great deal of sense.¹⁹ One proposal which

¹⁷ Ibid., p. 427.

¹⁸ Ibid., ch., 15, "The Strategy of Regional Policy."

¹⁹ Niles Hansen, "Urban Alternative for Eliminating Poverty," *Monthly Labor Review*, vol. 92, No. 8, pp. 46-47.

calls for the creation of new communities through the expansion of existing towns on the fringes of our metropolitan areas is based on the assumption that:

Public funds may be integrated with actual or potential external economies to produce rapid growth in [existing towns] with a minimum of external diseconomies of congestion.²⁰

As part of the program for expanding medium size cities, it has been suggested that formal channels of migration or commutation be developed through which workers living in depressed areas nearby could be guaranteed new employment opportunities.

In the past city planners have tended to draw heavily on the British "garden city" concept (adopting the idea that greenbelts should be developed around the periphery of a new community in order to protect it from the future onslaught of suburban sprawl).²¹ This has led to the belief that new communities must be physically divorced from other settlements. As a result, many developers have limited their purchases to "unspoiled" farmlands or natural areas beyond the fringe of suburban development. For several reasons, this approach has been unnecessarily expensive and has placed restrictions on the residents for whom housing and jobs in the new community would be available. New communities conceived and constructed as extensions of existing settlements and as integral parts of already well-developed regions can make a significant contribution to meeting the needs of the disadvantaged.

There are several reasons why it is more desirable to concentrate on the expansion of existing suburban communities (or the creation of expanded new communities) rather than on investments in entirely new, physically isolated new communities. The first reason has to do with the fact that land located at a distance from existing settlements is generally unimproved and unserved by infrastructure. The argument is usually made that this vacant land is more suited for new community development because of its low costs; however, the experience of all large-scale developers to date has shown that the initial purchase price of land is only a small percentage of the final sale price once the land has been fully improved or serviced for high density development. Thus, it can be argued (purely in economic terms) that land close to an existing settlement will be more easily serviced through the extension of surplus capacity of available infrastructure. Another economic argument supporting the closer location rests on the fact that land values and the demand for vacant land is generally higher close to existing developments. Thus, buying land at a closer location, it will be possible to market the housing or sale of developed land at a faster rate than would be possible at a more remote location. This would help to eliminate many of the high front-end costs that currently plague private developers and reduce the time of exposure before a positive cash flow is achieved.²²

Another set of arguments for selecting new community sites that are extensions of existing settlements is based on the belief that new communities should be planned within a regional framework and must directly address themselves to the opportunities for uplifting the economy of lagging areas. By locating close to an existing area,

²⁰ Ibid.

²¹ See Frederic J. Osborn, *Green Belt Cities* (London: Evelyn, Adams, and MacKay), 1969.

²² R. Bruce Ricks, "New Towns Development and the Theory of Location" in *Land Economics*, February 1970, pp. 5-12.

a new community can offer new jobs and housing for residents in the surrounding area.

Planning new communities as extensions of existing towns will help the new community developer overcome many of the "chicken and egg" problems that have haunted several developments in the past. Imbalances in the initial attraction of either jobs or residents will be more easily absorbed by the existing employment and housing in the area. The problem of not being able to attract employers until there are people and not being able to attract homebuyers until there are jobs will be somewhat alleviated by the existence of both jobs and employees. Furthermore, churches, social institutions, and community-serving facilities that the developer is usually unable to provide for the initial residents in an isolated new community are already available. This will help to cut the developer's costs and provide better services to initial residents. (There are, of course, the disadvantages of not being able to plan and nurture these new institutions according to more idealized goals or in ways that would be more responsive to the future needs of the new community's residents.)

Economic arguments for building new communities in open rural areas depend on the assumption that the difference between marginal per capita product and marginal cost in a new community will be greater than in existing urban areas. In fact, though, the opposite seems to be the case if we judge by existing cities that are comparable in size to proposed new communities.²³ That is, the gross product per worker is higher in more densely developed cities than it is in suburban areas.²⁴

New communities in metropolitan areas can be designed to take advantage of (1) the existing employment opportunities in the suburbs, (2) the rapidly growing population potential, (3) the availability of existing physical and social infrastructure, (4) transportation access to a variety of urban and suburban centers, (5) the obvious economies of scale which accrue to large scale development.

A growth strategy based on the new community concept would seek to develop growth centers in metropolitan areas (where new urban gains are likely to occur) which will help to improve the overall pattern of urban development. "The role of the central city would remain strong. Rather than competing with central cities, in a rational redistribution of the region's activities in a high-growth area, new communities would complement and relate to the central city."²⁵

The feasibility of a new community depends on three general factors: Accessibility, availability, and developability. Accessibility is essentially a measure of the degree to which the proposed development will link into the transportation and communication network of the metropolitan region. Availability relates to the possibility of assembling a site at a competitive price with manageable financing. Developability deals with the geographic and topological suitability of a site and is closely related to the kinds of technologies (land-fill techniques, bridgebuilding capabilities) available.

²³ William Alonso, "The Mirage of New Towns" in "The Public Interest," No. 19, spring 1970 (based on an earlier paper, "What Are New Towns For?" prepared for the research conference of the Committee on Urban Economics, September 1969, Cambridge, Mass.), p. 5.

²⁴ Alexander Ganz, "Our Large Cities: New Directions and Approaches," (MIT, Laboratory for Environmental Studies), December 1969, p. 46. (Table VI: hypothetical contribution of our large cities to national growth and welfare.)

²⁵ Gladstone, *op. cit.*, p. 538.

New communities built in outlying rural areas would probably not serve to stimulate the economy in those lagging sections; a new community which seeks to achieve a self-contained economic market will find that seeking closure at such a scale will result in lower capital production.²⁶ From the point of view of making a successful public investment it would be most sensible to build new communities in metropolitan areas where they could draw on neighboring and surrounding settlements for a substantial part of their economic base and infrastructure especially during the early stages of development. Not only would the initial capital investment in a new community in an outlying rural location have to be much greater (since there would be no existing infrastructure and job base to draw on), but the operating expenses would always be greater since a new community in an outlying area would have to be built at considerably larger scale if it were to succeed.

New communities developed as growth centers within metropolitan areas are probably more likely to succeed because of the immediate accessibility of existing settlements; although other difficulties arise in such situations because long-time residents are resistant to new large-scale development which seems to threaten their style of life and the power they have over the political situation. These political issues are examined more fully in chapter III.

NEW COMMUNITIES AS AN ALTERNATIVE TO SUBURBAN SPRAWL

It is often argued that the development of new communities or large-scale planned urban growth will help to avoid a replication of past suburban development with all its attendant problems—suburban sprawl, segregation of social groups, political balkanization, and municipal fiscal imbalance.²⁷ The concept or strategy of planned urbanization seems to offer an opportunity for the development of completely organized environments with the most efficient, least wasteful uses of land and the most equitable provision of public services and facilities. Some of the public advantages which stand to be gained by planning for urban growth include:

1. Lower per capita costs to the resident because of the advantage of carefully planned uses designed to reduce unit costs (thereby achieving economies of scale).²⁸
2. The optimum development of open space and recreational areas through careful planned unit or cluster development within the new community.²⁹
3. Maximum choice of housing for a full range of income and racial groups because of lower development costs and avoidance of discriminatory zoning practices.³⁰
4. A comprehensive transportation system not only for internal circulation but also for travel to larger urban centers and outlying communities through comprehensive planning.

²⁶ Alonso, *op. cit.*

²⁷ Donald Canty, ed. "The New City" (The National Committee on Urban Growth, Policy published by Urban America, Inc., by Frederick A. Praeger, New York), 1969 or "New Towns: A New Dimension of Urbanism" International City Managers Association, Chicago, 1968.

²⁸ William H. Whyte, "Cluster Development" (New York, N.Y., American Conservation Association), 1964.

²⁹ William H. Whyte, "The Last Landscape" (New York, N.Y.: Doubleday), 1968.

³⁰ This is not to say that new communities can provide a range of housing opportunities without government subsidy, because they can not. See M.B. Zuckerman, "Zurban Report," prepared for President Johnson's Task Force on New Communities, 1968, for a full discussion of mechanisms for financing low- and middle-income housing in new communities.

5. A high level of employment through the creation of new markets by coordinating housing and transportation programming with industrial relocation to the suburbs.

6. A wider range of cultural opportunities through higher density and more heterogeneous development of suburban areas.³¹

Existing patterns of urban growth and development are conditioned by an interrelated set of public and private decisions. "While the private market by and large sets the tone, scale and pace of development, public actions directly or indirectly affect, influence, and structure the shape of development."³² Thus, a critique of present urban development patterns must take into account the full range of political and economic forces at work.

What are the specific consequences of urban sprawl or unplanned urban growth? It has been shown that—³³

1. A sprawled or discontinuous suburban development is more costly and less efficient than a more compact one, each at the same density within settled areas. Many costs depend on maximum distance or maximum area; if these were reduced, costs would be lower per capita or per family served.

2. Sprawl wastes land since the intervening lands are typically not used for any purpose.³⁴

3. Sprawl encourages land speculation which is unproductive, absorbs capital, manpower and entrepreneurial skill without commensurate public gains. It destroys or impairs economic calculations that ideally lead to maximum general welfare.

4. It is inequitable to allow a system in which the new land occupier is required to shoulder such a heavy burden of capital charges and debt mainly for site costs—costs which in large part are unnecessary and unavoidable.

Most of the problems of sprawl relate to density. Since there are fewer houses per acre in the suburbs than in the city, it follows that, with respect to infrastructure, there are fewer requirements per family for infrastructure in the city than in the suburbs. Thus, if the suburbs could be developed at higher, more urban densities, less money/family would have to be devoted to infrastructure costs.³⁵ This assertion was recently given some support in a study undertaken for Fairfax County, Va., which demonstrated that an expenditure of \$20 million for sewers could support a new community population of 465,000 people—twice as many people as under sprawl conditions. These savings accrue for other infrastructure items, such as streets: For example a Baltimore study indicated that a new community development may require up to 200 fewer miles of streets—a savings approaching \$800 million.³⁶

³¹ See Herbert Gans, *People and Plans*, "Homogeneity versus Heterogeneity" (New York, N.Y.: Basic Books), 1968.

³² Kaplan, *op. cit.*, p. 3.

³³ Marion Clawson, "Urban Sprawl and Speculation in Suburban Land," *Land Economics*, May 1962.

³⁴ Two articles, "The Case for Scattering" by Lessinger and "The Nature and Economics of Urban Sprawl" by Harvey and Clark are often cited to show that sprawl works effectively to withhold land from premature development at low densities. While sprawl does seem to have this effect the wasteful sprawl pattern is haphazard and uncontrolled. A public policy to create land banks or to channel suburban development by means of coordinated public programming of capital improvements or by offering incentives (tax abatements, etc.) to private developers would have the same effect but would be much more predictable and would also serve to capture the increase in land values that usually accrues to the private developers (who artificially hold land off the market) and return it to the public coffers.

³⁵ Cited by Prof. Charles Harr in testimony presented before the Subcommittee on Banking and Currency, Oct. 22, 1969, p. 7. The question of a breakpoint is unanswerable because different services operate more efficiently at different levels—the optimum point is unknown.

³⁶ *Ibid.*

In many cases a city dweller in his flight to the suburbs may build his house in the middle of a vacant 1 acre lot. In doing this, he will have unwittingly insured greater infrastructure costs for himself if the suburban development becomes sufficiently urban to require a central sewer system. Wilbur Thompson describes these hidden costs:

Then, what was gracious living on ex-urban lots becomes suburban sprawl, too densely populated to be rural and too sparsely populated to be efficiently urban, and property taxes rise to "confiscatory" levels. For example, an assessment of \$2,000 per acre for a storm drain trunk line comes to a staggering 14 percent of the value of a \$15,000 home, with laterals and catch basins still to come and sanitary sewers to follow.³⁷

In addition to the advantages listed above, new communities—if Government controlled and subsidized to some extent—hold out the prospect of (1) increasing the housing supply for low- and moderate-income people while reducing the costs of infrastructure, services, and facilities and (2) maximizing the employment potential of low- and moderate-income workers. It has been pointed out that new communities can provide unique opportunities for the construction of large quantities of new housing at moderate prices:

The economies of producing housing on a large scale in a single area reduce the cost considerably. The large-staged market will enable builders to organize their time and work efficiently . . . and perhaps, of even greater significance, are the possibilities of experimenting with new technology in housing production; technologies that many large and exceedingly competent corporations have been investigating and which they are eager to put into practice. It is also possible that the volume of housing production in new communities could free many existing suburban units for purchase by moderate income people.³⁸

In addition, new community development may help to solve several other problems associated with providing sufficient housing for all groups of people.³⁹

First, new sources of investment funds—sources outside the traditional capital market—can be tapped. Second, new communities can solve the problems of site assembly that so often frustrate housing entrepreneurs in already developed areas. Third, they can provide land for housing development at substantially lower costs (per acre through large lot acquisition)—and it is sharply rising costs of land that has priced many builders out of the market; this is especially true of the small builder, the characteristic unit of production in the industry. For new communities can provide a continuing supply of housing sites for smaller entrepreneurs at rates far below the \$250,000 per acre paid for slum buildings to be razed in renewal areas or far out land that has risen in value as much as 2,000 percent in rapidly expanding urban centers.* * *⁴⁰

Another, and perhaps more important, argument made in favor of new community development is that large-scale planned urban growth can insure low and moderate income families (especially black families which have been confined to the inner city ghetto) a better opportunity to secure jobs and to achieve upward economic mobility. According to the U.S. Census Bureau only 5 percent of black Americans live in the suburbs. Yet, suburbia is where nearly 80 percent of the Nation's new jobs are. During the 1960's, industries in increasing

³⁷ Wilbur Thompson, "A Preface to Urban Economics" (Baltimore: Johns Hopkins Press), 1968, pp. 320-332.

³⁸ Harr, op. cit. The basic difficulties of building industrialized housing (presuming the production technology can be mastered) are "making a market" for new applications, transporting and stocking standard parts and pieces, and restrictive building regulations.

³⁹ Albert Katz, "Lower Rent Cost—Net Social Gains Through New Towns," "Land Economics," 1962.

⁴⁰ Harr, op. cit., p. 6.

numbers chose to locate farther out in the metropolitan suburbs.⁴¹ The blue-collar jobs created by industrial expansion outward remain inaccessible to blacks trapped in the inner city.⁴²

Several solutions to the "core-ring" (inner city-suburban) disparity in jobs and industrial growth have been proposed. Some suburbanties advocate improving the transportation system between urban ghettos in the inner city and suburban industry. This strategy has failed to provide positive results.⁴³ Some politicians and many blacks favor moving industry back into the inner city.⁴⁴ This scheme also has its drawbacks, and although the problem of providing jobs for inner city residents can possibly be handled in the short run by various schemes to redistribute governmental revenues and by writing down inner city property to make it more attractive for industrial development, a preferable long-run solution would involve a major dispersal of the low income population, particularly blacks.⁴⁵ Attempts to "open" the suburbs to urban blacks have been unsuccessful. First, even though 200,000 middle class blacks are moving to the suburbs each year, white hostility tends to confine them to black suburbs. Legally, the suburbs are open to blacks. But while the Federal Government and 27 States (including Massachusetts) have antidiscrimination laws on the books, they are often unenforced.⁴⁶ Another obstacle to opening up the suburbs is that each municipality has the power to block any increase in its low- and middle-income population—black or white—through refraining from taking the positive steps of public interest and subsidy necessary to produce moderate and low rent new housing. Although attempts are currently being made to break down the exclusionary tactics of existing suburbs, the chances of significant breakthroughs do not seem particularly promising.⁴⁷

The one strategy, however, which does seem to offer a great deal of promise is the building of integrated new communities. John Kain points out that—

Even in the face of continuing practices of residential segregation, the suburbanization of the Negro can still continue apace. The presence of Negroes in the suburbs does not necessarily imply Negro integration into white residential neighborhoods. Suburbanization of the Negro and housing integration are not synonymous. Many of the disadvantages of massive, central ghettos would be overcome if they were replaced or even augmented by smaller dispersed Negro communities. Such a pattern would remove the limitations on Negro employment opportunities attributable to the geography of the ghetto. Similarly, the reduced pressure on the central city housing markets would improve the prospects for the renewal of middle income neighborhoods through the operations of the private market.⁴⁸

⁴¹ With the new kinds of goods and services being produced in new growth industries and with the improvement in transport facilities, traditional plant criteria—proximity to supplies and markets—are becoming less important and the availability of urban amenities—good water and sewer systems, schools—more important. Land costs have driven the new mechanized industries to the suburbs and elsewhere, but these are the very industries offering the greatest potential source of jobs for semiskilled urban dwellers. The new interstate highway system has made it easier to serve a large urban area from the rim of a circumferential highway in suburbia than from the congested hub of a metropolitan area. Substantial diseconomies of scale in public services in large cities encourage industry to relocate in suburban areas. (ACIR *Urban and Rural America: Policies for Future Growth*, p. 58.)

⁴² John Kain and Martin Persky, "Alternative to the Gilded Ghetto," "The Public Interest," No. 14, winter 1969.

⁴³ Carol S. Greenwald and Richard Syron, "Increasing Job Opportunities in Boston's Urban Core," *New England Economic Review*, January-February 1969, pp. 30-40.

⁴⁴ See John Kain, "Race and Poverty" (Englewood Cliffs: Prentice Hall), 1968. Also see, for a summary of job creation strategies, "Proposal for Urban Development, Job Creation and Job Upgrading," Laboratory for Environmental Studies, MIT, Cambridge, Mass., 1968.

⁴⁵ Kain, *op. cit.*, "The Public Interest."

⁴⁶ The U.S. Justice Department has assigned 13 lawyers to enforce the 1968 Fair Housing Act; they have brought 44 cases to court and have won 13 of those cases.

⁴⁷ Paul Davidoff, of Suburban Action in Westchester, N.Y., is attempting to test the legality of discriminatory zoning practices for the NAACP.

⁴⁸ Kain, *op. cit.*, "The Public Interest."

Ghetto enrichment would accelerate programs aimed at upgrading the urban areas presently occupied by the Negro underclass. But since any program that significantly improves life in the ghetto also accelerates Negro migration to the same ghettos, this alternative is nothing more than another way of choosing a permanently divided country. There are two other options: the first calls for vigorous efforts to open the suburbs for Negroes, complemented by some firefighting programs of ghetto enrichment. The second choice includes ghetto improvement accompanied by a program to create new communities where Negroes can be masters of their own lives and shape their own environment.⁴⁹ The creation of new communities in suburban areas in close proximity to existing job opportunities could be coordinated with the creating of new communities by black developers and black enterprise.⁵⁰

The three major goals of a new community development program should be (1) to maximize regional productivity (by attracting private capital investment through increased efficiency); (2) to minimize public expenditures for capital improvements and services, (3) to maximize advancement opportunities for disadvantaged groups. Although the economic evidence is not conclusive, it would seem that these three goals are potentially realizable through the development of new communities because new communities allow for a greater degree of public coordination and control over the shape and pattern of urban development, allow for economies of scale in public expenditures, and allow for increased labor mobility by aggregating new industrial and commercial development. In addition, because new communities are typically built at a higher density than typical sprawled developments, they insure economies of scale in housing and infrastructure development, they reduce the number of miles of public highways and roads needed to link settlements, and they offer advantages to new industry through agglomeration.

Black new communities are only variant of the new community idea. The basic point is that new communities—whether integrated or black run—offer a wide range of opportunities for low- and middle-income people because of the economies of scale, the possibilities of increased housing production, the linking of job possibilities with new urban development, and—most important—the potential for politically feasible direct action and massive subsidy by higher levels of government.

New communities, developed under the guidelines of a State urban growth policy, could provide the housing for low- and middle-income people within close range of jobs created by industrial relocation in the suburbs. The State government has a residue of as yet underutilized powers to influence the growth and structure of urban areas. Programming and development of public facilities can create an envelope within which more efficient and more equitable patterns of urban growth and development can take place. The timing, location, and scope of public investment decisions influence, if not control, the physical form of the region. New community development seems to hold out a very real alternative to urban sprawl, an alternative which is directed at helping to meet the critical housing shortage and at

⁴⁹ Ervin Galanty, "Black New Towns," *Progressive Architecture*, August 1968, pp. 126-131.

⁵⁰ See Arnold Schuchter, "White Power/Black Freedom" (Boston, Beacon Press), 1968, ch. VII. Also see Planners For Equal Opportunity position paper on New Communities, presented at the American Society of Planning Officials Conference, New York, April 1970.

helping low- and middle-income people (especially inner city blacks) realize their full economic potential.

The role of State government in new community development

One reason that countries in Europe and elsewhere have gone so much further and been so much more successful than we have in the development of new communities is the more active role played by government. To point this out is not to minimize the need for private involvement. Rather it is to stress the need for cooperative involvement of all levels of government and private industry.⁵¹ The risks in building a new community are tremendous for the private developer who must go it alone, and to date the record of achieving public objectives has not been too good.⁵² The enormity of the undertaking, the lack of eminent domain power, the total lack of early return on a large initial investment and the inevitable uncertainty of doing something new are only a few of the considerations. The great risk is one of the primary reasons that large investors have been reluctant to back private efforts to build new communities. The private developer, though, is an essential partner without whom new communities probably could not be built at all. Government involvement is needed not to substitute for private action but to attract it.

*Considerations for State involvement in private efforts to build new communities*⁵³

"The risks are high and the potential benefits minimal . . ." is the conclusion reached by Eichler and Kaplin in their comprehensive study of new communities currently being developed in the United States.⁵⁴ They consider the possible benefits and costs that could result from public involvement (through capital improvement programming, grants-in-aid, or direct subsidies) in the development of new communities throughout the country. They present three arguments against the use of public funds for these purposes:

1. New communities only help the middle and upper income group in society;
2. Public funds would only help to finance poor investments (i.e., ones for which a private developer would be unable to secure private financing);
3. New communities do not achieve any valuable social objective.

These conclusions may be justified insofar as they refer to privately developed new communities of the past. But strong arguments can be made to support the contention that a public-private partnership in new community development could overcome each of the three assertions made by Eichler and Kaplan.

Criticism No. 1. New communities only help the middle and upper income groups in society.—Certainly it is true that most new communities developed in the past have been directed toward the middle and upper income markets due to the financial constraints imposed on the private developer. But the addition of public funds for housing subsidies, job training programs, industrial location incentives or

⁵¹ This point is made by Samuel C. Jackson, Assistant Secretary for Metropolitan Development of Housing and Urban Development in a speech before the annual meeting of the Federation of Rocky Mountain States, September 1969.

⁵² Edward P. Eichler and Marshall Kaplan, "The Community Builders" (University of California Press, Berkeley), 1967.

⁵³ This section is based on a study prepared by New Community Planning Associates, "New Communities: A Public or Private Venture?" December 1969, Boston, Mass., mimeo.

⁵⁴ Eichler and Kaplan, op. cit.

improved transportation facilities can vastly expand the income range of potential residents.⁵⁵ Eichler and Kaplan tend to oversimplify the impact of new communities by disregarding the development's effects on surrounding areas. Strategically located new communities can have a significant impact on existing central city areas through the filtering process in housing, the attraction of new employment opportunities to the region, and the development of prototypical solutions and technologies that can be applied in the inner city.

Criticism No. 2: Public funds would only go to help finance poor investments.—To the private developer a "good" investment is one that produces a high rate of return (in relation to the degree of risk) during the development period which in the case of new communities may be anywhere from 10–20 years. The success of the project after that point is of little concern—except in so far as the developer has an equity interest in leased properties. However, from the public point of view, an investment is considered over a longer time span because of the continual costs that must be borne in the provision of public services and facilities. Frequently public investments are made for their long-range or secondary effects rather than their short-range viability. If a public commitment to build new communities can lead to the prevention of a major transportation crisis in our central cities, then the decision would be justified in the eyes of a public agency or authority, even if the investment would be viewed as a poor one in the short run by a private developer.

Criticism No. 3: New communities do not achieve any valuable social objectives.—Privately developed new communities (there have not been any publicly developed new communities in recent years)⁵⁶ have been able to achieve critical social goals (providing low-income housing, increasing the job base of the region, maximizing open space) only in so far as these goals coincide with the private developer's objective of making as high a profit as possible on his investment. Several new communities have been able to maximize public open space through careful planning, to increase the employment base in the area, as well as to improve the educational and cultural facilities. But these are often improved by sacrificing other equally significant objectives—more lower income housing, greater income integration and innovations in housing and transport technology. Clearly the private developer is under a constraint to provide only what will be marketable or profitable. This is no reason, however, to condemn the entire concept of new communities as being incapable of achieving social goals. On the contrary, it merely indicates that the private market as it is currently structured is not capable of maximizing the broad range of social goals that could be achieved through increased public involvement.

The private community builders have traditionally begun their involvement with the purchase (or prior ownership) of large parcels of land. Then they have continued to plan their new community given the constraints of the market, their financial capabilities, and local governmental regulations on land use. There are two critical problems inherent in this traditional land-first approach. First, because the developer fails to clarify the goals of new community development

⁵⁵ The planning for several new communities in New York by the New York State Urban Development Corp. seems to indicate that this is the case.

⁵⁶ For a history of earlier public efforts in the United States to build new communities see Mary Mullarkey "The Evolution of a New Community: Problems of Government," *Harvard Journal of Legislation*, May 1969, pp. 462–495.

through careful planning before he purchases the land, he is frequently forced to make many sacrifices to meet the (political, financial, and social) constraints imposed on his site.⁵⁷ The developer frequently finds that the final purchase price for the land is the critical factor in determining what types of uses and what types of densities will be possible regardless of what he might think is most appropriate.

The second problem with the land-first approach is its failure to complement the needs and growth potential of the entire region. The private developer is, essentially, given the right to determine the future growth pattern for the region in which he selects his site. His decision to build is based primarily on the anticipated marketability of the site and the ability of the surrounding area to service his project and provide the level of facilities he requires. He is generally not concerned with the following:

1. The impact of his development on the entire region's growth. (Is his site the most appropriate location to develop a new growth center?)

2. The employment and valuable cultural activities it will attract away from areas of greater need within the region; and

3. The changes in priorities in regional and State appropriations of funds that will be required to provide the community with the desired level of facilities.

The major criticism of new communities built thus far in the United States (and in England for that matter) rests on the argument that they are not conceived as part of a regional analysis and rarely occupy a coherent place or role as part of the regional plans or, indeed, of any regional planning framework.

The key factors in the success of a new community development are sufficient capital, a short development period, a location which is developable, accessible, and available, ownership of the land prior to starting, as few legal restrictions as possible, and a competent administrative and marketing team.⁵⁸ Each phase of the new community development process (regional analysis, hiring of staff/consultants, financing, site analysis, site planning, intergovernmental relations, land acquisition, management, infradevelopment, tract development, marketing, evaluation) involves certain requirements that can best be handled by a different level of government or by the private sector.⁵⁹ The purchase of land might be handled by a public body with the power of eminent domain. At each stage a variety of public powers might be exercised to enhance the final outcome of the development. Different levels of government (agencies, instrumentalities) might perform different functions at each stage of the process: The Federal Government (HUD, HEW, Interior) might provide excess Federal land and subsidies for land acquisition, housing development, open space and transportation, and infrastructure planning. State agencies (DCA, DCD) could select the sites that make the most sense in light of state objectives and they could subsidize certain aspects of planning and development. A State corporation (with broad powers such as local override) might handle the intergovernmental relations.

⁵⁷ For a full discussion of the problems faced by a private developer in building a new community, see "The Role of Private Enterprise in Developing New Towns," Harvard Business School, Intercollegiate Case Clearing House, ICH, 13G45, PR 8A.

⁵⁸ For an elaboration of these considerations see the case prepared by McKinsey & Co., on Soul City, the new community being planned and developed in North Carolina by Floyd McKissick Enterprises.

⁵⁹ For a discussion of which phases can best be handled by which units of government, see New Community Planning Associates, op. cit.

An independent development district with power to act in a particular area (like the Massachusetts Port or Turnpike Authority) might handle a different aspect of the development process. Regional planning commissions, municipal agencies, municipal corporations (such as local planning agencies, or municipally created development corporations), and, of course, the private developer (who could best handle the building and marketing) would all ideally be involved.

State government has an important role to play in new community development. Just what that role should be depends on several things: What the potential for new communities in the State might be (how many new communities should be built, where, at what size); what kind of intergovernmental planning framework can be established; what financial resources are available and what moneys can be obtained from different sources such as the Federal Government; what kinds of instrumentalities presently exist and what kinds can be developed in the legal, political, and social context of State government. These and other questions will be considered in the next two chapters.

CHAPTER III

NEW COMMUNITY DEVELOPMENT STRATEGIES

INTRODUCTION

Constitutionally, the States are the ultimate holders of the police power and "are the legal masters of local governments and far superior to localities in their ability to raise revenues."¹ Politically, State governments are at least one step removed from the interjurisdictional conflicts which so often impede areawide planning for metropolitan growth. For these and numerous other reasons, any rational policy allocating responsibility for the development of new communities would more than likely assign a wide range of powers to the State government.

Unfortunately, direct State involvement in land-use planning, development control, and the creation of new communities has tended to be minimal.² On occasion there have been recommendations made for greater State action in promoting local development; part of a recent report to the National Governor's Conference contains a section entitled, "The Challenge of Orderly Growth," which spells out the kinds of State policies needed in the areas of zoning, land use, planned unit development, and new community development.³ Various States have already taken steps to insure a greater degree of State involvement in overall planning for urban growth.⁴

Increasing dissatisfaction with the pattern of metropolitan development has generated still more proposals for modifying existing arrangements and creating new concepts and instrumentalities. This chapter does not deal with proposals that call for the abolition of local governments, but rather with various supplements to local action on issues of urban development proposed; and in particular with the issue of new community development.⁵ Proposal to (1) facilitate metropolitan area planning for regional development, (2) create new agencies, short of metropolitan government, (3) generate private development incentives (all of which would provide for greater state control over the new community development process) have been suggested in a report for the National Commission on Urban Problems.⁶

¹ Edward Banfield and Morton Grodzins, "Government and Housing in Metropolitan Areas" (New York: McGraw Hill), 1958, p. 151.

² The exception to this statement is, of course, New York where the New York State Urban Development Corp. is very much involved in the development and planning of new communities.

³ The National Governor's Conference, "The State and Urban Problems: Staff Study for the Committee on State-Urban Relations of the National Governor's Conference," October 1967, pp. 68-79.

⁴ Some States have already taken steps to control certain types of land. Wisconsin, for example, in 1962 began a major open-space acquisition program. Since then, such States as New York, New Jersey, Pennsylvania, Connecticut, and California have also adopted laws to preserve recreational areas. In Colorado, a county must submit any proposed zoning ordinance to the State planning director for advice and recommendation. Similarly, Michigan counties are required to refer an adopted ordinance to the Michigan department of economic expansion. Substantial attention has been given in Connecticut to the development of regional planning agencies covering the entire State and to the integration of State and local development activities. ("Fragmentation in Land Use Planning and Control," prepared for the consideration of the National Commission on Urban Problems, Research Report No. 18, by James Coke and John Gargan, Washington, D.C., 1969, p. 57.)

⁵ For a discussion of proposals calling for substantial reorganization of metropolitan government see, A CIR "Alternative Approaches to Governmental Reorganization in Metropolitan Areas," June 1962.

⁶ "Fragmentation in Land Use Planning," op. cit.

A proposal to integrate the planning and regional development processes has been offered by F. Stuart Chapin.⁷ For each metropolitan area he proposes that a metropolitan area general plan be developed.⁸ Under Chapin's scheme, the general plan and a development "instrumentality" of some kind would be made operational through a metropolitan area public works program and urban development code covering zoning, subdivision, and housing regulations. This program would take into account the fact that:

* * * The provisions of public services in strategic locations can be used to divert growth into certain predetermined areas, and the withholding of public services can have the effect of dissuading development in other areas. The programming of public works and improvements and the budgeting and building of public facilities in particular locations, of course, is a related and a very fundamental lever in the followthrough on plans and policies for shaping growth.⁹

His plan would provide for different mixes of regulations and public investments in areas at different stages of urban development. In Massachusetts, the annual budget of the Commonwealth is close to \$1 billion per year and the carefully planned investment of these funds in public improvement could have a substantial impact on the pattern of urban growth.¹⁰

A second proposal calls for the establishment of metropolitan special districts that could plan and install certain critical components of the urban infrastructure. These would include transportation facilities, open space, and utilities. This presumes that metropolitan expansion is largely determined by the location of capital facilities, both public and private. By controlling the critical investments, growth could be diverted without the need for a new agency to assume the responsibility for traditional zoning and subdivision controls.¹¹

In 1960 a suggestion was made that a new type of special district—a suburban development district—be established. The basic power of the suburban development district would be an authorization from the State to acquire all land within its boundaries through purchase or option. The power of eminent domain would not be granted.¹² Another similar proposal designed primarily to preserve open space in metropolitan areas was proposed in 1961 by Jan Krasnowiecki and James Paul.¹³ They proposed that "metropolitan development commissions" be established which would operate through an adaptation of the British system of nationalization of development rights.¹⁴

⁷ F. Stuart Chapin, Jr., "Existing Techniques for Shaping Urban Growth" in "Urban Expansion Problems and Needs," op. cit., p. 123.

⁸ Ibid.

⁹ Ibid., p. 224.

¹⁰ Proposed Study: "A Public Investment Plan for the Commonwealth of Massachusetts," first staff report to the New England Regional Commission, Publication No. 799, September 1967, p. 21.

¹¹ ACIR, "The Problem of Special Districts in American Government" (Washington, D.C., U.S. Government Printing Office), 1964.

¹² Marion Clawson, "Suburban Development Districts," *Journal of the American Institute of Planners*, May 1960.

¹³ Jan Krasnowiecki and James Paul, "The Preservation of Open Space in Metropolitan Areas," *University of Pennsylvania Law Review*, vol. 110, No. 2, Dec. 19, 1961.

¹⁴ That system has been described as follows:

(a) When the area to be preserved or developed for open space purposes has been chosen, through procedures and within a governmental structure which best assure maximum benefit to the community, the properties in the area are valued;

(b) The valuation is based on the same principles and is accomplished under the same procedure as is the valuation of property for purposes of just compensation in condemnation;

(c) The values thus established for each property in the area are guaranteed to the owner by the governmental authority;

(d) The aggregate of those guarantees for the whole area is equal to the compensation which would be payable if the whole area were condemned in fee on the date when the open space program goes into effect; the fee, of course, is not condemned; instead, detailed regulations controlling the uses of the property for open space purposes are imposed against the guarantees; to the extent that such controls depress

Another proposal, made by William Slayton, calls for the establishment of State chartered, public development corporations with the authority to acquire land, prepare plans, install community facilities, and dispose of land by lease or sale to private developers.¹⁵ The power of eminent domain is included in the powers granted to such a development corporation. Slayton points out that "the public development corporation must be able to control land development and the appreciation of land values should accrue to the public—not to the private landowner merely because he happened to own land at the time of adjacent development."¹⁶

It has already been noted that a substantial portion of the capital investments made within a metropolitan area results from decisions of individuals functioning as consumers or corporate officials.¹⁷ Any realistic system of incentives and development controls must take the private decisionmaking process into account. Land banks, mortgage guarantees, and other types of incentives-controls systems have been suggested. A variety of such mechanisms will be considered in chapter IV.

One of the most viable incentive-control systems for encouraging orderly development within the private sector is State investment in new community development. Investments in transportation, health, education, and welfare are all part of a State investment program. A public investment program focused on new community development would be aimed at economic development as it relates to social and political objectives. The creation of totally new communities would permit large-scale social and economic planning as well as the establishment of the "proper relationships among land uses" from the earliest stages of development.¹⁸ Not only the commitment to ongoing guidance of development but also the inclusion of a mix of social classes and commercial-industrial activities would differentiate new communities from more familiar suburban sprawl.¹⁹ At present, the U.S. Department of Housing and Urban Development authorizes FHA loans for land purchase and development subject to the requirement that new communities house low income people and conform to metropolitan development plans.²⁰ New Legislation is currently under consideration that would provide further subsidies for public agencies (as well as private investors) interested in developing new communities.²¹

Footnote 14—Continued

the value of the land for uses actually being made of it at the time they are being imposed, the owner is permitted to draw on his guarantee for damages; to the extent that such controls depress the value of the property for other than existing uses—depress or eliminate the development worth—the owner may draw on his guarantee through an administratively supervised public sale of his property; the guarantee established for any property in the area is reduced by each payment of damages or compensation. Thus the damages and compensation payable by the community cannot exceed the guarantee established for each tract. What this means, in effect, is that development values not existing on the date when open space controls are imposed are not compensated. ("New Techniques for Shaping Urban Expansion," ASPO Planning Advisory Service, Information Report 1960, July 1962, pp. 16-17.)

¹⁵ William L. Slayton, "The Development of Needed Metropolitan Policies: Policies for Metropolitan Development," paper presented at the second annual conference on urban regionalism (Kent: Kent State University Center for Urban Regionalism, 1966).

¹⁶ Ibid.

¹⁷ For further elaboration and statistics on this point see William L. C. Wheaton, "Public and Private Agents of Change" in "Urban Expansion, Problems and Needs," op. cit., p. 65.

¹⁸ See for example, Daniel R. Mandelker, "A Legal Strategy for Urban Development," in Sam Bass Warner, Jr. (ed.), "Planning for a Nation of Cities" (Cambridge, MIT Press), 1966, p. 213.

¹⁹ See "Alternative to Urban Sprawl: Legal Guidelines for Governmental Action," prepared for the National Commission on Urban Problems, Research Report No. 15 by Fred Bosselman.

²⁰ Title IV, Housing Act of 1968.

²¹ The Nixon administration is currently preparing legislation that would amend title IV of the 1968 Housing Act to allow public development corporations to apply for money presently restricted under title IV to private developers. Money would be made available for the planning of new communities, in addition to the funds available for land and development.

State governments need to decide what strategy they will adopt to insure balanced regional development and what types of incentive-control systems they will employ. Should the Commonwealth establish a State-chartered, nonprofit corporation empowered to acquire land and plan and develop new communities? Should the State authorize groups of cities and towns to acquire, purchase, or take by eminent domain noncontiguous tracts of land for open space, transportation corridors, utility purposes or for privately developed new communities? Should the exercise of such powers be subject to the approval of a regional planning and development agency? Should the State (through the Department of Community Affairs, Commerce and Development and/or the Department of Natural Resources) designate land areas in which the State has a special interest? Could the State planning agencies prepare and administer direct land use and development controls which would insure that new community development would meet State objectives?

In this chapter three new community development strategies are evaluated. Each strategy is considered in terms of its political and financial feasibility and the public benefits it is likely to offer. The first strategy would authorize existing regional planning agencies to assume some of the powers of a regional development authority and to plan for new community development in their region. The second strategy calls for the establishment of a State development corporation to build new communities. The third strategy provides for the establishment of new community development districts which would be financed by the State but run by a board of directors made up of community representatives.

STRATEGY NO. 1

Providing regional planning agencies with the power to act as industrial and economic development authorities.

Description

Legislation presently exists which provides for the industrial development of cities and towns through the establishment of industrial development finance authorities.²² The creation of these authorities must be preceded by the finding that (1) unemployment or the threat of unemployment exists in the municipality or (2) security against future unemployment and lack of business opportunity is required in the municipality. By attracting new industry to the municipality or by substantially expanding existing industry, it is assumed that the industrial development finance authorities can help to combat these problems. Two or more contiguous municipalities may agree to consolidate their respective industrial development financing authorities into a single authority.²³ These authorities can acquire and sell land but they do not have the power of eminent domain. The general laws of Massachusetts provide for the creation of a State industrial finance board which on the request of any city or town can establish a local industrial development finance authority.

In 1966, 1967, and 1968 the Massachusetts Department of Commerce and Development proposed enabling legislation that would allow all regional planning agencies to act as industrial or economic

²² Massachusetts General Laws, sec. 772, ch. 40D.

²³ Ibid.

development authorities.²⁴ In other words, the idea of municipal industrial finance commission was extended to encompass all the cities and towns in a given regional planning area. (See map 2 in ch. 2 for outline of regional planning areas in Massachusetts.) The proposed legislation failed to receive the necessary support and ultimately it failed to pass. However, in 1969 one regional planning agency, the Southeastern Massachusetts Regional Planning Agency, did succeed in getting special legislation passed which empowered them to assume the responsibilities and powers of an economic and industrial development authority. Such an economic development authority is authorized to assume the duties, obligations, and responsibilities of a title IV redevelopment area designated pursuant to the Public Works and Economic Development Act of 1965.

If enabling legislation such as that proposed by the Department of Commerce and Development could be passed, most of the State would be subsumed under one or another regional, economic development authority. New community development proposed within an agency's jurisdiction would be planned and coordinated by the regional planning and economic development authority. (Sample legislation is provided in app. D.)

Political feasibility

Past experience seems to indicate that there is not much support for the establishment of regional planning and economic development authorities. However, the experience of the Southeastern Massachusetts Regional Planning Agency indicates that giving such powers to regional planning agencies is politically feasible. The passage of enabling legislation (as opposed to the special legislation which was passed in the case of southeastern Massachusetts) would be possible if an effort was made to educate the public. The department of commerce and development has no explanation of why the proposed enabling legislation failed to receive the wide-spread support in the past.

Financial feasibility

Regional planning agencies are currently functioning in Massachusetts (see app. E for a discussion of the legal basis for regional planning in Massachusetts). They are funded by per capita assessments on each member locality. Legislation which would alter existing regional planning agencies and bestow upon them the powers of a regional development authority would not empower these agencies to issue bonds. At present the State does not offer tax incentives to industry, in the usual sense of the term, nor does it authorize local governmental units to do so. Local governments are not authorized to issue either revenue or general obligation bonds for industrial development purposes in Massachusetts.²⁵ It is not proposed as part of this strategy to empower regional planning and development authorities to issue bonds. Thus, this strategy would cost no more and accomplish slightly more than the present approach to regional planning.

Public benefits

New community development under the control of regional planning and development authorities would at least be coordinated to a greater

²⁴ House bill No. 48, 1967, General Court of Massachusetts.

²⁵ "Review of Regional Economic Research and Planning on New England," (U.S. Department of Commerce, Economic Development Administration), prepared by the New England Economic Research Foundation, 1968, p. K-50.

extent than at present. The selection of sites for new community development would be the responsibility of the development authorities. This would insure that efforts to attract new industry in the area could be coordinated so that new community development would strengthen the entire regional fabric.

This strategy does not provide for direct State subsidy for new community development nor even for a pledge of State credit behind the issuance of bonds to support industrial development. The regional planning development authority would be responsible for insuring flexible enough zoning arrangements to allow new community development at a higher density than would otherwise be permitted.²⁶ A provision requiring the approval or disapproval by a majority vote of the regional planning commission on all local zoning and subdivision ordinances (and variances) related to proposed new community development would insure a greater opportunity to work for the needs of the whole region. Regional agencies might also work with State planning and development agencies to see that transportation, health, education, and welfare expenditures were diverted to coincide with the needs of new communities being planned. The regional authority, since it would have no money to build housing, could work with the Massachusetts Home Finance Agency (MHFA) or other nonprofit corporations (or the State) to build a wide range of housing types for families of all incomes.

Under this strategy new communities would, more than likely, be privately developed but they would at least be planned to some degree by the regional authority. It is assumed that this strategy would enhance the possibility of meeting State urban growth objectives. State government could maintain some degree of control over the new community development process by contributing funds (under certain conditions) to the work of the regional agencies. This strategy would probably be politically feasible and financially possible since new communities under this strategy would almost certainly be privately financed and developed. The regional authority (through the State) would be involved in the planning of the new community, but only in a minimal way.

STRATEGY NO. 2

Providing for the creation of a State-chartered, nonprofit new community development corporation.

Description

A variety of model new community development corporations have been proposed.²⁷ Recently the Governor of Massachusetts proposed the establishment of a replacement housing and community development corporation. As described in the Governor's proposal, such a corporation would have the power to replace housing demolished by public action and it would also have the power of eminent domain to accomplish its objectives. It would have the capacity to develop new communities anywhere in the Commonwealth. This is not to say that it would be empowered to create new municipalities. Rather, it would work within existing boundaries to guarantee that population and

²⁶ See, for example, Howard County 1985, technical report prepared by the Comprehensive Planning Section of the Howard County Planning Commission, April 1967.

²⁷ See ACIR, "State Legislative Program: New Proposals for 1968" (Washington: Government Printing Office, 1968).

economic growth would be carefully planned to coincide with State objectives. The proposed corporation would be empowered to promote industrial development projects relating to residential expansion (for Federal tax benefits unavailable now to exclusively industrial developments are still available to projects related to residential development). This new entity could act only after the community has formulated a new community plan. Lacking such a plan, the corporation could act when a local governmental body designated a given location as a new community area. And lacking such a designation, the corporation itself with the Governor's approval could make such a designation and begin development.

The agency as proposed would be permitted to borrow at least \$500 million at relatively low interest rates through the sale of tax-exempt bonds. In turn it could buy land and lend money to developers at relatively low interest rates to build housing and industry and community facilities. Developers would pay back the loans from income they made on property.

Political feasibility

The corporation would put together sites, insure development, and arrange for financing. No project could be undertaken without local approval—or, failing such approval, a two-thirds affirmative vote of the corporation board of directors and the approval of the Governor. The prime difference between the Governor's proposed corporation and the New York State Development Corporation, which serves as the only model of a State development corporation, is that there are more checks and balances on the powers of eminent domain in the Massachusetts model. No project area can be less than 100 acres, and no project can be developed in any town with less than 500 acres of vacant land. The corporation would also be empowered to override local zoning codes and building codes. This would be a direct challenge to the recently passed home rule amendment in Massachusetts.²⁸ The Governor's proposal is perhaps not the most impressive proposal for a State development corporation that could have been made,²⁹ but since it has already been proposed and since it has received some support from municipal officials, it is the model that should be considered at this point in time. It is not yet clear whether or not the proposal will be accepted, but the careful system of checks and balances certainly enhances its political acceptability.

Financial feasibility

The Governor of Massachusetts has set as his goal the creation of 230,000 units of housing in the next 10 years.³⁰ Many of these units will be included in the development of new communities throughout the Commonwealth. At present construction prices (about \$20,000 per unit) that much housing would cost about \$4.6 billion. That does

²⁸ One of the problems facing the Massachusetts Replacement Housing and Community Development Corporation bill is its direct challenge under section 8 of the home rule amendment to the Massachusetts Constitution (HRA 8). Under HRA 8 the general court may act "in relation to cities and towns either by general law or special law in enumerated circumstances." The findings of the proposed bill emphasize certain points to meet the challenge of HRA 8. First to assure its reading as a general law, and not just as a special law, the bill stresses the statewide breadth of the Commonwealth's urban problems, and need for at least several community development efforts to meet the problems. Second, the emphasis on statewide aspects of the Commonwealth's urban problems anticipates and hopefully overcomes the challenge that development within a single municipality is activity only in relation to that city or town, and therefore is not proper activity for the corporation.

²⁹ A superior proposal has been prepared by a group of students at the Harvard Law School. December 1969: "Proposed Legislation to Establish a Massachusetts New Communities Development Corporation" (Browning, Herfel, Scott, Silberman, and Susskind).

³⁰ Remarks made by Governor Sargeant at the annual meeting of the Citizens Housing and Planning Association of Metropolitan Boston, Dec. 8, 1969.

not include all the costs of developing complete new communities (e.g., infrastructure, industrial development, commercial development, recreation, and open space) which would probably total an additional \$5 billion. The initial cost to the Commonwealth of the Governor's proposal is estimated at \$2 million yearly—most of that money would go to finance the agency itself.³¹ Additional money would be available for housing loans if the legislature agreed to raise the \$50 million borrowing limit on the Massachusetts Housing and Finance Agency (at least 25 percent of the housing built through the housing agency must be low income and it has so far committed \$22 million).³² The new corporation would be in a good position to push for the full utilization of existing State and Federal subsidy programs. New communities would be developed by the State development corporation, although residential and commercial development could be subcontracted out to private developers. Ultimately the new communities would be subsumed by the existing municipalities in which they were located.

Coordinated State investment in capital improvements could reduce the actual costs of a new community (i.e., transportation planning could be coordinated with new community development to eliminate the need for additional costs for roads). Federal, State, regional, and local moneys could be pooled under this strategy. The program seems to be financially feasible.

Public benefits

Along with the problems of finance and land assembly, existing building codes, development standards and land use controls pose substantial barriers to a program that has as its general goal the successful development of new communities with a full range of housing, facilities, and jobs. Short of complete, new, statewide enabling acts, the creation of a development corporation with local override powers is the best way of insuring that local standards will not impede the development of balanced new communities. The development corporation strategy insures coordination of planning and investment decisions at the State level. It insures a wide range of housing types and (as compared with strategy No. 1) gives the State government a greater measure of control over comprehensive planning for urban growth in the Commonwealth.

STRATEGY NO. 3

Providing for the establishment of new community development districts.

Description

This third strategy is derived directly from a proposal made by Marion Clawson to establish "suburban development districts."³³ District boundaries would follow "natural features," and the size would vary from 10 to 20 square miles. The basic power of the new community development district would be an authorization from the State to acquire all land within its boundaries through purchase or option. However, the power of eminent domain would only be granted once the development district had acquired 70 percent of the land it needed by direct purchase or by purchase of options.

³¹ "Who Will Replace Housing—The State?" Boston Globe, by Janet Riddell, Dec. 16, 1969.

³² See "Operations Handbook for Mortgage Loan Financing of Multi-Dwelling Housing and New Construction," MHFA, July 1969.

³³ Clawson, op. cit.

The governing board of the new community development district would be composed of members from several interest groups: municipalities, other special districts, real estate developers, present land owners, citizens, State government and regional planning agencies. Each of these groups would be permitted to purchase stock in the development district. The new community development district would be empowered to plan, to acquire and control land, to contract with private developers for the development of the area, and to supply necessary governmental services.

The immediate objective of the new community development district would be to channel and coordinate private and public development activities to insure the development of compact new communities. A further objective would be to assist in the preservation of open space by providing an ample supply of well-located land that is ready for development, thereby accommodating development pressures that might otherwise overwhelm the defenses erected to protect the open space.³⁴

The new community development district is a means of carrying out a staged development process in which development occurs in a limited number of areas at a given time, and most of the unbuilt land is reserved for later development or permanently retained as open space. Each new community development district would cover an area large enough for a new community, but small enough to permit detailed design of the whole community, efficient coordination of all development activities and completion of development within a span of several years.³⁵

Two kinds of actions would need to be taken to secure development of the new community by private enterprise. Owners of sizable tracts of land designated for development at lower and medium densities would be encouraged to submit application for planned unit zoning, and all remaining land in this category would be rezoned.³⁶ Land designated for interim development, and other land not developed within a reasonable time would be acquired by the development district for sale or lease to developers (subject to specific conditions as to the character and timing of development).

³⁴ Henry Bain, "The Development District: A Governmental Institution for the Better Organization of Urban Development Process in the Bi-County Region," prepared by the Washington Center for Metropolitan Studies of the Maryland National Capital Park and Planning Commission, 1968.

³⁵ *Ibid.*

³⁶ When the development plan for the district is completed, landowners and prospective developers should be given an opportunity to apply for planned-unit zoning in areas which are designated for development at the lower densities (single-family housing, row housing and small apartment groupings). Approval of such requests should be subject to strict criteria to assure that the planned-unit developments will fulfill the development plan, and should also be subject to the requirement that development proceed in accordance with a schedule. After ample opportunity has been provided for planned-unit proposals, the rest of the land in this category should be rezoned by a sectional map amendment initiated by the agency.

This pair of regulatory techniques provides a simple and effective means of securing private development of the large single-family residential areas of a new community. There is a great gain for all concerned, in terms of certainty and procedural simplicity, and a great strengthening of Government's ability to secure development in accordance with plan.

Initiative is first placed in the hands of the larger landowners and developers, who are in a position to perform detailed planning and design and to finance development at a sizable scale. The planned-unit zone gives them broad latitude in proposing new developments, while vesting in Government the power to control development features that affect the public interest.

Initiative then passes to Government, which completes the rezoning in a systematic manner rather than awaiting applications from individual landowners, each intent on increasing the density of his tract. The sectional zoning map amendment initiated by a public agency is a convenient way to effect the regulatory action that is a prerequisite to development, in areas where numerous landowners would otherwise be put to the trouble and expense of individually filing applications for rezoning. This technique has the further advantage of placing initiative in the agency that is designing and coordinating development, instead of permitting it to remain indefinitely with the individual landowners who would be tempted to apply for more intensive zoning categories and thus necessitate time-consuming and costly administrative and judicial proceedings. (Henry Bain, "The Development District," Washington Center for Metropolitan Studies, 1968, p. 68.)

Political feasibility

A State agency (possibly the department of community affairs) would establish all development districts with the approval of the Governor and perhaps the General Court. This agency would designate the boundaries of the development district and elections would be held for the board of directors. The district would be established as a semi-public corporation which would be independent but manned by a board of directors directly responsible to the State government. The development district would be dissolved as a managerial unit when the new community development was substantially completed. However, the new community would remain as a separate fiscal unit in the State's accounts until all of the capital advanced for development was repaid. Initially, only one or a few development districts would be established in those areas where the potential for new community development is greatest. Much development would continue to occur outside these development districts in a traditional manner. However, after experience was gained through the use of this instrumentality the building of new construction might be concentrated in such districts.³⁷

This proposal would provide each new community development district with authority over zoning and subdivision control in the development district during the initial planning stages. Since new communities will be planned initially in those areas where new growth is most likely to occur, resistance should be minimal to this strategy. That is, new communities will be planned in areas where the pressures created by high growth potential will already be felt by the citizens. The alternative of suburban sprawl and haphazard growth will be very real to them. The development district would include representatives of all levels of government. This is an improvement over the regional planning and development authority described in Strategy No. 1. Resistance to strategy No. 3 would probably be less than that to the State development corporation. Development districts would be established only as needed and would be controlled in part by members of the local cities and towns. Since the development district would not have the power to eminent domain it would be less offensive to the localities involved. It is likely that political resistance to this proposal will come from the undeveloped areas of the Commonwealth, while highly urbanized areas would probably support this strategy as a way of building more low and middle income housing outside the central city.

Financial feasibility

Each new community development district would constitute a separate fiscal unit:

The development district can help to achieve four important financial objectives. First, it can provide the large amount of capital that is needed for public facilities early in the development process, and for acquisition of land for high density development; and it can recover this capital during and after development. Second, it can capture for the public treasury the increases in land value that are due to public decisions to concentrate intensive development at certain locations. Third, it can employ special assessments, taxes and user charges to assure that the residents and property owners of a

³⁷ Bain, op. cit.

new community pay the full costs of the facilities provided for them. Finally, the staging of the development process in districts would make possible a more equitable treatment of landowners in acquiring land for public purposes and in assessing land for taxation.³⁸

The capital needed by the development district agency (or corporation) can be raised by the State sale of bonds, which should be placed at the disposal of the agency from time to time for definite purposes stated and justified by the agency. Much of this capital would have to be raised by State bonds and local bonds even if development were to proceed in the conventional manner. A small amount of additional capital might also be needed to finance the agency's operating costs, including the detailed planning and urban design work, site preparation, promotional activities, and administration. The capital advanced for construction of public facilities would be recovered from the public agencies responsible for the provision of such facilities when money is available from their usual sources of funds. The payment might come in a lump sum from an agency capital budget, or in annual installment payments, or in rental payments.³⁹ The initial capital investment in the district and the agency's operating expense might be recaptured completely by a combination of the existing sources of funds from the various public agencies and profits from the sale and lease of land. However, the establishment of the development district would offer a good opportunity to inaugurate an improved method of paying for public improvements.⁴⁰

All taxes collected in the district would be shared with the towns which comprise the district. Services might be purchased from towns prior to the new community's completion. The sale of stock to all interested public and private agencies and individuals would also provide considerable revenue. These development districts would be

³⁸ *Ibid.*, p. 17.

³⁹ *Ibid.*

⁴⁰ "Three closely related devices are now employed in various circumstances in the two counties. Special assessments are used to finance the extension of local water and sewer lines, and the paving of streets and construction of sidewalks in areas that were developed or subdivided without these amenities. The construction of streets and sidewalks by homebuilders who add the cost to the price of the houses in a similar and common financial arrangement. The compulsory dedication of park and school sites (or payment of a fee in lieu thereof), which is likewise reflected in the cost of new houses, is another such device.

Use of special assessments to finance most or all of the other public facilities, including schools, libraries, and community centers, would have the advantage of confronting the home buyer (or renter) with the full cost of the facilities that will be needed to serve him, thereby enabling him to make a wise decision on the amount that he can afford to spend for housing. This system would help residents to avoid the plight of all too many suburbanites, who become overcommitted by failing to allow for the tax increases that will be necessary to provide the full complement of public facilities needed as the community matures.

Separate assessments would have to be levied for facilities that are of direct and sole benefit to a given property, and facilities that generate wide benefits. Two important considerations dictate this distinction. Assessments for water and sewer lines, frontage streets, and a few other facilities needed to make a tract of land usable, can properly be levied against tax-exempt institutions, since such assessments are similar to the prices that any user must pay for any facility or service, public or private. Furthermore, these assessments are not deductible in computing taxable income, since they are more akin to an investment in the property that is benefited than to a general tax (which is deductible).

By separating the two kinds of assessment, it will be possible to charge nonprofit organizations for the facilities directly appurtenant to their property, and to assure the tax deductibility of all other assessments. To make the distinction abundantly clear, the second kind of assessment should be given a new and more accurate name, such as "lump-sum tax for community facilities."

The two kinds of assessment could be spread over the properties in the development district in any of several ways. The cost of streets, water mains, and sewers might be assessed, as is now usually the case, in proportion to the length of the street frontage of the properties served. The cost of other facilities might well be assessed on an ad valorem basis. In some cases, the cost of facilities serving residential areas might be paid by the assessment of equal amounts against all dwelling units, but this basis would have a regressive tendency that would probably be unacceptable in most cases.

The use of special assessments would necessitate a careful estimate of the cost of all facilities to be provided in the new community, and determination of the value of each assessable property as of the time that the assessment is imposed upon it. While these calculations would not be easy, the agency would have sufficient information on the public improvements program to permit reasonably accurate cost estimates, and data on property values would be readily available if the assessment is not imposed until the time that the developed property goes on the tax rolls. Since the development process would be completed within a few years, the possibility of error would be limited." (Bain, *op. cit.*, pp. 78-80.)

eligible for Federal funds (e.g., Title IV: New Community Development) as well as for State subventions. MHFA could become involved as easily under this strategy as under strategy No. 2.

Public benefits

The benefits accruing under this strategy are the same as those that would accrue under strategy No. 2. The comprehensive nature of the planning for future growth is sacrificed somewhat, since the development corporation would be responsible for planning for the entire State at all times. But, perhaps, this third strategy is more realistic and more politically acceptable. The State would still be responsible for formulating a coordinated and synchronized overall public improvements program and it would be the State government that identified what high growth areas in which new community development districts should be established.

CONCLUSIONS

In Massachusetts it is fairly obvious that the multiplicity of localities (351 cities and towns) creates financial hardships and political fragmentation. A strong county system or metropolitan council of governments might provide a more efficient government. These possibilities have been discussed elsewhere.⁴¹ Given the strong tradition of local government in Massachusetts, however, it seems unlikely that governmental reorganization will occur in the near future. Urban expansion, though, is occurring now and will continue at a vigorous pace. The new community development strategies proposed in this chapter offer possibilities for channeling and coordinating urban development. Each of the three strategies is politically and financially acceptable, although the third strategy seems most desirable.

The State development corporation holds out the greatest promise for meeting public development objectives (e.g. providing more low and middle income housing in locations which correspond to job opportunities, preserving open space) yet the new community development districts are a reasonably good second choice. Empowering regional planning agencies to act as industrial and economic development authorities is a third possibility—although regional planning as it is currently structured in Massachusetts is less efficient than it might be.⁴²

The two most critical problems facing any attempt to create new communities in Massachusetts are (1) finding ways of financing the operating costs of a new community during the development period (assuming that capital construction can be paid for by State bonds and State agency programs), and (2) overcoming the political opposition offered by longtime residents to the creation of a new community expected to grow to 50,000 people within the boundaries of an existing town. The first problem can be dealt with rather efficiently by staging and managing the development process in order to keep a positive

⁴¹ For example, see Massachusetts Legislative Research Bureau report on regional government and report on substate regionalization, Office of Planning and Program Coordination, Massachusetts Department of Administration and Finance, 1969.

⁴² See "Regional Planning in Massachusetts Reexamined," a report prepared for the Massachusetts Department of Community Affairs by R. Stephen Browning and Lawrence Susskind, April 1970.

CHART VI.—ALTERNATIVE NEW COMMUNITY DEVELOPMENT STRATEGIES

	Political feasibility	Financial feasibility	Public benefits
STRATEGY NO. 1			
Providing regional planning agencies with the power to act as industrial and economic development authorities.	Politically feasible as demonstrated by the passage of special legislation empowering the Southeast Planning Agency to assume the powers of a regional industrial and economic development authority. Widespread public support not seen at present.	Involves no use of state credit to issue bonds. Financed by per capita assessment on member cities and towns just as at present. Would not provide money for specific projects, but be responsible for planning and coordination mostly. Extremely feasible financially.	Would gain public coordination over the selection of sites for new community development and the programming and investment in public improvements. Would not be able to insure either industrial development or the building of low and middle income housing.
STRATEGY NO. 2			
Providing for the creation of a state chartered nonprofit development corporation.	Politically unacceptable to a great extent because of the power of eminent domain. Also the power to override local building and zoning codes creates hostility to this strategy. Exclusion of local residents from membership and control over the corporation also makes this politically unrealistic.	Because this corporation would be responsible for development throughout the entire State the resources required would be substantial. Must rely on bonds and on increase in MHFA debt limit. Financially very difficult.	Would offer the greatest public benefits. Direct state involvement in new development; coordination of public experience with new development. Guarantee of breaking down exclusionary development practices through state override. Good chance of building low and moderate income housing where jobs are available.
STRATEGY NO. 3			
Providing for the establishment of the new community development districts.	Politically feasible because of direct participation of communities affected by new development and lack of eminent domain power. Would gain political support from urban areas which probably wouldn't be affected.	Financially feasible because restricted to a limited area. Direct involvement of private money, as well as the credit of the state behind bonds.	Less comprehensive than Strategy No. 2, but would provide for balanced and equitable development in high potential growth areas.

cash flow from the sale of housing and land, and the rental of commercial and industrial property. Some services can be purchased from the existing municipalities (e.g., school and health) until the new community reaches a size sufficient to support the building of their own facilities. In addition, taxes can be collected from the new community residents as they move in (just as in any other municipality) although some of the tax revenue will revert to the new community development district agency and some will be used to pay the surrounding municipalities for services purchased. If necessary, Federal loans can be obtained at very low interest rates to cover costs during the early stage of development.

The second problem, political opposition, is much more difficult to deal with. One principle that ought to be observed is to involve long time residents in the planning and development of any new community. Present residents of any area that is included in a new community development district should be given representation on the board of the agency as well as options to buy stock in the development district corporation. One good argument that can be made is that the new community, once completed, will certainly offer many benefits to the present residents that they could not possibly provide for themselves—improved schools, improved health care, additional community services and facilities. In addition, the development of a new community will certainly enhance the value of their investment in a home in the area. Longtime residents are obviously going to be afraid of being taxed to pay for newcomers' services and afraid of being politically submerged, but both of these fears can be allayed through the development district strategy. In the long run, if the State assumed the costs of education and the Federal Government assumed the costs of welfare programs, property owners would be less resistant to new development (in any form) since property taxes would not have to be so severe (to pay for the costs of education). However, until such a shift in fiscal responsibilities is made, the third strategy seems to present the best means of coping with these two serious problems.

CHAPTER IV

CONCLUSIONS AND RECOMMENDATIONS

INTRODUCTION

An essential characteristic of new large-scale urban development should be its reliance on effective land use planning and development guidance regulations. Even though large scale planned urban development when accompanied by strong and effective land use planning and regulation at the state level stands a good chance of being effective, the evidence available seems to indicate that the establishment of large, new, planned communities with a balanced composition is not economically feasible without significant governmental subsidy. This infeasibility stems from the investment costs resulting from the long period required for land assembly and improvement and the construction of infrastructure and utilities before revenue from the sale of sites or structures is sufficient to provide a net profit.¹

A number of strategies which could facilitate new community development by easing the problems of assembling and improving land were outlined in Chapter III. Additional methods for removing some of the land use and development constraints impeding new community development and for enhancing the possibility of meeting public development objectives will be discussed in this Chapter. Incentives to encourage individuals and industries to locate in new communities will also be outlined.

Urban development grants, loans and other federal assistance programs are available and probably necessary for successful new community developments—even new community development undertaken by state government. But conscious state efforts to pursue a new community development program can significantly assist private developers and investors while at the same time insuring a more efficient and equitable pattern of urban development:

State urban development plans related to a national urbanization policy could identify appropriate sites for new community development through the use of planning techniques and application of market analysis approaches. Detailed site identification and additional analyses [could] be incorporated into local and regional plans.²

¹ In light of this ACIR concludes that the states have a significant role to play in planning for and assisting in new large-scale urban and new community development. The state should be empowered to 1) acquire land by negotiation and through the exercise of eminent domain; 2) arrange for site development and construct or contract for the construction of utilities, streets and other related improvements, 3) hold land for later use, 4) sell, lease, or otherwise dispose of land or right thereto to private developers or public agencies; and 5) charter local, regional or state land development agencies. All such powers should be exercised in accordance with, and in furtherance of, the State's urbanization plan.

These activities could be financed as appropriate, through direct appropriations, charges and rents, grants, sales of land, and borrowing, if authorized. Borrowing authority should be granted on a revenue basis in anticipation of land sales and rents. Revenue from land sales and rents could provide a major source of income and a significant part of the operations of state land development instrumentalities could be on a revolving fund basis after an initial appropriation of working capital.

State assistance in making credit more readily available for business and industrial location in certain areas by establishing State and regional industrial credit agencies; placement of State and local procurement contracts and construction projects to foster urban growth in certain areas; and assistance and guidance for urban growth through State property tax deferral for new community development are all possible options. (A.C.I.R., *Urban and Rural America*, *op. cit.*)

² *Ibid.*, p. 156.

The state government through any one of a number of instrumentalities it might create could acquire land and make it available either by competitive bid or negotiated purchase at reasonable market rates as it is needed for development, thus relieving the developer of the risk of inflated land prices and heavy carrying costs. Different mechanisms or strategies could be utilized by the state to insure the installation of water and sewer lines and roads as required.³

INCENTIVE-CONTROL SYSTEMS FOR LAND USE GUIDANCE

New techniques and new ways of using existing techniques for guiding urban growth are needed to insure more equitable and more efficient patterns of urban development. Guiding the use of land in urbanizing areas to achieve the planned expansion of existing towns or the development of relatively self-sufficient new communities involves the following major problems: (1) shaping regional and community growth; (2) curbing urban sprawl; (3) assuring an adequate supply of land for certain kinds of private developments; (4) acquiring land for public purposes; (5) protecting land with unique characteristics; (6) lowering the cost of public improvements; and (7) regulating the relationships between landowners.

The process of new community development spans a period of at least fifteen years. During that time effective controls and techniques for guiding land use in a new community as well as in areas surrounding a new community are required. Zoning, subdivision control, the use of eminent domain, the purchase of development rights and scenic easements, taxation and economic incentives, the use of holding zones and planned unit development are land use guidance techniques that vary in effectiveness.

1. *Effectiveness of zoning as a control*

Local zoning regulations are ineffective for several reasons:⁴

(a) In most cases, these ordinances do not emanate out of the planning process. In some instances, zoning regulations and zoning administrators substitute for the plan and the planning process.

(b) Zoning ordinances were framed to regulate the development of individual lots by individual interests. They are presently not adequate to offer a prescriptive or regulatory envelope for newer design and development techniques.

(c) Zoning ordinances concentrate on individual uses, rather than the linkages between and among uses. Thus, they are difficult to utilize in an overall public planning and development strategy.

(d) Present zoning ordinances do not take into consideration overriding metropolitan and regional goals. Each city and town is an island unto itself with relatively little coordination between cities and towns in either the construction of zoning ordinances or overall land development policy.

(e) In the often indiscriminate use of low intensity zoning, "sprawl" and speculation appear to be encouraged.

³ *Ibid.*

⁴ Marshall Kaplan, "Implementation of the Baltimore Regional Plan Alternatives" (San Francisco: Institute for Planning and Development), 1965, pp. 26-27.

(f) Because zoning generally does not emanate out of a planning framework and almost always is unrelated to market behavior, it creates at times "artificial" limitations on suprluses in certain use categories restricting private choices which, if made, would be in the public interest, and result in public benefits.

2. *Effectiveness of subdivision control*

Like zoning, subdivision regulations are directed more at controlling incremental lot development rather than providing a solid basis for evaluating and setting standards for regional development practices.⁵

(a) Subdivision costs vary from town to town. These differences . . . apparently reflect not the choices of citizens but different skills and concerns of technicians. Efforts of the members of the building industry to operate in more than one jurisdiction are impeded. Complexities appear to have increased development costs.

(b) In many localities, subdivision codes do not agree with zoning bylaws, again adding to the frustration and cost of local developers as well as thwarting the implementation of public policy.

(c) Throughout the region, subdivision control is generally a "one shot" affair, with no appropriate public overview of continuing development.

3. *Effectiveness of eminent domain*

Mel Scott has pointed out that—

as the scale of government activity increases so does its need for land on which to locate public facilities, such as schools, parks, offices, hospitals. . . . Similarly, governmental participation in urban redevelopment is becoming a larger and more important public activity . . . with the broadening responsibility of government and the increasing complexity of problems facing urban areas, the power of eminent domain has become an exceedingly important means by which government can guide physical development. Public activities such as the highway and urban renewal program have been made possible through the use of eminent domain.⁶

The extension of eminent domain powers to include the taking of open land has not been evaluated by the courts in Massachusetts. It appears as if the constitutionality of enabling legislation allowing public entities to acquire open land for future development purposes or for "structuring" urban regions would be upheld by the courts.⁷

4. *The effectiveness of development rights and scenic easements*

Constrained by the relative ineffectiveness of zoning and subdivision codes, many states have adopted an additional control: the right to restrict the development of land through the purchase of land development rights. In effect, what this means is that in return for compensation, private owners accept a diminished version of their former fee simple title.⁸

There are some difficulties with this approach:

(a) Legal difficulties in ascertaining public purpose justifying expenditure of public funds and use of the police power.

⁵ *Ibid.*, p. 27.

⁶ Mel Scott, *Effectuation of the Urban General Plan* (Berkeley, California: University of California Adult Extension Program), 1963, Section 2, p. 4.

⁷ Eloise Morgan, "Certain Legal Problems Suggested by the Creation of New Towns in Massachusetts," Massachusetts Department of Community Affairs, April, 1969.

⁸ Kaplan, *op. cit.*, p. 33.

(b) Difficulties in determining the value of the rights taken (a diminished title is still left in the hands of the private individual) by the public entity.

(c) Public costs associated with acquisition of development rights approach costs associated with "taking" land through eminent domain procedures.

(d) Securing of development rights does not usually permit unrestricted public use of land.⁹

5. *Effectiveness of taxation and economic incentives as land use controls*

Manipulation of tax policy, credit programs and subventions are rather important mechanisms public decision makers have to affect basic land development. Effectuation of a coordinated strategy relative to the use of these economic incentives is a difficult task. "To achieve fine grain effects by economic controls requires highly sensitive management and close attention to relative shifts in the magnitude of effects."¹⁰

(a) *The property tax* is the most important tax affecting the course of land development.¹¹ Reliance on the property tax leads to noticeable differences in the ability of cities and towns to provide urban services. This fact is somewhat related to noticeable disparities in the tax base and the regressive tendencies in the State tax structure.¹² Flexible use of this tax as a strategic tool for affecting land use, is impeded by legal requirements necessitating uniformity of taxation within specific areas and assessments of property at market value.¹³

(b) *Preferential assessment* indicates a break with a rigid legal criterion for assessing at market value. A preferential assessment law is designed to preserve open space and agricultural land. Agricultural assessments may be valuable, too, in implementing certain public policies for structuring growth, if combined with a state and regional development plan and program of implementation to guide the urbanization process.¹⁴

(c) *Capital gains tax.* "Perhaps the tax provisions with the most influence on the land development pattern in suburban and ex-urban areas is the federal capital gains tax and the deductibility features with respect to property taxes of the Federal income tax. Both these provisions seemingly unrelated to any national land policy encourages the withholding of land from development on the part of those playing the optimization of income game."¹⁵

The treatment of land areas as capital gains allows owners (especially those with large financial resources) to retain land with relatively little holding costs. No income tax is collected until the land is sold. Upon sale the return from the transaction is taxed up to 25% rather than at ordinary income tax rates. Elimination of capital gains benefits might cause large land

⁹ *Ibid.*

¹⁰ John Dyckman, "The Control of Land Developments and Urbanization in California," Appendix to the Report on Housing in California (Sacramento, California: State Printing Office), 1963, p. 310.

¹¹ Kaplan, *op. cit.*, pp. 34-39.

¹² *Ibid.*

¹³ *Ibid.*

¹⁴ *Ibid.*

¹⁵ *Ibid.*

owners to revert to long-term leases, thus freezing land in its present use.¹⁶

6. *The effectiveness of holding zones*

Several recent reports on land use policy suggest the possibility of authorizing local or state government to designate holding zones in which development would have to be delayed for several years.¹⁷ Holding zones are a form of police power regulation. They differ from land banks in that they do not involve governmental acquisition of land, although they might entail the payment of compensation under some circumstances.¹⁸

The Douglas Commission suggests making provision for the—
establishment of holding zones in order to postpone development in areas that are inappropriate for development within the next three to five years. Local governments should be authorized to limit development within such zones to houses on only large lots (e.g. 10 to 20 acres) agricultural and open space uses. The State legislature would require that localities review holding zones designations at least every five years.¹⁹

Such a device would allow the state to postpone urban development when financial or other legitimate considerations made it impossible to provide services for more intensive use of an area.

7. *The effectiveness of planned unit development*

The planned development of land, especially of large tracts, offers a promising device for dealing with many of the problems associated with present development procedures and patterns. Planned development, as distinct from new communities, can be applied to small scale development.

The Douglas Commission recommends that—

State governments enact enabling legislation for, and local governments adopt provisions establishing regulatory process for planned unit developments. Such legislation should authorize provisions to vary according to the size of the property (e.g. to permit high rise buildings of light industry only in projects of more than a specific size).²⁰

Contrary to the usual practice of not mapping planned unit development districts until a project is approved, a more effective technique would be to enable the localities to “classify undeveloped land in planned development districts within which development would be allowed to occur only at a specific minimum scale. If a community were unwilling to purchase land for development, provision could be made to require that new development in specified undeveloped areas take place at a fairly large scale.”²¹

When a specific development proposal of modest scope is announced by a property owner somewhere in the undeveloped sections of Commonwealth, the burden of proof naturally lies upon those who would restrict the use of land by its owner. That burden can rarely be overcome, except in cases where there is an exceptionally clear and immediate public interest in prohibiting development. Therefore, a steady progression of scattered development appears to be inevitable,

¹⁶ *Ibid.*

¹⁷ David Heeter, *Toward A More Effective Land Use Guidance System* (Chicago: American Society of Planning Officials), 1969.

¹⁸ *Ibid.*

¹⁹ The National Commission on Urban Problems (Douglas Commission), *Building the American City* (Washington, D.C., U.S. Government Printing Office), 1968, p. 245.

²⁰ *Ibid.*

²¹ *Ibid.*, p. 246.

as long as the long-run public interest in preserving a given area as open space for example, must undergo reevaluation time after time, in competition with immediate pressures generated by each proposal for private development. This scattered development in turn sets the precedent for more development by destroying some of the open space values which have helped to justify public control, and by siphoning off development that would otherwise create compact centers in more appropriate locations.²² The most effective technique for dealing with this problem is "land banking."

The land bank provides a community with an effective means of controlling the character and timing of urban development. Fundamentally, the local government acquires land and holds it until conditions are appropriate for public use or sale on the private market for purposes that are included in the community's comprehensive plan. This idea has not been used widely, although it seems as if it would work quite effectively.²³

In order to achieve the seven objectives mentioned at the beginning of this discussion of incentive-control systems for land use guidance, the State government needs to enact legislation enabling State, regional, and/or local development authorities or agencies to acquire land in advance of the development for the following purposes: (a) assuring the continuing availability of sites needed for development; (b) controlling the timing, location, type and scale of development; (c) preventing urban sprawl, (d) reserving for the public gains in land values resulting from the action of government in promotion and securing development.

At such time as the development of such land is deemed to be appropriate and in the interests of the region, such land could be sold or leased at no less than its fair market value for private development or public development in accordance with approved state and regional urban growth plans. Wherever feasible, long term leases should be the preferred method of disposing of any public land, and leases should be set so as to permit reassembly of properties for future planning and development. Legislation should specify maximum period that such land may be held by the public before lease or sale.²⁴

AN INTERGOVERNMENTAL PLANNING FRAMEWORK FOR NEW COMMUNITY DEVELOPMENT

Implicit in any decision to provide for state control over the development of new communities is a coordinated public decision making and planning process. To implement the development of new communities requires the full and coordinated use of existing and proposed public powers to guide and structure the urban development process. Any implementation strategy should be based on a statewide development plan and planning process as well as an accepted, ordered set of goals. In essence, consistency and conformity with area-wide plans will be the most important criteria in evaluating the desirability of expending public as well as private resources.²⁵

²² Bain, *op. cit.*, p. 43.

²³ Kaplan, *op. cit.*

²⁴ Douglas Commission, *op. cit.*, p. 250.

²⁵ Heeter, *op. cit.*, pp. 58-59.

Responsibility for planning and implementation has to be shared among all levels of government.²⁶ Planning would include (1) the completion of a state wide urban development plan, (2) completion of area-wide development plans by regional planning agencies, (3) acceptance of regional plans by state and local public bodies, (4) widespread dissemination of the plan throughout the region. Implementation of a new community development program would require:

1. Review of all public and private actions of regional importance for consistency with area-wide plan.

2. Utilization of public works, public facility and transportation planning to structure and direct growth.

3. Complementary use of land use controls and regulatory mechanisms with public works and facility programming and development.

4. Coordination of tax and assessment policies with area-wide plans.

5. Regional review of those federal programs (implemented by the public and private sectors) affecting the regional development pattern.

6. Creation by the state of a state development corporation or new community development districts empowered to coordinate and regulate public and private development actions to insure the development of balanced new communities.

7. Encouragement of private participation in new community development through the selected and careful application of land use controls, public provision of water and sewer facilities, as well as transportation.

8. Immediate acquisition of strategic high potential growth areas by existing state agencies or new instrumentalities.

9. Reservation of land intended for future development through the combined use of low intensity zoning, control and development rights, compensatory zoning, and the programming of public facilities and improvements.

The present land use planning and regulatory system fails to protect adequately the interests and issues which transcend local governmental boundaries. In addition, in most instances they are not sufficiently strong nor sufficiently flexible to permit and sustain the planned development of a new large scale community. To rectify this, it has been suggested that a state planning and review agency be created to promote and protect extra-local interests and resolve disputes.²⁷ The state should assume an active role in applying land use guidance and control techniques in an effort to insure the successful development of new communities. The state agency should have the authority to (1) prepare and effectuate state and regional land use policies and plans,²⁸ (2) review local plans and ordinances for compliance with state legislation and state plans and policies,²⁹ and (3) directly regulate the use of land and public facilities in those areas in which there is a state-wide interest.³⁰

²⁶ *Ibid.*, p. 56.

²⁷ Heeter, *op. cit.*, p. 46.

²⁸ *Ibid.*

²⁹ See the American Law Institute, *A Model Land Development Code*, Tentative Draft No. 1 (Philadelphia: American Law Institute), 1968.

³⁰ See *New Directions in Connecticut Planning Legislation*, (Chicago: American Institute of Planning Officials), 1967.

POSTSCRIPT: QUESTIONS THAT REMAIN TO BE ANSWERED

Many assumptions have been made in the course of this exposition. The questions which underlie these assumptions need to be discussed publicly. This thesis concludes with a series of questions which need to be considered by public officials and private citizens alike prior to the implementation of a state new community development strategy:

1. Can we set specific goals for state urban development? Who should set goals? What kinds of citizen participation can there be in the goal setting process?
2. Can we move quickly enough once we have established a clear set of development objectives? Can we overcome the bureaucratic sluggishness of the governmental bureaucracy?
3. What mix of incentives and controls makes the most sense, given the political realities of Massachusetts?
4. What rate of urban growth does it make the most sense to try to sustain? Who should set that rate? Should it be a constant rate?
5. Should a disproportionate amount of state funds be spent to meet the needs of low-income families since their level of need is highest?
6. Should growth occur evenly throughout the Commonwealth, or should new developments be concentrated in only a few areas?

Answers to these questions have been assumed throughout this thesis. Whether or not they are the "right" answers remains to be seen.

B. PUBLIC INVOLVEMENT IN NEW COMMUNITY DEVELOPMENT: JUSTIFICATION, PROBLEMS, AND A PROPOSAL

(By R. Stephen Browning, Harvard University)

Editors Note: This is an excerpt of Mr. Browning's paper. Within we present part of chapter 1 and the entire chapter 2 which deals with public involvement in new community development, as well as his accompanying bibliography.

New communities are a vast paradox. Many urban writers claim that new communities can provide a better way of life. Yet, with all the publicity given to the concept of new communities, very little positive action has been taken by either the public or the private sectors to help develop them. Is it because new communities in fact cannot produce the manifold advantages claimed for them by their advocates? This paper takes the position that it is not a lack of capacity in providing the claimed advantages; on the contrary, the problem with the new community concept is more political and legal in nature. That is, new communities have not been developed because institutional structures do not exist which would be capable of successfully undertaking such a large-scale task. Moreover, it is not yet clear that even if these institutions were to be created tomorrow, they would have the constitutional authority to act.

This paper will approach the problem in three ways. First, it will present a general analysis of the concept of new communities and the strategies for their implementation. Second, it will examine the more significant legal and political issues which constitute the bulk of the problems now impeding public development of new communities. Third, it will present a proposed statute which seeks to formalize a reconciliation of these issues into a proposed political structure for the development of new communities.

Both the legal analysis and the proposed statute are based largely on Massachusetts case and statutory law, not because it is particularly typical, (although much of what is said does have broader application) but because the State is among the first to broach these issues. Moreover, solutions arrived at in Massachusetts may serve to some extent as prototypes for other State new community programs.

THE NEW COMMUNITY CONCEPT AND STRATEGIES FOR ITS IMPLEMENTATION

A. THE NEW COMMUNITY CONCEPT

1. A brief look at the record

New communities are not new. Conceptually, they doubtless date to the dawn of human settlements. One of the earliest expressions of the contemporary new town concept has been attributed to Leonardo da Vinci, who suggested that the city of Milan be ringed with eight

satellite cities in order to relieve urban congestion. Four centuries later, Ebenezer Howard, an uneducated court stenographer, proposed a similar solution for relief from London's urban growth and initiated the modern new town concept.¹

Early notions of modern planning originated with social theorists and utopian planners who were essentially reacting to the effects wrought by industrialization on the cities.² The rapid change from agrarian to urban living, resulted in crushing population influxes which so pressurized existing urban infrastructures that government, which had previously operated at a relatively relaxed pace and primitive level, was unable to provide basic urban services. Perhaps more significantly, government was legally and politically unprepared to control urban growth patterns.³

These conditions suggested that something more than "natural forces" was needed to shape future urban growth. The accompanying notion was that city planning in an industrial age required far more than planning for grand boulevards and vistas and that urban development patterns must be shaped by planning for human values. The new town concept emerged from these notions.

Social theorists and planners had recognized the effects of industrialization, but Howard was the first to order the components of the city into a coherent form and formulate a complete strategy for alternative development—the garden city. Suggesting that relief from crowded and unsanitary urban conditions might be had through decentralization,⁴ Howard proposed that London be surrounded with a series of self-contained urban centers of 30,000 population each. These carefully planned communities, protected from external encroachment and internal growth by surrounding greenbelts, were to combine the virtues of intense urban living with those of the more rural life style.

The garden city concept was imported and introduced to this country by Clarence Stein during the 1920's and 1930's.⁵ Although far short of the isolated, self-sufficient English garden city, Stein planned several residential developments, including Radburn, N.J., one of the more significant contributions to the development of modern planning. Combining concepts of Howard's comprehensive proposals with the neighborhood concept delineated by Clarence Perry,⁶ Radburn reflected Stein's belief that the typical suburban environment lacked both essential amenities and the feeling of community.

Stein reasoned that limited dividend corporations or government agencies could provide a framework for the heavy financial investments and flexible continued planning that would be necessary for such development. He further argued for positive governmental intervention into the field of urban development. His principal efforts were directed toward the creation of governmental, legal, and financial frameworks that could address the task of new community development as a continuing long-term process rather than a methodical

¹ E. Howard, *Tomorrow: "A Peaceful Path to Real Reform"* (1898), later published as *"Garden Cities of Tomorrow"* (1902).

² For illustrations and analysis of utopian and conceptual new town proposals, see Reiver, *"The Place of the Ideal Community in Urban Planning"* (1962).

³ A. Gallion, *"The Urban Pattern"* (1962).

⁴ E. Howard, *op. cit.*

⁵ C. Stein, *"Toward New Towns for America"* (1951).

⁶ A. Gallion, *op. cit.*

pursuit of a predetermined end. Despite these efforts, most of Stein's communities were not entirely successful. The large initial investments and the high cost of capital carrying charges pushed the price of their housing units above the reach of low-income workers.

The large scale planning efforts of Stein and others depended to a great extent on Federal financial aid. The early Federal efforts at new community development were typified by complete governmental ownership of land control of planning and initial financing with the result that the projects were both well designed physically and rapidly developed. However, the communities later suffered because of poor planning for the transition of administration from the Federal agency to local government and as a result of the adverse economic impact accompanying the termination of Federal subsidies.

In contrast to the rather minor and inconclusive role that the Federal Government has played in new community development, the British Government has committed itself as a matter of national policy to the development of new towns. The New Towns Act of 1946⁷ authorizes the Minister of Housing and Local Government to select new town sites and to appoint development corporations, under the direction of prominent citizens, to carry out planning and development. The development corporations then acquire land, by compulsory purchase if necessary, undertake planning and contract for construction services. Although they have power to construct certain public services, the services normally provided by local authorities are not undertaken. The corporations are funded by public loans and exercise virtually complete control over development, but are not conceived of as a substitute for local government. Initially, town boundaries are to be coincident with existing lines of jurisdiction and upon completion, of development, the corporation is dissolved and administration passes to a national commission which assumes ownership and control of the new town. Although, upon transferral to the Commission for the New Towns, further local control is permitted, the new towns remain essentially under the control of the National Government.⁸

One of the most significant concepts underlying new town planning in England is the concept that incremental increases in land values resulting from the development of new towns should accrue to the public; and that public ownership provides the most effective method to control land use.

Since passage of the original New Towns Act, over 20 new towns have been designated.⁹ Originally conceived as vehicles for the decentralization of population and control of urban growth, new towns are now used as a policy instrument to stimulate industrial and economic growth in underdeveloped regions and to coordinate population and industrial growth.

While the British new town program has been the most extensive, it has not been exclusive. Stockholm, Sweden, has undertaken to build satellite new towns as part of its municipal growth policy.¹⁰ Tapiola

⁷ 9 and 10 Geo. 6, c. 68.

⁸ For a history of the English new towns, see F. Osborne and A. Whittick, "The New Towns" (1963); See also L. Rodwin, "The British New Towns Policy" (1956).

⁹ For an excellent discussion of the history and development of new communities with recommendations for governmental action, see Advisory Commission on Intergovernmental Relations, "Urban and Rural America: Policies for Future Growth," ch. IV: New Communities and Their Objectives (1965) (hereinafter cited as ACIR: Urban and Rural America) at 67.

¹⁰ Ibid., See also R. Duckworth and D. Kertzman, "Development Corporations," The Maryland-National Capital Park and Planning Commission (1968).

is a well publicized Finnish new town undertaken in response to the post war housing shortage and is often cited for its excellence of design and ability to achieve an effective socioeconomic balance of population.¹¹

Up until 2 years ago, contemporary new town development in the United States has been exclusively a creature of private enterprise, and its origins were in the post-World War II period. Although a housing shortage followed World War II, the economic condition was one of growth rather than recession and large-scale merchant-builders moved into this favorable market.

These merchant-builders differed from the earlier developers who had initiated the suburban movement primarily in terms of scale of operation. The merger of land acquisition and improvement with standardization and merchandising of residential construction permitted more efficient production of housing units and greater returns on invested capital. The result of the merchant-builders operations during the late 1940's and 1950's was the full maturation of the suburban movement which had begun decades before.¹²

During the late 1950's and 1960's the contemporary community developer emerged with a new product—total environment—which was designed to answer the criticisms which have been directed at suburbia while retaining profitability.¹³ Contemporary new communities have been developed by a variety of developers. Both Reston and Columbia were initiated by individuals who believed that a better quality environment could be profitable. Corporations such as General Electric, Westinghouse, and Boise-Cascade have become involved in new community development, primarily to stimulate sales of their products and to provide a test market.¹⁴ Other corporations such as Gulf Oil and Sunoco have become involved probably because of tax savings. Corporations with large landholdings and families with extensive holdings, primarily in California, have also begun to develop new communities. However, the common thread of all developers to date is the problem of returning a substantial profit on invested capital.^{14a}

In 1968 the Federal Government made its first significant gesture to help the private new community developer.¹⁵ Seeking to reduce the pressure of the heavy "front end investment" which characterizes large-scale development, Congress offered a Government guarantee for the loans of new community developers. The novel aspect of the new legislation is that it permits the developer to issue "cash flow debentures" which require no repayment until the new community project begins to generate a positive cash flow.¹⁶ In spite of the theoretical advantages of the Government guarantee, it has been neither enthusiastically received by the private sector¹⁷ nor adequately

¹¹ ACIR: Urban and Rural America, op. cit., at 67; See also discussion in H. Elderidge, "Taming Megalopolis" (1967) at 835.

¹² See discussion in E. Eichler and M. Kaplan, "The Community Builders" (1967) (hereinafter cited as Eichler and Kaplan) at 20.

¹³ Ibid.

¹⁴ Interestingly, General Electric recently withdrew from the field of large-scale development, claiming that a greater public commitment—with the use of eminent domain—would be required in order to make such ventures economically feasible.

^{14a} ACIR: Urban and Rural America, op. cit., at 79-82.

¹⁵ Title IV, 1968 Housing Act.

¹⁶ See testimony of Robert B. Weaver, Secretary of HUD, before the House Committee on Banking and Currency, March 1968.

¹⁷ From conversation with William Finley, executive director for the new community of Columbia, Md., fall 1969.

funded by Congress.¹⁸ The major faults are traceable to the prerequisites for issuance of the guarantee, which include such things as a socially and economically mixed developments with a wider range of housing choice and community facilities.¹⁹ Although these items are clearly desirable from a public interest standpoint, it is questionable whether they can be provided without substantially more subsidy than that created by the guarantee.²⁰

PUBLIC INVOLVEMENT IN NEW COMMUNITY DEVELOPMENT: LEGAL CONSTITUTIONAL, AND POLITICAL ISSUES

A. THE PUBLIC PURPOSE DILEMMA

The chronic refusal to see the land problem in anything but a restricted and archaic perspective may well be one of the contributing factors to our modern economic incoherencies. Surely it is an indication of myopia to cast about for social patterns and to plan political structures without so much as a glance at the very obvious basis of economic life. There are programs and programs, all of them seemingly founded on the proposition that industry and capital and finances are ethereal essences floating about balloonlike and designing no commerce with the ground. There are books and books on economics, every week a new batch. In how many of them will you find the word "land" mentioned in the indexes? Perhaps Chesterton complained correctly when he found that the man in Bedford is not conscious of Bedfordshire. Our urban population have completely forgotten that we all live on the land.²¹

1. *Present use: The nature of the problem*

In much of the literature concerning the potential role of American governments in new community development there seems to be an implicit assumption that not only is it a good idea for government to be involved in controlling, acquiring, or developing land for new communities, but that all of these actions are permissible as well. Such an assumption, without reference to specific laws, intuitively seems acceptable, particularly in a country like the United States, where, in less than two centuries, government has managed to dispose of over 1 billion acres of public land either by gifts or by sales at reduced prices.²² Thus, it does seem implausible to assume that a government, capable of disposing of so much land, should not also be capable of reacquiring land for new community development. The plausibility of this conclusion notwithstanding a cursory survey of the relevant law should suggest to even the most casual reader the existence of so many constraints that it would be dangerous to assume such power without further investigation.

Perhaps this point can be made more lucid by examining closely some statements from the new community literature. In probably the

¹⁸ See statement of Charles M. Haar, professor of law, Harvard University, before the House Committee on Banking and Currency, Oct. 22, 1969.

¹⁹ See new regulations promulgated by HUD for title IV, February 1970.

²⁰ For an idea of what title IV was conceived of as being (before it was run through the legislative wringer), see Mortimer Zuckerman, "The Zurban Report", confidential memorandum prepared for the President's Task Force on the development of New Town's legislation, fall 1967.

²¹ G. R. Geiger, "The Theory of the Land Question," Macmillan Co., New York (1936), p. 5.

²² Extrapolated from data in Sakolski, op. cit., p. 173.

most critically acclaimed work on American new communities to date, the following conclusions about public land acquisition were made:²³

By purchasing strategically located land, States and large local jurisdictions can give direction and form to future urban growth. They can encourage large-scale urban development by assembling parcels of land which might not otherwise be available and without which costly bypassing would be required. [I]t seems clear that for State land development agencies²⁴ to accomplish their objective of carefully planned acquisition of land for future urban use, they must be able to acquire land considerably in advance of development.

In support of the quoted conclusions, ACIR offers a number of very compelling reasons why advance public acquisition of land is needed, but as to whether such actions are legally permissible, virtually nothing is said. There are at least two possible explanations for the lack of the report's emphasis on the legal issues. It is possible that its authors felt that the law, as an institution, is completely rational and, since presumably their report is rational, the two must coincide. A more realistic interpretation is that the authors recognized the wide divergence in the laws of the various States, and yet felt their case could only be effectively made by presenting the most favorable interpretations of State law. If the latter explanation is true, then a serious problem will conceivably arise in those cases when their conclusions are applied to a State which subscribes to a very narrow view of permissible government involvement.

Other authors, when considering the subject of public land acquisition, treat it more as a political or ideological problem rather than a legal problem. Charles Abrams, the noted attorney and planner, exemplified this position when he wrote:

Not the least of the obstacles is that new town programs have been too often associated with the romanticized conceptions of the "city ideal" instead of resting on the realistic need for assembling fragmented land and providing well-balanced schools, streets, and utilities in advance of homebuilding rather than after the fact. The notion that it is "socialism" (derived from foreign programs where the state continues owning the land) is absurd—it is anything but that when implicit in the plan is the withdrawal of the public from land ownership and the reservation in public ownership only of the schools, streets, and other traditional public services. If anything, its main premise is "desocialization."²⁵

The point is, in short, that when scholars consider both land control and acquisition aspects of new community development, they devote very little time to the underlying legal problems. To make this point is not to denigrate the quality and scope of their work; on the contrary, it only serves to indicate the vast complexity of the land-acquisition issue.

The principal legal problem normally overlooked in these studies is the extent to which government involvement in these types of activities satisfies the requirements of the legal "public purpose doctrine."

The public purpose doctrine

The public purpose doctrine originated in early English law with the Magna Carta, which imposed a due process limitation on the King's inherent power of eminent domain. The due process restric-

²³ ACIR, "Urban and Rural America," p. 152.

²⁴ For an elaboration on what ACIR means by "State land development agency" see "ACIR State Legislative Program: New Proposals for 1969," sec. 507 et seq. (1968).

²⁵ Charles Abrams, "A Land Development Program for California" in Eldredge's edition of "Taming Megalopolis," Doubleday, Garden City (1967), pp. 850-851.

tion and the further restrictions that takings must be compensated, found their way into preconstitutional American law.²⁶

The fifth amendment to the U.S. Constitution includes both the due process and compensation requirements with the "public use" limitation:

No person shall be . . . deprived of life, liberty, or property, without due process of law; not shall private property be taken for public use, without just compensation.

Nearly all State constitutions have similar provisions. Article X of the declaration of rights of the Massachusetts constitution provides:

. . . No part of the property of any individual can, with justice, be taken from him, or applied to public uses, without his own consent, or that of the representative body of the people . . . And whenever the public exigencies require that the property of any individual should be appropriated to public uses, he shall receive a reasonable compensation therefore.

The 14th amendment to the U.S. Constitution requires the States to comply with due process and this has been interpreted to require compensation when private property is taken for public use.²⁷

Early interpretations of the public-use limitations were few and broad, presumably because of limited governmental activity and an abundant supply of land. Historically schools, parks, highways, public buildings, and other uses were construed as public, as they involved actual use by the public,²⁸ but early redevelopment schemes where land was to be resold to private developers after taking were invalidated.²⁹

Thus, during the 19th and early 20th centuries the public-use doctrine was interpreted to require, literally, a "use by the public." This interpretation began to evolve, however, with increased governmental activity in urban development and public use came to mean public purpose. Government had traditionally relied primarily on its police and taxing powers to respond to the pressures of urbanization.*

The question for new communities, then, is whether their development represents a public purpose that would justify government acquisition of land for them. Land acquisition by the government, whether through eminent domain or purchase, of course necessitates the outlay of public money. In order for any legislation involving the public acquisition of land to be sustained, therefore, the money spent must be for public purposes or public use. *Allydon Realty Corp. v. Holyoke Housing Authority*, the leading Massachusetts case sustaining a public

²⁶ To make this point is not to denigrate the quality and scope of their work; on the contrary, it only serves to indicate the vast complexity of the land-acquisition issue.

²⁷ *C.B. & Q. Ry v. Chicago*, 166 U.S. 226 (1897).

²⁸ See Nichols, "The Meaning of Public Use in the Law of Eminent Domain," 20 B.U.L. Rev. 615 (1940).

²⁹ See *Salisbury Land & Improvement Co. v. Commonwealth*, 215 Mass. 371 102 N.E. 619 (1913).

*It is important to ask at this time whether the limitations are more rigid for eminent domain than for voluntary sale, or vice versa. On this point, most commentators agree that the requirements for each should be the same. (McQuillin, *Municipal Corporations*, § 44.35 (3d ed. rev. 1963); 2 Nichols, *Eminent Domain* § 712 (1) (3d ed. Sachman & Van Brunt 1950). Interestingly, there has been only one court in the Nation that has faced the issue directly, and that was the Massachusetts Supreme Judicial Court, when in 1873, it confirmed the position of the commentators with the statement:

"The power of government, thus constituted, to affect the individual in his rights of property, whether by exacting contributions to the general means; or by sequestration of specific property, is confined, by obvious implication as well as by express terms, to purposes and objects alone which the government was established to promote, to wit, public uses and public services. This power, when exercised in one form is taxation; in the other is designated as the right of eminent domain." (*Lowell v. Boston*, 111 Mass. 454, 462 (1872). [Emphasis added.]

Thus, the implication for the permissibility of government sponsorship of new community development is that it won't make any difference whether the government buys the land from a willing seller or takes it from a reluctant one. Admittedly, to base such a conclusion on a single case, (and one nearly 100 years old, at that) is tenuous, but there do not seem to have been any other cases or changes in circumstances that would indicate any different result.

use and eminent domain powers in an urban redevelopment project, makes clear that "an expenditure (of public funds) is not necessarily barred because an individual as such may profit, nor is it necessarily valid because of incidental benefit to the public."³⁰ The proper role for the courts is to determine with due deference to legislative findings, the real,³¹ primary,³² dominating,³³ or fundamental³⁴ purpose of the statute; and if that purpose is public, to sustain the expenditure.

The *Allyndon* case suggests a nonexhaustive list of factors appropriate for court consideration in making the determination of public use.³⁵ Not all the factors must be present in each case. As the court lists them, the factors relevant to new communities legislation are: (1) Whether the benefit of the legislation is available on equal terms to the entire public in the locality affected; (2) whether the service or commodity supplied is one needed by all or a large number of the public; (3) whether the enterprise bears directly and immediately, or only remotely, on the public welfare; (4) whether the nature of the need to be met requires united effort under united control, or can be served as well by individual competition; (5) whether private enterprise in the past has failed in supplying the want or eradicating the evil; and (6) whether, insofar as benefits accrue to individuals, the whole of society has an interest in seeing those individuals benefited.

Each of these factors would be met affirmatively with new communities legislation. The statewide need for alleviation of urban congestion already is clearly stated in the legislative finds of the proposed statute later in this paper.* The number of individuals residing in the State's urban centers is certainly sufficiently large to satisfy the requirement of need by a substantial segment of the public. The new communities will be open and available to individuals of all income levels within the affected locality. New industry and commerce attracted to the community will add to the general public welfare. The need for a united effort and the failure of private enterprise in eradicating current urban evils are self-evident after one glance at existing urban centers. And insofar as private developers might benefit as individuals from the legislation, the entire public is benefited, for without some financial aid and incentive no developer would be able to raise funds sufficient to develop new communities and survive the timelag between time of investment and return on investment.

Thus, it appears that the expenditure of money for the acquisition of land to build new communities satisfies the criteria of public use. At the very least this would seem to be true for a new community to be developed as a part of an urban renewal project, because according to the *Allyndon* case: "the elimination of slums can be found to be a direct benefit and advantage to all of the people" ³⁶ Such a conclusion, unfortunately, is of little help since the logical places to build new communities are not usually in the urban areas where much blight exists and little growth is occurring; on the contrary, the more

³⁰ *Allyndon Realty Corp., v. Holyoke Housing Authority*, 304 Mass. 288, 293, 23 N.E. 2d 665, 667 (1939).

³¹ *Ibid.*, at 295, 23 N.E. 2d at 669.

³² *In re Opinion of the Justices*, 332 Mass. 769, 782, 126 N.E. 2d 795, 802 (1955).

³³ *Opinion of the Justices*, 334 Mass. 760, 764, 135 N.E. 2d 665, 667 (1956).

³⁴ *Massachusetts Housing Finance Agency v. New England Merchants National Bank of Boston*, 1969 Mass. Adv. Sheets 987, 996, 249 N.E. 2d 599, 606 (1969).

³⁵ 304 Mass. at 293, 23 N.E. 2d at 667-68.

*See proposed legislation, pt. III, *infra*, sec. 3(4).

³⁶ *Allyndon Realty Corp. v. Holyoke Housing Authority*, 304 Mass. 288, 294, 23 NW 2d 665, 668 (1939).

desirable place to build them is in the urbanizing areas of the Commonwealth, where there currently exists such enormous growth. Moreover, the appropriate sites within these urbanizing areas are primarily vacant and unblighted. Thus, for the government to acquire the fee, or parts of the fee, for the desirable land, its actions must be predicated on something other than elimination of blight.

There has been no case in Massachusetts where vacant, unblighted land has been acquired by government to be used for an urban development project like a new community. There have been, however, Massachusetts cases where vacant unblighted land has been acquired for actual public uses like parks,³⁷ schools,³⁸ hospitals, and roads.

The land in these "actual public use" cases is reserved for certain components which, although certainly necessary for any new community, are not by themselves sufficient for a new community. That is to say, there are other land uses which (although perhaps not as vital to a new community as certain "actual public uses") are nonetheless necessary for successful development. This "less vital list" includes such things as housing, offices, stores, and factories: In short, all of those things traditionally provided by the private sector.

Thus, the prospects for new community development on unblighted vacant land do not, at this point in the analysis, loom too large. However, before submitting to the dicta of the cases cited above, it might be helpful to look briefly at the laws from the early 1930's, the period which witnessed the genesis of judicial doctrines relating "public purpose" to blighted land.

The question of blight

The first use of eminent domain to effect an end which was not literally a use by the public came with the early public housing programs. In 1936, the New York Court of Appeals upheld a taking of land by the State for construction of low-income public housing. The court stated that the basic purpose of government is to protect the health, safety, and general welfare of the public; and that when a condition arises which threatens this, it is largely immaterial which of the powers government uses to effect a remedy, as long as the power is reasonably employed and fairly calculated to correct the evil.³⁹

Ironically, initial Federal efforts to take land for Federal low income housing encountered less success in the courts. In an early case, it was held that the Federal Government could not take land for slum clearance and construction of low income housing under the housing program of the National Industrial Recovery Act.⁴⁰ This resulted in State condemnation of land for development of federally aided low income housing under the housing acts, which was upheld.⁴¹

While the purpose of the early renewal programs was to replace slums with low income housing, slum clearance itself was upheld as a sufficient public purpose even though the ultimate use was not low income housing or housing at all, but commercial facilities.⁴²

³⁷ *Wright v. Walcott*, 238 Mass. 432, 131 N.E. 291 (1921).

³⁸ *Byfield v. City of Newton*, 247 Mass. 46, 141 N.E. 658 (1923).

³⁹ *New York City Housing Authority v. Muller*, 270 N.Y. 333, 1 N.E. 2d 153 (1936). For a discussion of the evolution of public purpose doctrine in light of urban renewal efforts, see Morris, "The Quiet Legal Revolution: Eminent Domain and Urban Redevelopment," 52 A.B.A.J. 355 (1966).

⁴⁰ *United States v. Certain Lands in the City of Louisville*, 78 F. 2d. 684 (6th Cir. 1935).

⁴¹ *Oklahoma City v. Sander*, 94 F. 2d. 323 (10th Cir. 1938).

⁴² *Bowker v. City of Worcester*, 334 Mass. 422, 136 N.E. 2d. 208 (1956).

In the landmark case of *Berman v. Parker*,⁴³ the United States Supreme Court upheld a taking under the 1945 District of Columbia Redevelopment Act which authorized the clearance of substandard housing in blighted areas. The plaintiff owned property which itself was not blighted, but the Court upheld the taking of his property because it was part of an area which could be redeveloped as a whole in order to promote a better balanced and more attractive community.

The Court grounded its decision on the police power which Congress possessed in its jurisdiction over the District of Columbia and stated:

We deal, in other words, with what traditionally has been known as the police power. An attempt to define its reach or trace its outer limits is fruitless, for each case must turn on its own facts. The definition is essentially the product of legislative determinations neither abstractly nor historically capable of complete definition. Subject to specific constitutional limitations, when the legislature has spoken, the public interest has been declared in terms well-nigh conclusive. In such cases the legislature, not the judiciary, is the main guardian of the public needs to be served by social legislation * * * This principle admits of no exception merely because the power of eminent domain is involved. The role of the judiciary in determining whether that power of eminent domain is involved. The role of the judiciary in determining whether that power is being exercised for a public purpose is an extremely narrow one * * * We do not sit to determine whether a particular housing project is or is not desirable * * * It is within the power of the legislature to determine that the community should be beautiful as well as healthy, spacious as well as clean, well balanced as well as carefully patrolled. If those who govern the District of Columbia decide that the Nation's Capital should be beautiful as well as sanitary, there is nothing in the fifth amendment that stands in the way * * * Once the object is within the authority of Congress, the right to realize it through the exercise of eminent domain is clear. For the power of eminent domain is merely the means to the end.⁴⁴

Berman and Parker, despite its permissive language, has one important implication for new community development: it is a case that many legal scholars identify with questions of urban renewal and eminent domain; it is concerned, in short, with issues of "blight." And, since new communities as discussed in this paper are envisioned for development on vacant, unblighted land, it hardly seems appropriate to justify such an action by calling the new community site blighted, irrespective of its condition.

The dubious nature of the "blighted" strategy was recently indicated in the State of Washington when an industrial commission sought to acquire a one thousand acre tract of land to be used as a major industrial park and port facility.⁴⁵ Ironically, although the tract consisted of open, vacant, and choice farm land, the commission described it as "marginal" (i.e., blighted). The Supreme Court of the State of Washington refused to accept such a tortured description and thus disallowed the acquisition. However, a lone, dissenting judge in that case recognized the unfortunate consequences produced by the marriage of the concepts of private use and blighted land, performed under the auspices of the "public purpose" doctrine. Instead of directing his attention to the condition of the land, he focused on the planned use, and then asked rhetorically whether that use was really private. He provided his own answer to this question when he suggested:

The notion of what is public use changes from time to time. Public use expands with new need created by the advance of civilization and by the modern tendency of people to crowd into large cities. Such a taking as here proposed could not

⁴³ 348 U.S. 26 (1954).

⁴⁴ *Ibid.*

⁴⁵ *Hogue v. Port of Seattle*, 54 Wash 2d 799, 341 p. 2d 171 (1959).

possibly have been thought a taking for public use at the time our constitution was drafted when the State was practically a wilderness without a city worthy of a name.⁴⁶

In arriving at his conclusion, dissenting Justice Finley alluded to changing circumstances. He documented these changes with statistics on demographic movement, municipal fiscal imbalance, and "expert" opinions from economists and others "trained and experienced in the fields." Perhaps these observations offer some guide as to how the public use concept might be reoriented.

Can the doctrine be changed?

In what has been described as the "quiet legal revolution",⁴⁷ the public purpose doctrine has undergone continuous evolution to permit increased positive governmental involvement in urban development, which contemporary urbanization requires. Despite the fact that its requiem was written over 20 years ago,⁴⁸ the doctrine remains alive and well.

The Massachusetts court has not gone as far as other courts, which have upheld slum prevention as a public purpose, but like most other courts, has used slum clearance as a legal crutch to uphold various redevelopment activities.

The court has indicated that it will consider each case upon its own merits and will give weight to legislative findings of fact.⁴⁹

In a recent decision, the court upheld a statute which empowered the Massachusetts Housing Finance Agency to make low-interest mortgage financing available to housing projects in which one fourth of the tenants would be of low-income category with the remainder being in the moderate income would be at most incidental and no greater than necessary to achieve the purposes of the act.⁵⁰

The court overruled a previous advisory opinion on essentially the same issue,⁵¹ but because the revised act provided that each new project would be accompanied by elimination of an equivalent number of slum dwellings, the court apparently continued to rest its finding of public purpose, at least partially, on this basis:

This provision we interpret as designed to ensure, among other things, that low income families will obtain substantial benefit from each project and that . . . each project will be matched within a reasonable time by public agency elimination of an equal number of substandard units. To this extent slum clearance and elimination is thus added to the other objectives of the act.⁵²

In determining public purpose, the court has continued to hold that public benefit must be "primary" with only "incidental" benefits to private individuals.⁵³ This implies that the court can determine where the line is. Moreover, it has continued to base its decision upon slum clearance as a valid purpose. Whether the Massachusetts court would uphold expenditure of public funds and the use of eminent domain for new community development on open, unblighted lands is open to

⁴⁶ *Ibid.*, at p. 195 quoting *Twin City Building and Investment Co. v. Houghton*, 144 Minn 1, 174 N.W. 885.

⁴⁷ Morris, *supra* note 74.

⁴⁸ Comment, "The Public Use Limitation on Eminent Domain: An Advance Requiem," 58 "Yale L. J." 599 (1949).

⁴⁹ *McLean v. City of Boston*, 327 Mass. 118, 97 N.E. 2d 542 (1951).

⁵⁰ *Massachusetts Housing Finance Agency v. New England Merchants National Bank*, 249 N.E. 2d 599 (1969).

⁵¹ "Opinion of the Justices," 351 Mass. 716, 219 N.E. 2d. 18 (1966).

⁵² *Massachusetts Housing Finance Agency v. New England Merchants National Bank*, 249 N.E. 599 (1969).

⁵³ "Opinion of the Justices," 334 Mass. 760, 135 N.E. 2d. 665 (1956).

question. It would require the judiciary to take an additional step beyond the limits of its past decisions.⁵⁴

New communities might be closely related to slum clearance projects or to elimination of substandard dwellings with replacement in the new community, but this would impose severe limitations on new community development.

The court has, apparently, continued to find that the function of the public purpose doctrine is to protect against undue governmental redistribution of property among individuals. This would seem to imply that free market forces are the only determinate of distribution. The function of the doctrine could, however, be conceived of as allowing government to effect a more efficient allocation of resources than can be done by free market forces. This is the effect of welfare programs, taxation, and of other government regulatory activities. In part, the justification is that the existence of slums, poverty, and other urban ills causes harm to the public welfare and the public is entitled not only to eliminate existing harm, but to prevent harm from occurring. Then, government ought to be able to employ the means necessary to accomplish these public purposes.

The use of eminent domain to acquire land for new community development could greatly facilitate and encourage private developers. It could do this at relatively little cost to the public. The very existence of the possibility of ultimate condemnation can mitigate the probability of its actual employment. Those who know that they will not be able to hold out forever are more likely to arrive at a reasonable price through negotiation. This alone could substantially reduce the extensive lead time period which is such a costly factor in the present financial equation.

It could also provide an element of certainty to the developer when new community development is otherwise feasible. Under present conditions there is really no assurance at all that a developer will be able to acquire the sizable tract of land required. There is a very real risk that after he has acquired initial parcels of land his "secret will be out" (that he must acquire a given number of acres) and prices will rise.⁵⁵ Even if he decides to proceed with development at a reduced scale, adjoining landowners would reap the appreciated values largely due to the developers own investment of resources.

However, if there are holdouts or if prices have risen exorbitantly high and if the land is not very close to urban fringes, so as to be susceptible to more traditional subdivision development, the developer stands to take a substantial loss, because even if the resale price is the same, the cost of carrying charges will be lost. This may provide a deterrent to one of the more romantic forms of new community—the independent new town.

The State could, however, condemn land which could not be acquired through purchase and resell or lease it to developers. As a matter of public policy, the State should attach conditions to its use: for example, conditions which insure that a fair amount of low income housing be provided in all stages of development.

⁵⁴ See Morgan, "Certain Legal Problems Suggested by the Creation of New Towns in Massachusetts," Monograph published by Mass. Dept. of Community Affairs (1969).

⁵⁵ Typically, new community land use regulations require a minimum number of contiguous acres under unified ownership or control before development will be permitted. See Howard County, Md. zoning regulations. sec. 17.

The use of eminent domain to assist in assembling land could provide an effective means of facilitating new community development at minimal cost to the State. Indeed, it will, in reality, be necessary in order to allow maximum potential employment of private resources and of new community development.

The case for justification of Government land acquisition for new communities

Only in the sense of preventing the growth of slums, however, is the government sponsorship of new communities the kind of action which legitimately deals with the issue of blighted land. Moreover, the very intent of the proposed statute is to establish communities in urbanizing areas of substantial open space, space which is probably not blighted under even the most liberal definition of the term.

Despite the apparent unavailability of the blighted land concept on which to sustain the public purpose behind acquisition of land for new communities, the case law does indicate an expanding notion of eminent domain in Massachusetts sufficient to sustain a carefully drawn and controlled statute.

In the first place, where the asserted public purpose has not been pinned on the particular kind of land to be taken, the Massachusetts courts have stressed only the purpose of the bill and have not rejected the taking of open land as per se an invalid public purpose.⁵⁶ For example, in the *Worcester Housing Authority* case,⁵⁷ the Court sustained the inclusion within a project area of subareas that contained neither residential property nor buildings that were "substandard" or "decadent" within the statutory meaning.

The declared purposes of the statute would in many cases be thwarted if the authority must exclude from the redevelopment every adjacent parcel to which considered by itself, the statutory definition may not apply.⁵⁸

The court here did go on to stress the contiguity of the nonconforming subareas and their proximity to residential buildings; but nevertheless did verify the taking of clearly unblighted land.

A second, and related, factor suggesting the validity of eminent domain for a public new community development is the emphasis in the cases on planning and prevention. On the Federal level, the Supreme Court, in sustaining a broad program aimed at eliminating existing slums and blighted areas that tend to produce slums, offers this functional justification for the taking of unoffending tracts of land:

If owner after owner were permitted to resist these redevelopment programs on the ground that his particular property was not being used against the public interest, integrated plans for redevelopment would suffer greatly.⁵⁹

In Massachusetts, too, the courts have deferred to some preventive legislation. The 1943 high court broadly suggested that even if the evil to be avoided is one feared rather than one presently existing, that is no reason for denying legislative authority to guard against it.⁶⁰ More recently the court brought together the ideas of planned growth and prevention of blight to find a public purpose in the elimination of

⁵⁶ Morgan, op. cit., at 23.

⁵⁷ 335 Mass. 19, 138 N.E. 2d 356 (1956).

⁵⁸ Ibid. at 22, 138 N.E. 2d at 358.

⁵⁹ *Berman v. Parker*, 348 U.S. 26, 35 (1954).

⁶⁰ *Commonwealth v. Town of Hudson*, 315 Mass. 335, 340, 52 N.E. 2d 566, 570 (1943).

blighted open area that lay in the path of, and interfered with, the sound growth of the city.⁶¹

In making that finding, the court said "consideration may properly be given to the prevention of the development of slums adjacent to the blight."⁶² And in 1969, the court deferred to a legislative program of preventive action whose purpose was the "permanent elimination of slums in the project areas by preventing their initial growth."⁶³

Taken together these last two cases suggest an approach to drafting new communities legislation to assure that the corporation's activities are interpreted as public purposes justifying eminent domain powers. Because of the *Dodge* opinion, the legislation should stress the urbanizing nature of the land to be used for the new community and should define urbanizing in terms of the land's lying in the path of the growth of the nearest metropolitan center. Then, because of the *Massachusetts Housing Finance Agency* opinion, the findings should stress that the new communities, by providing a mix of living and occupational opportunities, will prevent the growth of slum conditions within the new entity itself and, by relieving the population pressure in the adjacent city, will complement the slum clearance programs already in operation there.⁶⁴

A third factor supporting the public purpose of new communities legislation is the emphasis the case places on a continuing regulation of projects by a public body.⁶⁵ Although the cases do not make clear the extent to which control by a public body must be maintained to protect the public purpose status of the project, the regulation of a new community site, at least during its development, seems sufficiently thoroughgoing in the proposed statute to make use of this factor.

Finally, an analysis of the "Opinion of the Justices" invalidating the statute to construct a stadium complex and associated roadways suggests a finding of public purpose in the new communities legislation. The court reasoned in that case that even a large multipurpose stadium for public events could be for a public purpose, if the expenditure of public funds and the extension of public privileges, powers and exemptions were adequately governed by appropriate standards and principles set out in the legislation itself.⁶⁶ But, the court continues, provision of such facilities is not as "clearly and directly" a public purpose as supplying housing, slum clearance, mass transportation, highways and vehicular tunnels, educational facilities, and other necessities. As to such essential enterprises the public objectives are well understood.⁶⁷

Moving from that analysis to a new communities statute, one finds that the very facilities whose provision the court has found most "clearly and directly" to be public purposes are the very facilities that new communities are designed to provide. Furthermore, the proposed statute clearly sets out (sec. 8) the very kinds of principles and standards necessarily precedent to land acquisition that would quiet both

⁶¹ *Dodge v. Prudential Insurance Co. of America*, 343 Mass. 375, 179 N.E. 2d 234 (1961).

⁶² *Ibid.*, at 383, 179 N.E. 2d at 241.

⁶³ *Massachusetts Housing Finance Agency v. New England Merchants National Bank of Boston*, 1969 Mass. Adv. Sheets 987, 249 N.E. 2d 599 (1969).

⁶⁴ Mass. Const. am. art. 43 already permits the General Court to take, improve, build on, and resell land "for the purpose of relieving congestion of population and providing homes for citizens." By only a slight extension of its reasoning, the condemnation of land by a corporation for development of new communities receives further justification.

⁶⁵ *Opinion of the Justices*, 341 Mass. 760, 168 N.E. 2d 858 (1960), *Opinion of the Justices*, 334 Mass. 760, 135 N.E. 2d 665 (1956).

⁶⁶ "Opinion of the Justices", 1961 Mass. Adv. Sheets 1171, 1188, 250 N.E. 2d 547, 558 (1969).

⁶⁷ *Ibid.*, at 1189, 250 N.E. 2d at 558.

public and judicial unease at the possibility of uncontrolled eminent domain takings.

Although no case precisely analogous to that posed by new communities legislation has come before the court as yet, the direction in which the court has been moving in the area of eminent domain suggests that the court "could" uphold a delegation of the general court's eminent domain power to a public new communities corporation under an enabling act containing carefully drawn guidelines and a strong legislative finding of public purpose.

2. *Issues regarding future use*

The nature of the problem

The primary purpose of this part of the paper is to consider the implications of government involvement in acquisition of land for new communities. At this time one final distinction is necessary before the analysis proceeds.

It is obvious that in almost every case where a large tract of land could be purchased for a new community, the development process would be strung out over a number of years. The reasons for this are obvious—limited working capital, labor force, management talent, marketing staff, etc. To confirm the length of time needed for development, one only need look at the development strategies for existing new communities to discover that the staging periods generally range from 10 to 20 years. The recognition of these extended development periods suggest a temporal dimension of land acquisition that is significant for the present analysis. Perhaps an examination of the subject of government land acquisition should be discussed at either end of the development timespan; that is, acquisition of land that will be used immediately for a new community and acquisition of land that will be used for future expansion of a new community.

Although the distinction between present and future use in this particular context may seem arbitrary and ill-defined, it is crucial to an adequate legal analysis of the entire issue of land acquisition and control, because it is conceivable that a given governmental action may be appropriate for a present use, but invalid for a future use. It is interesting to note that most of the new community literature concerned with the legality of government involvement in the acquisition and control of land has concentrated implicitly on questions of present use. However, the issue of future use has not been completely neglected, as a great deal of the recent "open space" literature has dealt with questions concerning it.⁶⁸

The issue of new community development in Massachusetts has not gone unnoticed by legal scholars. In fact only last spring a paper was prepared on the questions of the use of eminent domain and police power controls applicable to new community development on vacant, unblighted land in Massachusetts.⁶⁹ Although the paper was throughout a thoughtful and articulate analysis of Massachusetts law, its emphasis was primarily upon present use. In order to complete, rather than duplicate these efforts, the focus of this part of the paper will be primarily on questions of future use.

⁶⁸ See "Techniques for Preserving Open Spaces," Harvard Law Review, vol. 75, p. 1622 (1962).

⁶⁹ Morgan, "Certain Legal Problems Suggested by the Creation of New Towns in Massachusetts," Massachusetts Department of Community Affairs (1969) 59 pages.

Why be concerned about the future?

There are a number of reasons why State governments should be concerned about acquiring and/or controlling land that will not be immediately affected by the present development of a new community. Perhaps the most important of these is to capture increments in value created by public investment. The British Government recognized this when Parliament enacted the recommendations of the Uthwaite Commission report, which called for the acquisition of the development rights for all the land in England. This, in effect, entitled the government to receive any increases in private land that are due to the efforts of government and not the landowner.

The problem with an idle landowner gaining is not so aggravating when the nearby industrious landowner is richly rewarded for his efforts. But when the relative value increases in favor of the "do nothing" landowner, the pill becomes harder to swallow. This condition has become increasingly prevalent in our country's history, particularly with respect to our public expenditures on capital improvements. The most notable recent example can be found in the Federal interstate highway program, where in some cases, public investments have been exceeded by unearned private increments, sometimes at a factor of 5. That is, for example, a 10-mile stretch of highway may cost \$20 million of public funds and yet when its construction is completed, the privately owned land on the highway's flanks will sometimes have increased in value by as much as \$100 million.

There are reasons for allowing this system to continue, but their validity should not be allowed to pass unchecked. For example, although it is frequently asserted that there is no substance to the "do nothing" label, that in fact the landowner is doing something by risking his capital, there is some empirical evidence to suggest that in many areas of the United States that risk is in fact minimal.⁷⁰

The law of future use

Consider for a moment the distinction between the legality of the two following hypothetical conditions: (1), acquiring a tract of land and within 1 or 2 years constructing a densely populated, mixed income new community on the entire site, and (2), acquiring the same tract of land and building the same community in the same place, but at a much slower pace, perhaps staging it over 20-year period. Needless to say, the second condition is the more realistic one, given the nature of the development process. Yet, as pointed out earlier, most of the legal studies in this area have tended to assume (either consciously or unconsciously on the part of the writers) that development is an act in the present tense.

Assuming that the distinction between the two conditions is a valid one, why is it significant? To begin with, it points up two separate, but related, legal issues that must both be overcome if new communities are to be built in this country's rapidly expanding urbanizing areas. Both of these issues are dimensions of the concept of "public purpose," the doctrine discussed in the previous section. Thus far, the present use dimension of public purpose has been emphasized, as the analysis has tended to address the following question:

⁷⁰ Dyckman, "The Control of Land Development and Urbanization in California," in the California Governor's Commission on Housing, "Housing in California," app. p. 29 (1963).

Can the acquisition or control of a vacant, unblighted tract of land be a public purpose if the land is used immediately for a new community? Now the focus will shift to issues of future use while addressing the following question: Assuming it is valid to build the community immediately, does it make any difference that the new community will not be built on the land for a few years?

The previous section's historical examination of public use as it relates to present use indicated that the concept has continually been expanded by the courts for over a century. Interestingly, as far as future use is concerned, the judiciary's interpretations have been almost as expansive. The issue has actually been faced only once in Massachusetts when, in 1952, the court ruled positively on the question, thereby allowing a future use to be called a public use even though it was not even certain that the government's planned use for the land would ever materialize.⁷¹

Earlier cases in other States show a more restrictive view toward future use. The focus used to be on three things: the ultimate use, the specificity of how and when it was to be used, and the necessity of the use. That is to say, if the ultimate use was specific, actually public, and necessary, then it would be permitted.⁷²

In spite of the liberalization of the future use aspect of the public use concept, it still appears that the present use doctrine may be more expansive, because only in the latter case have the courts talked about permissible activity beyond actual public use.

To date there have been no reported urban renewal cases where land acquisition was authorized by a court that knew there would be no replacement of the blighted area with new development until some distant date. Thus, a showing of future public purpose is probably not sufficient to substantiate a present acquisition. Ironically, it seems that such a conclusion may represent a distorted perspective, drawn, as it were, from an examination of the issue while wearing the blinders of the case law. Because, if instead of examining judicially reported cases, an empirical study were conducted for the subjects of these cases, a different conclusion might be drawn. Indeed, a current survey of American urban renewal would reveal many instances where blighted development was razed and no new development has followed. Moreover, there are a surprising number of these cases where the projects have remained vacant for nearly 20 years. Certainly in these types of cases it is difficult to argue that the proposed replacement use is a present use.

An important issue raised by these empirical findings has to do with the question of which act provides the public purpose. Is it the removal of the blight? Is it the development of replacement buildings? Or, is it the two acts together which make the whole thing a public purpose? The answer seems to be that it is the two acts taken together. As has been shown earlier, it is clear that the first act (removal of blight) by itself provides public benefit.⁷³ It is less clear that the second act (subsequent development) by itself serves a public purpose; in fact, it can be convincingly argued that the second act does not serve the public purpose, and that the legitimacy of the

⁷¹ *Sellers v. Town of Concord*, 107 N.E. 2d 784, Mass. (1952).

⁷² *People v. Fisher*, 190 N.Y. 468 477, 83 N.E. 482 (1908). This was a New York case where the State took and that it was going to use for a canal that was necessary for a linkage.

⁷³ *Berman v. Parker*, 348 U.S. 26, 75 Sup. Ct. 98, 99 L. Ed. 27 (1954).

entire process rests exclusively on the first act. Such an argument would assert that the second act is only permitted on land acquired by government, because blight is being removed, but if there were no blight the acquisition would not have been permitted in the first place. However, an equally compelling argument can be made against this position by resorting briefly to the following hyperbole: Would the entire process be considered a public purpose if the blighted development were replaced by another blighted development? The answer clearly is "No." According to the logic of this argument, the second act must also constitute (at least to some degree) a public purpose even though it is, in most cases, an essentially private use.

In summary, there are two significant points to be made about the urban renewal cases as they relate to new community development: (1) there is a present act which is public (that is, the removal of blight) and there is a second act which is also public (that is, new development on the previously blighted land); (2), the proposed use for the land is a future use in that it does not occur immediately and often is postponed indefinitely.

How future is future? How necessary is necessary?

As mentioned earlier, there have been no cases in which acquisition of unblighted land was permitted where the proposed use was essentially private. In those cases where the proposed uses are clearly public, and not private, the permissibility of the acquisition is determined by the "specificity" and the "necessity" of the use.⁷⁴ Some courts, for example, have disallowed acquisition of property that was to be used for such clear public uses as schools. In one case, a period of 30 years was held to be too long to show that the proposed school was necessary.⁷⁵

However, in nearly all of these cases of this type, their dispositions seem to rest, in large part, on the question of whether the Government is conducting itself in a manner that is competitive with private interest. John Dyckman captured the essence of this issue when he observed:

One is prompted to speculate that urban clearance powers are granted to governments largely because their exercise is not profitable for those governments. And the acquisition of suburban land for possible sale to future developers is frowned upon because it is too profitable to leave to government.⁷⁶

The courts in Massachusetts, like those in many other States, have labelled this kind of proposed involvement as dealing in "real estate", and they have made it clear that real estate is not a permissible activity for the State government. The leading case for this position was decided in 1913 when the supreme judicial court rules that a statute was unconstitutional because it allowed a public corporation to buy land and then later sell it for a profit.⁷⁷

Although the *Salisbury* decision does not sound encouraging, in it the court made a series of observations that offer some promise to the current issue of Government land acquisition for new communities.

⁷⁴ See note 107, *supra*.

⁷⁵ *The Board of Education of the City of Grand Rapids v. Baczewski*, 340 Mich. 265, 65 N.W. 2d. 810 (1954).

⁷⁶ Dyckman, "Housing in California," *op. cit.*, p. 322.

⁷⁷ *Salisbury Land Improvement Co. v. Commonwealth of Massachusetts*, 215 Mass. 371, 102 N.E. 619 (1913). See also "In re Opinion of the Justices," 91 N.E. 578 (1910).

The court began its opinion with the now-traditional observation that the Government could only purchase property for a public use.⁷⁸ Secondly, it made a more novel and certainly more progressive observation that the property could be purchased to hold in reserve for a future public use. Thirdly, it observed that a sale of the acquired property is permissible so long as it is accompanied by a showing that circumstances have changed considerably since the property was first acquired. These three observations do sound promising, but then the court lowered the boom when it observed that it was not permissible for Government (or, more specifically in this case, an instrumentality created by Government) to speculate; that is, to buy property for the sole purpose of selling it later at a profit. This, of course, is the finding of "real estate" involvement which ultimately proved fatal for the Government land acquisition in that particular case.

On balance, the *Salisbury* case is not so damaging, even with its findings on "speculation." The court in that case would probably have defined "speculation" to mean the present acquisition of property to create a profit in a future transaction. Courts in other States have used speculation in a much broader sense. For example, the court in the *Michigan* case cited earlier exemplified this broader interpretation when it observed that to purchase property before it was needed, in order to save the added expense of buying it at an inflated value, when it really was needed, is speculation, and therefore not a permissible Government activity. However, not all States have adopted this broad view of speculation. For example, a Florida court ruled that it is permissible to buy land that will be used in the future for an airport.⁷⁹ Although there have been no decisions in Massachusetts like that in the *Florida* case, the *Salisbury* decision is certainly a precedent for a future decision that would allow acquisition for future use so long as the proposed use is public, and so long as the property is not being purchased for the exclusive purpose of selling it later at a profit.

Excess land

Another aspect of the future use question often arises under the rubric of "excess land acquisition". Generally this has been a question related almost exclusively with highway or street construction. For example, in 1910, the Massachusetts Legislature proposed buying land in downtown Boston to help improve the transportation flow for the business community there. The idea was to purchase enough land to improve accessibility vastly to and from the various businesses. In an advisory opinion, the Massachusetts Supreme Judicial Court ruled that these proposed purchases would be excessive and not public uses and therefore should be disallowed.⁸⁰

The following year saw the ratification of an amendment to the Massachusetts Constitution which specifically permitted acquisition of "more land and property than are actually needed for the actual construction of such highways or streets."⁸¹ And by 1953 the excess condemnation doctrine was expanded even further. In that year, in

⁷⁸ Since there was no mention of "blight" in the entire case, it is presumed that the court was authorizing acquisition of unblighted land.

⁷⁹ *Carlor Co. v. City of Miami*, 62 So. 2d 897 (Fla.), cert. denied 346 U.S. 821 (1953).

⁸⁰ In re Opinion of the Justices, 91 N.E. 405 (1910).

⁸¹ Art. 39, 1911.

another advisory opinion, the Massachusetts court, although ostensibly reaffirming its earlier position that excess purchase was not a permissible Government activity, nevertheless, permitted land acquisition that clearly would not have been allowed at the turn of the century. The court was able to do this by altering its interpretation of what acts constitute a public use. In the case before them, the State legislature had empowered the Massachusetts Turnpike Authority to purchase substantially more land than was needed to build a highway. This (excess) land was to be used for garages, service stations, and restaurants on the restricted access turnpike. The Court held that the land was not "excess," that the land was necessary for the operation of the turnpike, and that the acquisition was therefore permissible as a public purpose.⁸² Interestingly, the court emphasized that its decision could have been made without the benefit of the 1911 constitutional amendment.⁸³

This decision permitted the turnpike authority to buy unblighted land that was ultimately leased to private businesses such as Howard Johnson Restaurants and Citgo Service Stations. In doing this, the court took a big step forward in the law relevant to new community development. However, the court took pains to limit the magnitude of this step when it stated:

While land cannot ordinarily be taken by eminent domain for the purpose of renting and sale * * * this principle is inapplicable where, as here, the property rented and sold is thereby devoted to a public purpose.⁸⁴

Public use, as a legal concept, has many dimensions. It serves as a restrictive force in Government exercise of the powers of eminent domain and spending, and, apparently in Massachusetts, the extent of this stricture is equal for the exercise of both powers. Moreover, in exercising these powers, public use displays another of its dimensions and that is the treatment of present uses and future uses.

But what significance do these statements have for new community development? For one thing, acquisition of land, although originally limited to actual public uses, has historically been expanded to cases where even though the uses are in fact private, the courts have permitted them by labeling their purposes as public. Furthermore (notwithstanding the fact that most of these public purpose cases have been confined to urban renewal projects, where the public nature of their purpose was determined by the blighted condition of the land) there have been some cases (e.g., the *Turnpike Authority*) where the acquisition of unblighted land was allowed to be used for purposes that the courts called public even though it can be persuasively argued that they were more private uses than public uses.

Thus, the permissibility of acquiring unblighted land for new community development will probably depend on whether the purpose can be demonstrated to be public. Furthermore, the favorable disposition of the new community concept will also depend on a demonstration that the proposed development is both specific and necessary. At least some degree of advance planning for future use must be shown, but the court in *Carlton* found that—

It is not necessary that a political subdivision of the State have money on hand, plans and specifications prepared and all other preparations necessary for im-

⁸² Opinion of the Justices, 113 N.E. 2d 452, 466-468 (1953).

⁸³ *Ibid.*, 468.

⁸⁴ *Ibid.*, p. 468, citing the *Salisbury* case.

mediate construction before it can determine the necessity for taking private property for a public purpose.⁸⁵

The planned ultimate use of the land, of course, must be for a public purpose, but if the only purpose is to generate revenue, courts would be unlikely to uphold acquisition. However, where revenue raising is only incidental to the public purpose, then the taking is more likely to be upheld.⁸⁶

Flexibility is also an important part of an advance acquisition program, particularly so where new communities may not be able to be projected with as much certainty as highways, but it seems clear that once the Government agency obtains title in fee in good faith, it may dispose of land or shift its uses if changed conditions dictate. It may also receive income from lease or rentals during the interim holding period.⁸⁷

Court decisions concerning review of advance land condemnation programs are few. Few, if any, courts have prohibited advance condemnation per se. Aside from fraud and bad faith, and assuming the projected use is for a valid public purpose, courts have focused their attention upon the reasonableness of the time period involved.

A major objection to a land bank is apparently fear of "socialism" and of large-scale governmental ownership of land, and that individuals may be placed in a tenurial relationship with Government. The fact remains, however, that Government is the largest owner of land in the United States and is increasing its acquisition of land daily for public parks and other uses. The fact that, in new community development, land would be returned to private ownership after condemnation should operate to reduce these apprehensions.

With new community development, there may be a problem in determining whether or not land is being taken in advance. If, for example, the projected size of the new community were 100,000 population and 10,000 acres, initial development might require only 500 acres. More land would be developed in stages after the land was improved and sales were made. Eventual completion of the community might, however, require a substantial period of time—10 to 15 years or more. Some land would not be developed until years after original development had begun. If condemnation of this land, which was programed for later development was invalidated as being a taking too far in advance of need, then new community development could be prevented. Owners of land could develop according to their own plans and reap appreciated values caused by the new community developers investment of resources. Regulation might be construed as unreasonable, but the developer would be powerless to exercise eminent domain. Later condemnation, because of the costs of improvements, would be prohibitively expensive and new community development could be effectively prevented.

Cases or restrictions which state that land may be taken in advance of actual need only when such period is reasonable should be interpreted, in the instance of new community development, to mean in advance of the date when the development of the new community begins and not the date of ultimate completion. Measuring the period

⁸⁵ *Carlor Co. v. City of Miami*, 62 So. 2d. 897 (Fla.), cert. denied 346 U.S. 821 (1953).

⁸⁶ See *Courtesy Sandwich Shop v. Port of New York Authority*, 190 N.E. 2d 402 (N.Y. 1963). Les judicial objection should be evident where revenues obtained are reinvested in the new community.

⁸⁷ See cases discussed in U.S. Department of Housing and Urban Development, "Advance Acquisition by Local Governments" (1968), at note 9.

from the latter date could have the ironic result of preventing that which had already been declared to be a public purpose.

A summary of the law of public use in Massachusetts

Throughout this part of the paper, a number of observations have been made about the *Massachusetts* case law as it relates to the various aspects of the complex issue of public use. Perhaps it will be helpful now to summarize briefly these observations and compare them with the criteria established earlier in the paper.

Public use, as a legal concept, has many dimensions. It serves as a restrictive force in Government exercise of the powers of eminent domain and spending, and, apparently in Massachusetts, the extent of this stricture is equal for the exercise of both powers. Moreover, in exercising these powers, public use displays another of its dimensions and that is the treatment of present uses and future uses.

But what significance do these statements have for new community development? For one thing, acquisition of land, although originally limited to actual public uses, has historically been expanded to cases where even though the uses are in fact private, the courts have permitted them by labeling their purposes as public. Furthermore (notwithstanding the fact that most of these public purpose cases have been confined to urban renewal projects, where the public nature of their purpose was determined by the blighted condition of the land), there have been some cases (e.g., the *Turnpike Authority* case) where the acquisition of unblighted land was allowed to be used for purposes that the courts called public even though it can be persuasively argued that they were more private uses than public uses.

Thus, the permissibility of acquiring unblighted land for new community development will probably depend on whether the purpose can be demonstrated to be public. Furthermore, the favorable disposition of the new community concept will also depend on a demonstration that the proposed development is both specific and necessary. If this is done the requirements of future public use will also be satisfied.

If these various demonstrations are made, does this mean that the purposes for Government involvement in new community development will also be satisfied? The answer to this question will obviously depend on which strategy the Government will choose to employ in acquiring the land for the new community. But it will also depend on how it makes the various showings that its actions are indeed public purposes. That is to say, if it is stated that the public purpose of the involvement in new communities is to conserve for the public the incremental value created by growth in the population and public expenditures, then it is clear that the purpose will not be achieved, because the *Massachusetts* case law is explicit that this type of speculation is not a permissible Government activity.

However, such a conclusion raises yet another question: Will it be permissible for Government to recoup some of its investments, if it does so without emphasizing that the recoupment itself is not one of its specific purposes for becoming involved in new community development? Answers to questions of this type will be determined by the manner in which Government chooses to justify its involvement. Thus, it should be clear that the feasibility of Government-sponsored new communities will ultimately depend on how well its increased involvement can be justified.

3. *Legislative findings for public purpose*

The legal significance of legislative findings

Throughout this part of the paper there have been, on balance, probably more negative than positive comments made about the legality and constitutionality of Government involvement in new community development. However, in spite of the negative remarks, the feasibility of the Government sponsored new community concept will ultimately depend on how well the Government's position is documented by the legislature and advocated before the courts. The Advisory Commission on Intergovernmental Relations sensed the gravity of this requirement when it stated:

Particular care should be taken in drafting state legislation authorizing the exercise of eminent domain powers by land development agencies to include a clear and definite finding by the legislature that the acquisition of land for future development to assure the best possible use of natural resources is a public purpose. Courts increasingly defer to legislative findings of public purpose.⁸⁸

In this section of the paper an effort will be made first to determine how much weight the Massachusetts courts will place on these types of findings, and second, to examine the various claims which might constitute an appropriate list of findings for state enabling legislation.

The law is well established in Massachusetts that the findings of the legislature are to be given great weight by the courts (*Allyndon* decision). The unwillingness of the courts to pierce the "legislative thicket" was exemplified in 1962 when the supreme judicial court declared:

The principles applicable whenever the constitutionality of a statute is attacked are well established. Every presumption is indulged in favor of the validity of the statute. . . . There is a very wide discretion in the legislature. If the question is fairly debatable, courts cannot substitute their judgement for that of the legislature.⁸⁹

On some questions it appears that the legislative findings are handled by the courts as conclusive presumptions. One such question is the issue of "necessity" which was discussed earlier under the heading of future use. Although the case law on future use poses some problems for new community and acquisition policies, it seems that most of these problems have been created by a lack of firm and specific legislative findings of necessity. Consider, for example, the case of *City of Boston v. Talbot*, where the supreme judicial court, while ruling favorably on the permissibility of a condemnation suit, demonstrated its deference to a clear legislative statement of necessity:

The question whether the use for which land is taken under the right of eminent domain is a public use is a judicial question, and the determination of the legislature may be revised by the court. *But if the use for which the taking is made is public, the question whether the taking of a particular piece of real estate is necessary or expedient is a legislative question, upon which the decision of the legislature, as a tribunal of fact, is conclusive.*⁹⁰

The content of the legislative findings

It has been stressed throughout this paper that the public mechanism needed for new community development is one that would be

⁸⁸ ACIR, op. cit., p. 162.

⁸⁹ *Hall-Omar Baking Co. v. Commissioner of Labor and Industry*, 344 Mass. 694, 184 N.E. 2d 344, 348 (1962)

⁹⁰ *City of Boston v. Talbot*, 91 N.E. 1015, 1016 (1910), emphasis added.

capable of acquiring and/or controlling large tracts of land in urbanizing areas for the development of new communities. Since there already exist several of these mechanisms established in other States, perhaps their enabling legislation would offer a guide as to how the legislative findings should be phrased for Massachusetts. The enabling legislation for the recently established New York Urban Development Corp. offers what is probably the most copious set of findings. The statute begins by emphasizing a long list of problems, including persistent unemployment for the State, the problem that unemployment in turn creates, and the inefficient and obsolete facilities (i.e., industrial, commercial, and community facilities, the existence of blight and the trend toward blight in many areas). The various problems just listed are then linked with causes, such as lack of adequate planning and the inability of the private sector to solve the so-called "urban crisis." Finally, the legislation states, as a matter of public policy, that New York can begin addressing these problems by creating a—

State urban development corporation which, through the issuance of bonds and notes to the private, investing public, by encouraging maximum participation by the private sector of the economy, including the sale or lease of the corporation's interest in projects at the earliest time deemed feasible and through participation in programs undertaken by the State . . . and by municipalities and the Federal Government, may provide or obtain the capital resources necessary to acquire or construct . . . industrial, manufacturing, commercial, educational, recreational, and cultural facilities, and housing accommodations for persons and families of low income . . . (and that all of the above) *are public uses and public purposes for which public money may be loaned and private property may be acquired and tax exemptions granted and that the powers and duties . . . are necessary and proper for the purpose of achieving ends here recited.*⁶¹

Certainly the conclusions drawn from the New York Legislature's findings (that part italicized in the above quote) emphasize the very key words that have been stressed throughout this part of the paper. However, there remains some question whether enough was said in the findings to support the assertion that some of the currently proposed activities by the UDC are in fact "public necessities" that are required for the "public use and purpose." It was mentioned earlier that the UDC is now planning for three new communities, at least two of which will be located in urbanizing areas away from the urban core. Yet, nearly all of the legislative findings for the UDC were focused upon the urban core areas, and nothing was made explicit about problems with development in urbanizing areas.

Other legislation has been more specific about these geographic areas. In fact, the findings for the proposed legislation by ACIR are explicitly and exclusively devoted to urbanizing areas. In their report, the commission persuasively and concisely stated their findings in the five following statements:

1. Local planning and development controls are inadequate to cope with the pressures on land and its development in rapidly growing urban areas.
2. Efficiency and economy in the provision of public services, both in capital outlay and operating costs, depends upon a sound method of acquiring land and for the planning of its use for future public and urban development uses.
3. Public acquisition of land, the planning of its use, and the establishment of sound development standards would help preserve one of the State's primary resources.

⁶¹ McKinney, "Consolidated Laws of New York Annotated," Book 65, pt. 1, Unconsolidated laws, sec. 6252, p. 188, pocket supplement 1969-70, emphasis added.

4. Private industry has encountered difficulty in providing new industrial, commercial, and residential facilities in new large-scale urban development because of problems in assembling land suitable for building sites, the difficulty of attracting private capital at reasonable cost to finance development, and the difficulty of private enterprise alone to plan, finance, and coordinate industrial and commercial development with residential developments for persons and families of low income and with adequate public services to serve new development.

5. State acquisition of land, site improvement, and disposition of land around the fringe of urban growth areas and at other points in anticipation of future growth, provide a major method for implementing state and local urban growth policies for assisting private developers.⁹²

The proposed legislation by Krasnowiecki and Paul complements the ACIR findings by providing elaboration, particularly for the claims of efficiency and economy. Selected passages from their proposed legislation spell out the following purposes:

* * * To secure open spaces, within metropolitan areas which will promote the economic use of land and the economic development of facilities, services, and improvements necessary for urban community living in metropolitan areas by:

* * * Restricting or preventing new urban development in areas where it will impose unreasonable costs for required public facilities or services;

* * * Retarding development * * * in areas where it is not yet timely because of lack of adequate public facilities * * * and because the costs which the extension, construction, operation, or improvement of such facilities * * * would impose on the area are unreasonable by comparison with its present resources;

* * * Preserving less congested land areas in the metropolitan areas which could be used, in part, to achieve economies in planning and locating transportation facilities.⁹³

The legislative findings could continue, but it seems more important now to ask whether the dozen or more already listed have any basis in fact. Krasnowiecki perhaps best recognized the need for such scrutiny when he observed:

If data cannot be marshaled to show that the preservation of an open space area will reduce costs and promote long term economies in the public sector, then the desirability of many projects and perhaps, too, the *philosophy of the underlying enabling legislation may be open to serious question.*⁹⁴

It will be recalled how Justice Finley, in his dissenting opinion, in *Hogue v. Port of Seattle* judicially recognized some "statistical facts"⁹⁵ which demonstrated to him that it was in the public interest of the people of Seattle to buy open land for an industrial park. One is left to ponder how convincing these "facts" were and why the majority of the court did not find them sufficiently compelling to commit the city to buy the land in question. One possible explanation is that the statistics were not examined as a part of the legislative history which authorized the taking in the first place. Whatever the case, it is clear that the data supporting legislative findings for Government involvement in large-scale development should be made public and formally recorded as a part of the legislative process.

Toward a critical examination of public benefits and costs

In examining the facts which support or detract from the various legislative findings listed thus far, it is helpful to divide them into benefits and costs. On the benefit side of the ledger, there are at least four significant but somewhat interrelated assertions.⁹⁶

⁹² ACIR, "State Legislative Program: New Proposals for 1969," pp. 507-2-3 (1968).

⁹³ Krasnowiecki and Paul, op. cit., pp. 218-219.

⁹⁴ Ibid, p. 82 (emphasis added).

⁹⁵ See note 81, supra.

⁹⁶ Most of these four assertions have been developed from material in Shoup and Mack, "Advanced Land Acquisition by Local Government," op. cseit.; e note 37, supra.

a. Benefits

(i) *Active Government support for new communities will achieve lower land and development costs per unit of government service.*—There are several different premises that serve as the foundation for this assertion. For one thing, the claimed reduction may arise as a result of either a lower price of land, while quantity and quality of the developed output remain constant, or of a higher quantity or quality of the developed output while the cost of the land remains constant.⁹⁷ Also the reduction may be created over time, because the acquisition may predate large increases in land value that are attributable in great part to a government's decision to build a new community in a given area. (It will be recalled that the Massachusetts' courts look unfavorably upon legislation enacted for the purpose of allowing Government to speculate in real estate; so, to avoid judicial opposition, this particular premise should probably focus on land that will be publically retained for uses such as parks, streets, and public buildings, rather than transferred to private interests at a profit.) A third premise is predicated on the possibility that Government in many cases will be able to achieve a return on the temporary use of the land. Although not really a positive premise, this last statement is intended more as a rebuttal, demonstrating mitigating circumstances to the charge that advanced land acquisition will be too costly for the public sector.

The first assertion has not gone unchallenged. The noted urban economist, William Alonso, recently ravaged many of the conceptual under-pinnings of new community advocates in his critical article entitled: "The Mirage of New Towns."⁹⁸ In his analysis, he offered two arguments against the first assertion. First, he argues that the Henry George idea of public ownership of land to recapture increments in value is a problem because (a) it forgoes the cybernetic market mechanism⁹⁹ and (b) it may inhibit the entrepreneurial search for new uses.¹⁰⁰ He considers the last reason most important because "increases in land value are one of the primary incentives for private participation." He argues secondly that, although land may be cheaper (its price being established primarily by its locational value as determined by its accessibility) it does not mean, therefore, that it will be less expensive overall. In fact he believes otherwise: "Cheap land will probably be inconvenient land and might prove to be very expensive in the end" (p. 28). This argument has less force than his first (at least for the purposes of this paper), because Alonso appears to be speaking more about the land economies of new towns in rural, rather than urbanizing areas.

(ii) *Government sponsorship of new communities will mean an improvement in the procedures and capabilities for getting the best sites.*—This assertion, like the first, has several dimensions, two of which are most important. Both are concerned with the process today, and both demonstrate how the private sector has worked against Government cost optimization. The first has to do with the selection of sites for the development of "actual public uses." Today, governments delay ac-

⁹⁷ Ibid., p. 36.

⁹⁸ Alonso, "The Mirage of New Towns," *Public Interest*, spring 1970; footnotes all based on a longer unpublished paper (40 pages) delivered at the Research Conference of the Committee on Urban Economics, Sept. 11-12, 1969, Cambridge, Mass.

⁹⁹ For an opposing viewpoint, see Mandelker, "Controlling Land Values in Areas of Rapid Urban Expansion," *UCLA Law Review*, vol. 12, pp. 734-761 (1965).

¹⁰⁰ Alonso: op. cit., p. 20.

quisitions of land for the development of public facilities until the private demand is sufficient. By that time, the most suitable sites for these facilities are preempted by the very private development that generated the demand in the first place.¹⁰¹

The second part of the above assertion has to do with the manner by which private developers currently acquire sites for new community development, a manner that might be characterized as the "land first approach," because, as it usually happens, the first action the private developer takes is the acquisition of the land. His criteria for purchase normally are based on such things as the anticipated marketability of the site and the ability of the surrounding area to service his project with the level of facilities it requires. Although these considerations are important, particularly for the security of his investment, they fail to encompass several other items which, from a regional public policy standpoint, are crucial. These include such considerations as:

1. The impact his development will have on the entire region's growth.
2. The strain it will have on the surrounding communities to meet the increased demands of new residents in the area.
3. The employment and valuable cultural activities it will attract away from areas of greater need within the region.
4. The changes in priorities in regional and State appropriations of funds that will be required to provide the community with the desired level of facilities.¹⁰²

It is just these four kinds of regional considerations that the British new town developers have recently recognized as crucial to the public interest of the new development and the surrounding area.¹⁰³

While some private new community developers prepare analyses of regional growth patterns and demographic and economic trends, their studies are frequently only for public relations purposes (i.e., for their industrial and commercial sales and leasing brochures) or for determining what share of a particular local market they can expect to capture. If governmental agencies could be involved in the site selection process, hopefully they would have the necessary motivation and expertise to encourage regional community strategies that satisfy the regional needs and plans and to discourage those that do not.

(*iii*) *Government sponsorship of new communities will mean an improvement in both the patterns of land use and the quality of planning.*—This particular assertion serves as a pot pourri of secondary benefits associated, in one sense, with advanced public acquisition of land. The value of it is easy to understand—plans can be better and more realistic with the tool of advance acquisition because there will be less impediments and obstacles to deal with. In this sense, the thrust of this assertion is economic; that is, how to maximize the quality and utility of a new urban environment while seeking to minimize its cost.

However, in quite another sense the assertion is social; that is, seeking to create urban communities that can "intermesh the lives of people who live in them, by concentrating on integrating their work,

¹⁰¹ Shoup, *op. cit.*, p. 4 (see note 37, *supra*).

¹⁰² Hobbs, "New Communities; a Public or a Private Venture?" unpublished manuscript, p. 12, Harvard University (Dec. 2, 1969).

¹⁰³ Notes from speech given by Professor Rose of the University of Birmingham, England, at Harvard University, (Oct. 24, 1969).

play, education (and access to each), intellectual and artistic developments, social contacts, personal as well as community facilities and services.”¹⁰⁴ To a large extent these phases constitute the platitudes of planners, words that have little operational value. Alonso finds fault with them also, primarily because the empirical evidence to support the successful operation of these types of specially integrated and socio-economically mixed, intentional communities has not yet been forthcoming.¹⁰⁵

Some sociological studies have been done, however, on precisely this issue for English new towns; unfortunately, the findings there are not yet conclusive.¹⁰⁶ One thing is clear; it is difficult to generalize from the data available. It seems that many of the scholars who have studied the subject proceeded with a predisposition about the value of such community developments. However, these are the types of opinions and studies which must be reconciled if the legislative findings are to have sufficient substance to withstand judicial scrutiny.

(iv) Government sponsorship of new communities will promote and permit a more efficient production of public facilities and services.—The last assertion is associated closely with the first, except that most of the emphasis here is on the output of the development. This includes such things as lower development costs, both because of economies of scale and because of more intensive use of services (e.g., higher density means smaller sewer length allotments per capita).

The development is efficient not only because costs can be reduced but also because some of the benefits can be increased. The fact that large tracts of open space can be preserved for recreational and conservational use under planned unit development is but one example of these benefits.

Also lower development costs would ultimately help reduce the significant costs attendant to the provision of housing and facilities for low income families and persons.

On many of these claims, however, most of the critical attention is generally placed on the costs (or marginal costs). This is a conceptual weakness which Alonso has sought to correct by stressing productivity along with costs. His position is that even though new towns may have a lower per unit cost, the marginal per capita productivity will be much lower than that of larger cities.¹⁰⁷ Like his arguments on land costs, although they may seem sound and compelling, they are probably more applicable to development in rural areas rather than urbanizing areas.

b. Costs

The cost side of the ledger includes such items as cost of capital, tax revenue foregone, and the costs of managing an advanced land acquisition program.¹⁰⁸ All of these items are crucial, and it is clear that they must certainly go into any legislature's cost-benefit equation before it decides to establish its own new community development program. They are, nonetheless, much less important to the legislative findings than the benefits. In fact, if any costs are to be emphasized, they should be those associated with current development patterns, so that the legislature can show how these costs would be eliminated

¹⁰⁴ Shoup, op. cit., p. 101.

¹⁰⁵ Alonso, op. cit., pp. 20-25.

¹⁰⁶ Wilmotte, "Social Research in New Communities" JAIP, p. 387, November 1967.

¹⁰⁷ Alonso, op. cit., pp. 7-8.

¹⁰⁸ Shoup, op. cit., pp. 47-52.

or reduced with a new community policy. One example might be to attempt to demonstrate that the current costs for purchasing unblighted open areas and for developing these areas in a carefully planned fashion will be less expensive (in present value dollars) as a preventive expense, than would be the task of redeveloping the same area once it became blighted (assuming that the blight arose as a result of inadequate planning and control). Although, at first blush, this argument may not seem realistic, the fact that redevelopment involves many more costs than just the expenses for demolition and reconstruction (e.g., consider the social costs to the people being removed) may be sufficient to tip the scales in favor of a "preventive development" policy.

Summary

The purpose of this section was to emphasize the significance of legislative findings, to indicate the types of legislative findings that have been included in enabling legislation for public land corporations in other States, and, finally, to examine briefly the substance, scope, and limitations of some of these various findings.

In retrospect, it seems fair to conclude that the significance of legislative findings, provided they are accurately and comprehensibly formulated and documented, is sufficiently powerful to permit Government action, that, in many aspects, would not have been permissible under past law. Thus, the direction is if this type of legislation is to be successfully proposed and implemented. What is now required is a rigorous and critical examination of the types of findings necessary. In short, if public sponsorship of new communities is necessary, and if public involvement in the planning and development of new communities is something that, in fact, benefits the public, both economically and socially, and if these benefits cannot be matched by other types of public or private problem-solving mechanisms, then these facts should be demonstrable. If it cannot be so demonstrated, then the utopian notions of new community development must be cast aside and more practicable solutions should be sought. In any event, this is clearly the direction for future search.

B. HOME RULE DILEMMAS

One of the most striking features of the political geography of Massachusetts is that it contains no territory that is not incorporated into one of the Commonwealth's 312 towns and 39 cities.¹⁰⁹ The process of incorporating towns in Massachusetts hit its peak between the years 1775 and 1799, declined generally through the 19th century, and ceased entirely after 1920.¹¹⁰ Similarly, incorporation of cities, first permitted by Constitutional amendment in 1821, ceased by 1923 with the establishment of the Commonwealth's 39th city.¹¹¹ Since the 1920's not only has there been little tendency to diminish the number of municipalities in Massachusetts,¹¹² but the general court, when petitioned for the consolidation of two or more cities or towns in recent years has refused even to consider the possibility.¹¹³

¹⁰⁹ Bureau of Governmental Research, University of Massachusetts, *Intermunicipal Relations in Massachusetts* 31 (1956) (hereinafter cited as *Intermunicipal Relations*).

¹¹⁰ *Ibid.* 1.

¹¹¹ Legislative Research Council, Commonwealth of Massachusetts, *Report Relative to Municipal Home Rule (Proposed Constitutional Amendment)* 88 (1956) (hereinafter cited as *Municipal Home Rule*).

¹¹² *Intermunicipal Relations*, supra note 145, at 2.

¹¹³ National League of Cities, Department of Urban Studies, *Adjusting Municipal Boundaries: I. Practice* 177 (1966) (hereinafter cited as *Adjusting Municipal Boundaries*).

Despite the deference of the general court toward maintenance of the existing and historical number of municipalities within the Commonwealth, no strong tradition of municipal autonomy existed at any time up to the passage of the home rule amendment in 1966. On the contrary, legislative control of even the most trifling detail of local government was the rule.¹¹⁴

The sources of that control may be found, first, in an early and repeated assertion by the courts of Massachusetts of the doctrine now known as Dillon's Rule¹¹⁵ and, second, in the right of free petition written into the Commonwealth's constitution.¹¹⁶ The general attitude of the supreme judicial court toward towns and cities has remained constant into the 20th century. For example, in 1941 the court stated its attitude like this:

Cities and towns are political subdivisions created for the convenient administration of government, and they possess only such powers as are conferred upon them in terms or by necessary implication of enabling acts. [Citations omitted. They are separate units, possessing only the authority thus entrusted, and acting as instrumentalities of local self-government.]¹¹⁷

Such a judicial interpretation of municipal dependency was reinforced prior to 1966 by the actual practice of the general court in dealing with petitions made to it under article XIX of the constitution. Because the practice had been to receive and consider every petition, irrespective of its worth, the result was to encourage "the filing of requests for legislation on local affairs which are already within the competence of local legislative or administrative bodies, and which might better be resolved locally."¹¹⁸

Although the initiative of petitioning the legislature was that of the municipality, each time it exercised that right it demonstrated its debility, not its strength. The paralysis of effective local self-government and the delays inherent in legislative petition might have been tolerable 100 years ago, or perhaps even 50. But with the growth of large urban centers, with their many and urgent needs, the situation had grown too burdensome both for the urban municipalities and for the legislature itself. The former increasingly required the ability to assess and attack their own problems as they arose, without first having to go to a legislature, where a petition might be emasculated by log-rolling and dilatory tactics, or defeated outright because of hostility from rural legislators or a bar on special legislation.¹¹⁹ The legislature itself, on the other hand, increasingly burdened with its own growing functions, no longer had the time necessary to consider properly all the petitions made to it.

In a State, such as Massachusetts, where Dillon's Rule was accepted doctrine, two problems had to be overcome both by municipalities and

¹¹⁴ Municipal Home Rule, *supra* note 147, at 87, describes the gradually subordination of communities to the general court and concludes: "By the end of the 19th century there could be no violation of municipal home rule by the legislature because there was no home rule left to 'violate.'" This is still the case (in 1965)."

¹¹⁵ *Ibid.* 88-90.

¹¹⁶ Massachusetts Constitution, pt. 1, art. 19. The people have a right, in an orderly and peaceable manner, to assemble to consult upon the common good; give instruction to their representatives, and to request of the legislative body, by the way of addresses, petitions, or remonstrances, redress of the wrongs done them, and of the wrongs done them, and of the grievances they suffer.

¹¹⁷ *Burnham v. mayor and alderman of Beverly*, 300 Mass. 308, 390, 35 N.E. 2d 242, 243 (1941). In 1964, only 2 years before passage of the home rule amendment, the court cited the then art. 2 of the amendments to the State constitution as the basis for the "settled doctrine that the towns of the Commonwealth possess no inherent right to self-government and for the proposition that 'the power to create, change and destroy municipal corporations is in the "legislature".'" *Paddock v. Town of Brookline*, 347 Mass. 230, 238, 197 N.E. 2d 321, 326 (1964).

¹¹⁸ Municipal Home Rule, *supra* note 147, at 94.

¹¹⁹ 18 *Ibid.* 46; Sandalow, "The Limits of Municipal Power Under Home Rule: A Role for the Courts," 48 Minn. L. Rev. 643, 653-653 (1964).

by the legislature. Not only did both require some affirmative assurance that municipalities could enact measures for their own governance without seeking prior legislation or even prior legislative approval, but they also required the establishment of some relatively clear limits on the ability of the legislature to interfere with and annul local governmental action. The solution to these two problems required some form of home rule enactment. Because of the existence of Dillon's Rule in its courts, the only effective form of home rule enactment in Massachusetts could be an amendment to the State constitution.

The constitution was so amended in 1966.¹²⁰ The actual effect of that amendment on the status of cities and towns in the Commonwealth, however, is not yet exactly clear. In large part this uncertainty results from the dual functions of a home rule amendment: as a grant of local power and as a limitation on State legislative power.

In both its aspects the home rule amendment bears upon the efficacy and legitimacy of a new communities statute drawn to operate through a public corporation on a statewide basis. Insofar as the fact of the home rule grant, or any ordinance or bylaw passed under that grant, might nullify statewide new communities legislation in a particular municipality, the efficacy of such an approach to new community creation has found most "clearly and directly" to be public purposes—the very facilities the new communities corporation was designed to provide. Furthermore, the proposed statute in part III clearly sets out in section 8 the very kinds of principles and standards necessarily precedent to land acquisition that would quiet public and judicial unease at the possibility of uncontrolled eminent domain takings.

Although no case precisely analogous to that posed by new communities legislation has come before the court as yet, the direction in which the court has been moving in the area of eminent domain suggests that the court could uphold a delegation of the general court's eminent domain power to a public new communities corporation under an enabling act containing carefully drawn guidelines and a strong legislative finding of public purpose.

1. Boundary adjustment

The second home rule limitation on the power of the legislature to act through a statewide new communities corporation concerns the matter of boundary adjustment. Unlike the limitation on land assembly, which required a determination of those general law powers "in relation to cities and towns" the legislature could delegate and those which it could not, the home rule amendment is explicit about the special law power to affect municipal corporation boundaries: it is the general court that may enact a special law—

(S)olely for the incorporation, or dissolution of cities and towns as corporate entities, alteration of city or town boundaries and merger or consolidation of cities and towns, or any of these matters.¹²¹

Although this language does not exclude a delegate from exercising these compulsory functions for the legislature, the reasons rebutting such a delegation are persuasive. As a matter of logic it would be absurd to allow one incorporated entity of the State—a public new community development corporation—to alter the status of another such incorporated entity—a municipal corporation of the State. As a

¹²⁰ 19 Massachusetts Constitution, am. art. 89.

¹²¹ Massachusetts Constitution, am. art. 89, section 8(4).

matter of history, it has been the general court, by special enactment, which has exercised full and solitary control over the boundaries of the commonwealth's governmental entities.¹²² And finally, as a statutory matter, the existing scheme of petition for municipal incorporation, annexation, or consolidation¹²³ and of boundary changes between adjoining towns¹²⁴ requires action by the general court.

Section 8 (4) of the home rule amendment, of course, does not prohibit the legislative enactment of a general law establishing a boundary adjustment procedure in which delegated entities are authorized to determine when and under what conditions such adjustment shall take place.¹²⁵ The general court, however, has chosen not to enact such legislation. To the extent it has placed any initiative for boundary alteration or municipal incorporation on any individuals or group outside itself, the general court has given that group only the right to petition for, not to compel, change.¹²⁶ Effectively, boundary changes in Massachusetts currently can occur only by special act of the legislature.¹²⁷

The implications for a new community development corporation are clear. Insofar as any planned new community would require (for reasons to be suggested later) the adjustment of existing municipal boundaries or the alteration of existing units of municipal government, the development corporation would have to secure such adjustment or alteration by special act from the general court. The most apparent obstacles to this aspect of new community development, therefore, are political and practical: how to get the necessary special legislation through the general court; and, even if the special legislation can be obtained, how to phase its enactment with the work of the development corporation so that potential private and other developers at best will be attracted to, and at worst not be discouraged from, participation in the new community development project.

Under the envisioned operation of the new communities statute in part III, there are several situations in which the development corporation would desire the general court to exercise one or more of the powers reserved to it by section 8(4). As has been described, the purpose of the statute is to establish a program of new community development that will complement and serve as a true alternative to existing programs of urban renewal and redevelopment. The communities to be developed, therefore, are to be large, relatively self-sufficient, responsive to areal needs, diversified in economic base, and located in urbanizing regions containing substantial areas of open space.¹²⁸

To achieve this type of community, and to place the new community at the location most advantageous from the viewpoint of rational statewide planning, may necessitate the development of a new community site overlapping the contiguous boundaries of two incorporated

¹²² See, e.g., *Coolidge v. Inhabitants of Brookline*, 114 Mass. 592 (1874); *Stone v. City of Charlestown*, 114 Mass. 214 (1873); *Opinion of the Justices*, 60 Mass. (6 Cush.) 578 (1851).

¹²³ Mass. gen. laws annotated c. 3 sec. 5.

¹²⁴ *Ibid.*, c. 42 sec. 7.

¹²⁵ The legitimacy of such an enactment in the fact of the home rule status of municipal corporations is considered, *infra*, at note 188. Despite one reading of the amendment that would invalidate such general legislation, at least as to a procedure permitting the non-consensual annexation or consolidation of a home rule municipality, the possibility of a stricter reading in Massachusetts courts is not great. See generally Littlefield, "Metropolitan Area Problems and Municipal Home Rule" (1962) pp. 25-32.

¹²⁶ Massachusetts general laws annotated C. 3 sec. 5; C. 42 sec. 7.

¹²⁷ Even were a general procedural law to exist, the special act would still be the more important tool in new community development. Although ideally municipalities would cooperate to accommodate their boundaries to a new community, the greater likelihood is that compulsion from the general court in the form of a special law would be required.

¹²⁸ See proposed statute, pt. III, *infra*, sec. 3(11).

municipalities. Assuming that the decision has been made not to confine new communities dogmatically within the borders of a single municipality, one is faced with a choice among a set of alternatives whose value must be assessed by balancing political feasibility against developmental needs.

(For purposes of the following discussion, the contiguous municipal corporations will be designated A and B respectively, and the overlapping new community site will be designated C.)

2. *Alternative approach to dealing with local government in the development of new communities* *Inaction*

The least politically controversial alternative available is to do nothing, to allow, under section 35 of the proposed statute, the return to the control of municipalities A and B those portions of C falling within their respective boundaries.¹²⁹ Because Massachusetts contains no unincorporated territory, at no time will this laissez faire approach leave part of a completed new community outside the protection of some local governmental unit.

This very fact creates problems, however, from a planning point of view. Among the reasons for emphasizing in the legislation development of large communities was the desire to attract inhabitants from all income levels, to accommodate commercial, industrial, and recreational, as well as residential, development, and to take advantage of the economies of scale inherent in their construction. To plan such a community with the foreknowledge that part of it would return to one municipality, the remainder to another, would require the wisdom—and good fortune—of a Solomon. Municipality A would not sit idly by while the plan called for all the more valuable industrial or other development to fall within municipality B. Nor, for example, would A wish to include the greater part of the low income housing within its borders, while luxury dwellings happened to fall in B. On the other hand, the need to duplicate construction within A and B likely would destroy the optimum community plan, undermine the anticipated economies of scale, and serve as a disincentive to investment from private developers.¹³⁰

Irrespective of the problems of planning and development, the ultimate problem of governing C is itself adequate cause for rejection of this laissez faire alternative. A boundary line might bisect C along physically understandable but politically incomprehensible lines, creating arbitrarily separate units of government, a functional entity that will be developing, as it grows in size, needs and interests increasingly peculiar to itself and apart from those of A and B.

Even if one were to draw the dubious conclusion from these facts that the utter simplicity of seeking no boundary adjustment outweighs the developmental needs of the new community, municipalities A and B, as a practical matter, still would have to effectuate some rather

¹²⁹ The discussion will not consider the situation in which the development corporation finds it unnecessary to supersede any of the powers of municipalities A and B at any time during the development process. No private developer could possibly be attracted in such a situation not only because of the absence of control but also because the external control over his unified plan is under the control of two separate units.

¹³⁰ The inability to present a unified plan that would avoid uneconomic duplication would probably be sufficient to deter private investment. A further disincentive, however, is the likelihood that such an inefficient plan would not qualify for various governmental programs intended to attract private new community investment—specifically the New Communities Act of 1968, Public Law No. 90-448, title IV, § 2 Stat. 514.

extensive programs of cooperation to govern the new community properly. Elements of a cooperative program might include simple informal agreements or more formal intermunicipal contracts.¹³¹ The possibility of adopting either or both of these elements constitutes the second alternative for dealing with the boundary problems created by an overlapping new community.

Intermunicipal cooperation

Presumably the healthy growth of the new community, by contributing to the prosperity of both municipalities A and B, will provide an incentive for them to enter into voluntary agreements. Despite any incentive, however, the agreements probably should be formalized, not only to provide greater assurance that the service or function will be continued, but also, as a matter of sound planning, to clarify just what the service or function is and how it will be provided.

For the purpose of providing basic services to the new community, interlocal contracts are potentially effective.¹³² As an alternative form of metropolitan government, a regime of intergovernmental agreements also has the advantage of lowering the unit costs of providing a service, of not interfering with citizen control and participation, and of consequent political feasibility.¹³³

Yet the very voluntarism of these agreements creates offsetting disadvantages, especially where, as seems likely in Massachusetts, municipality A is a relatively large city and municipality B is a more rural town or small city. In that situation, the bargaining power of the two municipalities would be unequal and the ability to provide needed services would lie almost exclusively with A. A consequently could choose either to exact high rates for the services, or to ignore B's requests for cooperation. Furthermore, because the new community probably was located as it was in order to relieve urban center A from the excessive demands already being made on its services by its core city population, A might not be in a position to provide the needed services in the first place.

Another weakness created by the voluntarism of intermunicipal agreements to provide services is that—

(T)hey are practical only when the immediate local interest of each participating unit is not likely to be in conflict with the broader areawide interest. Since the agreements are voluntary, when such conflicts appear likely, governmental units probably would not choose to participate in an agreement, or if already participating, would withdraw.¹³⁴

Even if the dichotomy between area-wide and local interests set up in this quotation were not a serious obstacle to the mechanical provision of basic services to the new community, it would be a serious obstacle to the daily governmental operation of the unitary new community. In fact, the dichotomy really is a trichotomy, with the interests of the largely self-sufficient new community deserving independent considerations along with the interests of the individual municipalities and the area as a whole. A set of intermunicipal agree-

¹³¹ The exercise of extraterritorial power on a reciprocal basis is eliminated as a possible element because of the contiguity of all incorporated municipalities throughout the commonwealth. Advisory Commission on Intergovernmental Relations, "Alternative Approaches to Governmental Reorganization in Metropolitan Areas," at 23-23 (1962) (herein cited as ACIR: Alternative Approaches). See generally F. Sengstock, "Extraterritorial Powers in the Metropolitan Area" (1962).

¹³² Intermunicipal Relations, *supra* note 145 at 4-6.

¹³³ ACIR: Alternative approaches, *supra* note 169, at 30-31.

¹³⁴ *Ibid.*, at 30.

ments can satisfy only specific, identified needs of the new community, and those needs will be met most adequately only where their provision is in the perceived area-wide interests of A and B. Although C will be represented on the governing councils of both A and B, those bodies meet separately with the result that an exclusive reliance on inter-governmental contracts to meet C's ongoing needs will leave C without any means to express them as a separate entity to a governing body capable of responding to them. The paralysis latent in such a situation is entirely unacceptable for a new community of any substantial size.

Metropolitan government

The third alternative solution to new community boundary problems then is some form of metropolitan government in which the interests of the new community as a functional, independent whole would be given consideration along with those of the municipalities within whose boundaries the new community lies. This kind of metropolitan government could not deal with the new community only by discrete, voluntary agreements reached from time to time on narrow issues.

Consequently, metropolitan administration by council-of-governments, for example, would be inadequate because it is strictly advisory. Although the council might provide for representation from the new community as a separate entity, the effect of council action still would be just to recommend, not to require, that the duly constituted municipalities within the council region act on issues pertinent to the new community.

On the other hand, a true, compulsory metropolitan government, in which the interests of A, B, and C are represented and balanced according to the needs of the entire area, runs into severe practical and legal problems in Massachusetts. Perhaps the most convincing practical problem is that the creation of such a metropolitan government at the very least would require special legislation by the general court;¹³⁵ while equipping it with the compulsory powers necessary to override the will of individual municipalities on some issues might require an amendment to the home rule provisions of the constitution.¹³⁶ Because the likelihood of achieving even the first piece of legislation is remote, the creation of any kind of metropolitan government to assist new community development in Massachusetts is equally remote.¹³⁷

Annexation

The fourth possible alternative to meeting the boundary requirements of an overlapping new community is annexation. Strictly in terms of its physical effect on boundary lines, annexation would mean the inclusion of the entire new community site within the boundaries of one municipality and the concurrent excision from the contiguous municipality of that part of the site originally falling within it. For equally strong legal and political reasons, achieving annexation of a new community is virtually impossible in Massachusetts today.

¹³⁵ Massachusetts Constitution am. art. 89, sec. 8(3).

¹³⁶ Ibid. The nature of the "metropolitan or regional entities" envisioned by the home rule amendment is not clear, although the wording of sec. 8(3) makes it evident that the cities and towns encompassed by it are not meant to be superseded by the entity with respect to those charter adopting powers granted to them by sec. 2. Of course, a "regional entity" could be created without an amendment by dissolving municipalities A and B under sec. 8(4) and reincorporating the entire area, but the new entity thus created is not a metropolitan government in the generally understood sense of the term.

¹³⁷ Even the utilization of existing county units as partial metropolitan governments is unlikely, given the weakness and narrow functions of county units and the nonconformity of county lines with existing metropolitan areas in the commonwealth. Intermunicipal Relations, *supra* note 8, at 25-27.

A simple definition of annexation points up the crux of the legal impediment in Massachusetts:

Annexation is the addition of territory to a municipal corporation as an integral part. Generally, it involves joining all or part of the territory of an unincorporated, less populous, or subordinate local unit to that of a larger unit, usually incorporated, offering a more complete array of municipal services.¹³⁸

In Massachusetts all local units are incorporated, and the question thus becomes whether one incorporated municipality may annex part of an adjoining incorporated municipality. The answer is to be found in the home rule amendment and in chapter 3.S f and chapter 42, S 7 of the general laws of the Commonwealth.

In Massachusetts, as in the majority of States, no statute explicitly excepts incorporated areas from annexation proceedings, nor does any statute state that only unincorporated territory may be annexed. In fact, the only provisions of the general laws dealing at all with annexation are chapter 3, S 5, and chapter 42, S 7.

The first merely provides for uniformity of petitions to the general court for special legislation. The second provides that the department of public works, with the concurrence of town meetings, may propose to the general court changes in town boundaries.¹³⁹

Neither qualifies as any sort of enabling act providing procedures for annexation, and no case law seems to exist dealing with the implications of the statutory silence with respect to annexation procedures in Massachusetts.

Three other jurisdictions, however, have considered the legality of annexing incorporated territory in the face of statutory silence, and all three have denied the legality.¹⁴⁰

If the appellate courts of other States were called upon to answer the question of whether or not annexation laws are applicable to incorporated territory in the absence of an express prohibition thereof, there is more than a possibility based on experience in the above three States (of North Dakota, Wisconsin, and Texas) that they would void an annexation of incorporated territory.¹⁴¹

That conclusion is especially likely in Massachusetts because of the additional factor of the home rule amendment, under which each city and town, whether or not it has adopted a home rule charter, receives all the protections of the amendment.¹⁴²

Viewing the amendment from the perspective of the home rule powers granted, and not the protections afforded, one reaches the same conclusion. Even with respect to unincorporated territory.

In most States having home rule provision . . . the courts have held that home rule powers do not add anything to a cities (sic) power to annex territory. General laws must still be looked to for such power.¹⁴³

Massachusetts courts too are likely to reach that conclusion. Although one State does permit a home rule city to annex even unincorporated territory on the basis of its home rule grant alone,¹⁴⁴ the reservation of the boundary alteration power to the legislature in the home rule amendment itself,¹⁴⁵ the presence of only incorporated land

¹³⁸ Adjusting Municipal Boundaries, *supra* note 149, at 1.

¹³⁹ Intermunicipal Relations, *supra* note 8, at 31.

¹⁴⁰ F. Sengstock, "Annexation: A Solution to the Metropolitan Area Problem" 42-43 (1960) (hereafter cited as *Annexation*).

¹⁴¹ *Ibid.*

¹⁴² 114 Massachusetts Constitution am. art. 89, sec. 8.

¹⁴³ 115 Littlefield, *supra* note 161, at 22.

¹⁴⁴ *Ibid.* at 23.

¹⁴⁵ Massachusetts Constitution am. art. 89, sec. 8(4).

in the Commonwealth, and the total absence of any kind of annexation enabling legislation in the general laws all suggest that Massachusetts will follow the majority rule.

If it does, a new community could be absorbed by an existing municipality only by special law,¹⁴⁶ for no general annexation law now exists. As a political matter, passage of that special law would not be simple. In the 10 years prior to 1960 no significant annexation occurred in Massachusetts¹⁴⁷ nor would the pattern change the new community scheme. Matters of local pride, the desire for political and social independence, and the lack of enthusiasm for assuming financial obligations of neighboring communities¹⁴⁸ would continue, as ever, to be sources of potential opposition to annexation from at least one of the municipalities involved. Or, for example, if the annexing municipality did not object that the new town would put a strain on its ability to provide services, then the municipality from which territory is to be excised certainly would resent the loss of formerly open land whose appreciated value will not accrue to that annexing municipality. No matter which municipality is to be the annexor, potential opposition exists within both of them, as well as within the area to be annexed itself.

Although a petition for annexation could reach the general court under chapter 3, section 5, despite this local opposition, its road into enactment would have been made no smoother. The opposition raised at the local level is simply shifted to another forum. The consequences of the shift have been described in this manner:

(T)he legislature may be controlled by rural groups who view urban problems in a negative manner. Frequently there is an entrenched custom in the legislature described as "legislative courtesy" whereby the legislators honor the wishes of the delegate or delegates of the affected areas and their opposition may thwart any action. It is clear those States that utilize legislative determination as the sole means of affecting annexation are those having the least annexation.¹⁴⁹

Perhaps a real need does exist in Massachusetts for a general annexation enabling statute.¹⁵⁰ By providing a possible alternative to annexation by special act it might function at least to induce the legislature to give more serious consideration to annexation petitions, perhaps from a new community developer, when they do come before

¹⁴⁶ Ibid.

¹⁴⁷ Annexation, supra note 178, at 11.

¹⁴⁸ Intermunicipal Relations, supra note 145, at 31.

¹⁴⁹ Adjusting Municipal Boundaries, supra note 149, at 7.

¹⁵⁰ Such a statute, of course, would be useless if the home rule status of the cities and towns in the commonwealth were held to render ineffective a general law setting up a procedure by which those cities and towns might be annexed. A Texas court has held invalid an annexation procedure that would have permitted one home rule city the right to annex by charter amendment, another city which had the right to adopt, but had not yet adopted, its own home rule charter. *City of Houston v. City of Magnolia Park*, 115 Tex. 101, 276 S.W. 685 (1925). Under the Texas reading, the non-consensual annexation both of home rule cities and of cities eligible for home rule would be impermissible.

In Michigan on the other hand, the courts have ignored potential home rule obstacles and have upheld annexation legislation simply by citing authority for the dominance of the State over municipal corporations in matters of boundary adjustment. See, e.g., *Village of Kingsford v. Cudlip* 253 Mich. 144, 241. N.W. 893 (1932). The implication of the Michigan cases is that the legislature could provide even for nonconsensual consolidation.

Massachusetts has an equally strong history of legislative dominance over municipal corporations. See cases cited supra note 158. But it also has a strong tradition of deference to municipalities in legislation affecting boundary changes. See, e.g., *Stone v. City of Charlestown*, 114 Mass. 214, 221-223 (1873). This fact, together with the home rule amendment's application to all cities and towns, whether or not they have adopted a home rule charter as yet, suggests that any annexation legislation should provide only for consensual annexation of some sort. Even if the courts might approve nonconsensual procedures under a Michigan rationale, it is unlikely that such legislation would pass in the general court.

Neil Littlefield concludes that even the courts could not approve of the broader legislation.

(I)n most home rule States if some approach to area government is taken which anticipates implementation on the State level without local approval, constitutional provisions will have to be adopted.

Littlefield, supra note 161, at 32.

it. The legislation could be drafted either separately or as an integral part of the new communities proposal. In any case the new communities proposal should be drafted if not to include, at least to anticipate, and perhaps to suggest an annexation statute. Parts of the proposed statute for example, should be redrafted to make clear the procedure to be followed if annexation were to be part of the development of the new community.

At the present time, however, no annexation procedure does exist in the general laws of the Commonwealth. Desirable as its passage may be for purposes of facilitating rational urban growth, obtaining that passage would be no easier than obtaining passage of the special law currently necessary to achieve any kind of annexation. Because annexation thus unavoidably involves a major legislative battle, its usefulness as an alternative solution to new community boundary problems is not great.

Consolidation

The fifth alternative, consolidation, is closely related to annexation and, consequently, presents similar legal problems. Its political problems are not only similar but more severe.

Simply defined, consolidation "occurs when two or more municipal corporations or units of local government are abolished and, in the same process, a new municipal corporation is created."¹⁵¹ As a planning matter, consolidation is more advantageous than annexation for new community development: it creates an effective compulsory metropolitan governmental unit, it reduces the coordination problems inherent in a multigovernmental unit set-up, and it provides certain economics of scale in administration.¹⁵²

Unfortunately, all these advantages are offset by the political infeasibility of consolidation. Generally, consolidation procedures begin with some form of petition in each municipality to be affected and require approval by majority vote in each such municipality. That difficulty, and the threat to local officials posed by the dissolution of the original governmental units, are usually sufficient to render consolidation impossible.¹⁵³

The practical result in Massachusetts has been the refusal of the legislature even to consider petitions for consolidation. A case in point is the 1963 attempt of two municipalities in western Massachusetts to study a possible consolidation. Not only did the legislature give little attention to the bill, but:

[T]he main opposition to the measure came from cities and towns in the Greater Boston Metropolitan Area who believed that the success of a measure of this kind might provide a precedent for the merging of communities in their area.¹⁵⁴

Detachment and separate incorporation

Given the practical ineffectiveness of the consolidation approach, the final alternative for adjusting boundaries to accommodate a new community is the detachment of the new community site and its incorporation as an independent municipality. Like annexation or consolidation, this procedure is possible, unless otherwise constitutionally impermissible, by special law under section 8(4) of the

¹⁵¹ Adjusting Municipal Boundaries, *supra* note 149, at 57.

¹⁵² ACIR: Alternative Approaches, *supra* note 169, at 65.

¹⁵³ *Ibid.*

¹⁵⁴ Adjusting Municipal Boundaries, *supra* note 149 at 177.

home rule amendment. Consequently, its relative worth as a boundary adjustment technique may be determined by comparing its planning advantages and political feasibility with those of annexation and consolidation.

As a planning matter, and apart from constitutional restriction, detachment would assure a developer greater control over the development of his project, and thus make the investment more attractive to him. For example, independence of the new community would allow the developer to experiment more freely with new designs and technology and to create a more unified plan. Moreover independence would allow parallel experimentation in governmental administration, and it would permit more representational citizen participation in defining the needs of the entire community.¹⁵⁵ All these factors are extremely important in motivating the actual undertaking of a new community development.

The negative planning factors, on the other hand, are broadly economic and, although vital, would not necessarily discourage a developer from undertaking the new community project. These factors include losses of economies of scale in the smaller area; difficulties in providing basic services *de novo* without the assistance of existing municipal facilities; the complexities of instituting an entirely new functional government bureaucracy; and the questionable wisdom of introducing another independent governmental unit in an area that is likely to require some form of metropolitan governance one day.

The political feasibility of separate incorporation is not much more certain than that of consolidation or annexation, although the novelty of the idea and the variations it presents from the usual causes for opposition suggest a greater feasibility. For one thing, assuming some sort of equal overlap, neither existing municipality will stand to lose territory to the advantage of its contiguous neighbor; neither will be compelled to accept the financial obligations of its neighbor; neither will profit from an increased tax base at the expense of its neighbor; and neither will be compelled to be the sole provider of basic and costly municipal services. Although both municipalities will lose territory and potential economic growth, because the loss will be equal and shared it may not arouse the same antagonisms created if one were to lose to the advantage or the other. Furthermore, the creation of a wholly separate unit of government, rather than threaten the job security of some elected officials and municipal employees, most likely would increase the number of available positions and avoid the dilution of power in those already existing.

CONCLUSION

In drafting the proposed statute, all of these alternative approaches to deal with "home rule" problems were considered at length. After evaluating these various costs and benefits, the development district

¹⁵⁵ This advantage assumes, of course, that the real constituency of the new community consists of those who reside within its corporate limits. Because the new community legislation has been passed to alleviate statewide urban problems, the real constituency of the new community may be the people living in the nearby central city. Mullarkey, "The Evolution of a New Community: Problems of Government," 6 *Harv. J. Legis.* 462, 475 (1969) (hereinafter cited as Mullarkey). Although this argument is persuasive, it does not deny the desirability of insuring for those already living in the new community some real role in its governance.

concept began to emerge as the one strategy which best accommodated the political and legal problems posed by home rule considerations. To get a clearer picture of how the development district will accomplish these tasks we now turn to the statute which spells out the interrelationships anticipated between public development and local government.

(EDITOR'S NOTE.—Mr. Browning thoroughly develops and presents the statute in his paper.)

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PART II.—RECREATION LAND USE ISSUES

A growing population and growing personal disposable income have created and will continue to create increased pressure on our land resources for recreation.

In many cases demand for various forms of residential, industrial, and commercial development is converging on the same lands needed for recreation. There is a strong rationale for insuring that lands for public recreation uses will remain available. The need for an effective recreational land-use policy has long been apparent.

The papers within deal with two aspects of these problems.

The first deals with the shortage of shoreline recreational lands and the second deals with various user pricing policies.

A. THE CRISIS IN SHORELINE RECREATION LANDS

(by Dennis W. Ducsik, MIT)

ABSTRACT

Our Nation today faces a crisis in shoreline recreation. It has come about because a mushrooming demand for the unique and relatively scarce resources of the coastal zone has far outstripped the available supply. We have allowed a pattern of economic growth and development in the coastal zone to continue unchecked for the past 300 years, so that now we find that only a small percentage of the entire shoreline is in public hands for recreation. The problems of pollution and erosion have combined with the increasing tendency of private owners to restrict public access so that the supply of available shoreline, limited to begin with, is shrinking steadily. Yet the demands are increasing at a breakneck pace. The multiplicative effects of increasing population, income, leisure time, and mobility are expected to bring about a tripling in the demand for outdoor recreation by the turn of the century. Yet the facilities are saturated today with hordes of users, while there is little or no room for expansion within the existing economic and political environment.

This serious problem has materialized because of the serious deficiencies in our present allocative mechanisms of the private market and local political decisionmaking. Analysis has shown how these mechanisms fail to provide an efficient allocation of certain valuable resources in particular circumstances. These circumstances include (1) the inability of the price system to determine and articulate the true costs and benefits to society associated with a particular good and (2) the tendency of local political bodies to make decisions based on effects that are net benefits to the local community but not to the regional society.

A new framework for coastal zone management is proposed that places the prime responsibility for shoreline regulation in the hands

of the States. At the same time, it must be recognized that a strong Federal involvement is necessary to (1) coordinate the efforts of individual States and resolve conflicts that arise due to interstate secondary benefits and (2) establish uniform objectives and guidelines to assist the States in the problem of how decisions are to be made in the absence of the private market discipline.

I. INTRODUCTION

Over the last 300 years, the American shoreline has been considered a limitless resource, much the same as our air and water masses, to be used freely by man for the growth and progress of his society. Since the times of the early colonists, the coastal areas have been the gateways to this Nation. The first settlements that grew up around the natural harbors of the coastal zone have since developed into thriving centers of population and industry and as seaports that are focal points for the transportation and commerce of our growing Nation. Throughout this historical period of population growth and industrial expansion, the coastal zone has been recognized as an attractive place to live and work, a convenient transportation corridor linking the coastal cities, and as an ideal source of recreational opportunity. Since the capacity of coastal resources to support these multiple endeavors has always been viewed as relatively limitless, "the laws regulating man's activities in this zone were historically intended to protect and serve individual and group interests in dealing with each other"¹ within the context of the economic system of free enterprise in the private marketplace. Under this system, the shoreline "has largely been left for acquisition and exploitation by whatever public or private agencies desired to undertake its ownership, control, and management."² Since there always seemed to be plenty of shoreline open for a wide variety of recreational pursuits and no indications of serious damage to the ecological systems in the estuarine zones, there was no perceived need for public interference in the allocative workings of the private market. The result is that today, approximately 91 percent of this limited, unique natural resource is under private control, another 3 percent is restricted for military uses, leaving only 6 percent of the shoreline in public ownership. Thus, the coastline, as a public commodity, has become one of the most scarce of all our valuable natural assets and the shortest in supply relative to the heavy demand from competing uses.

Under normal market conditions, the prices associated with coastal real estate would adjust in such a situation so that the use deriving the greatest benefit (as measured in ability and willingness to pay) from coastal ownership would be able to secure control. This is indeed happening to a certain extent as the cost of acquiring shoreline property has become astronomical in recent years. It has become increasingly clear, however, that the price mechanism of the private market has failed to represent certain important societal values in its allocation of coastal resources and is unable to provide for the proper expression of

¹ U.S. Department of the Interior, Federal Water Pollution Control Administration, "The National Estuarine Pollution Study," vol. I, pt. II, p. 27, Nov. 3, 1969.

² The George Washington University, "Shoreline Recreation Resources of the United States," Study Report No. 4 to the Outdoor Recreation Resources Review Commission (ORRRC) of the Bureau of Outdoor Recreation, Department of the Interior, p. 10. (1962)

those values in a competitive marketplace. The two most often misrepresented values, the first of which is the topic of discussion in this article, are those associated with (1) the provision of adequate facilities for outdoor recreation in the coastal zone, and (2) the protection and preservation of the unique ecological systems that abound in the marine environment. Although both of these are immeasurably important and intricately related to the life and livelihood of every person in modern society, the coastal areas of this Nation have been sorely neglected as a public resource, while the need for careful allocation of this irreplaceable asset has gone unattended.

For generations there was little or no awareness of the dangers to future society "as long as the ability of the natural environment to absorb the effects of the socioeconomic environment seemed unlimited, and the problems of pollution and environmental damage were isolated."³ Only recently has it become apparent that "the laws protecting man from himself must be extended to protect the natural environment from man."⁴ We have begun to recognize the need of human society for the resources of the coastal zone and its value to civilization both as an essential part of its ecosystem and as an exploitable asset to be carefully allocated among competing uses. Of all these competing uses, the two that are most often misrepresented, recreation and ecology, may ultimately turn out to be the most important to the long-term health and well-being of man in our modern society! Although man is now the dominant species on earth, his very survival depends on the intricately complex ecological balance among all plants and animals within their respective environments; and the well-being of each individual depends upon the maintenance (with the help of recreation) of his internal psychological balance and the external balance that exists in his interactions with the outside world.

All this points to the inherent nature of the allocation of our scarce, valuable shoreline resources as an important issue in land-use management. It is the purpose of this article,⁵ to set forth the important economic, political, and sociological aspects of coastal land use for outdoor recreation, with a focus on the New England shoreline. The goal is to derive some insight into the nature of effective land-use policies that might be used to govern the allocation of shoreline resources in a manner most consistent with the goals and values of American society.

II. THE STATUS OF SHORELINE RESOURCES

Our Nation faces a crisis in shoreline recreation, right now, today. In straightforward terms, it has come about because a mushrooming demand for this unique and relatively scarce resource has far outstripped the effective supply. The problems are particularly acute in the crowded Northeast, of which the New England region is a part. Anyone who has been delayed for hours on a hot day in bumper-to-bumper traffic to Cape Cod beaches, or who has experienced the mobs of people at the Revere and Lynn shores, or who has not been

³ Ibid., reference 1; vol. I, pt. I, p. 4.

⁴ Ibid., reference 1.

⁵ D. W. Duesik, editor, Project NECAP, reporting the results of an interdisciplinary graduate course at MIT investigating selected issues of long-term significance to the well-being of the New England region, including electric power production, shoreline recreation, air and water pollution, and political reorganization (to be published by the MIT Press).

able to get to the coast at all because the beach is closed due to pollution or filled-to-capacity parking facilities, will attest to the immediacy of this critical shortage of available, accessible shoreline recreation areas.

All indications are that, unless immediate action is taken, these problems will get much, much worse. The demand for outdoor recreation, especially at the shore, has increased significantly in the last 10 years. The trends toward more leisure time, more real income, and greater mobility enable larger proportions of our growing population to seek and enjoy recreation activity of all types each year. The effects of these trends on outdoor recreation are evidenced in part by the rapid growth of companies making equipment for use in outdoor activities, and in the large increases in service facilities (such as campgrounds) that support the recreationalist in his varied pursuits. This gives us an indication of what to expect in the future: "more people taking more vacations, learning more about vacations and recreation, developing a wider range of skills and making more demands on every kind of recreation area, and rearing a generation of outdoor-minded children who will have even more skills and make even more demands."⁶

The critical nature of this situation is aptly described by Bayard Webster, of the New York Times:⁷

The shoreline of the United States has been so built up, industrialized and polluted during the last decade that there are relatively few beaches left for the family in search of a free, solitary hour by the sea.

From Maine to Florida and on around to Texas, from southern California up to Washington State, the Nation's seashores have become cluttered with hotels, motels, sprawling developments, military complexes, and industries of every kind.

Miles of tranquil beaches where hundreds of seaside retreats were once open to everyone for swimming or fishing have been fouled by oil spills, industrial effluents, farm pesticides, and city sewage.

What remains—shoreland that is not dirty, crowded, or closed to the public—amounts to a tiny fraction of the country's total coastal zone, about 1,200 miles or 5 percent of the shore areas considered suitable for recreation or human habitation.

The prospect of continuing encroachment, together with the intensified natural erosion often caused by heedless development (even in normal weather, winds, and waves can eat away or shift up to 20 feet of beach a year), has alarmed many marine biologists and conservationists.

Although . . . conservationists have been encouraged by indications that some States and bureaus of the Federal Government are becoming interested in protecting the Nation's coastline as a separate national resource, they fear that it may already be too late to reverse the trend.

Close to the heart of the problem are two factors largely beyond the control of Governmental authorities. One is the sharp increase in recent years in the Nation's population. The other is the rush to the large coastal cities by millions of people from inland rural areas.

The result is that popular demand for open recreational space near the water is rising just as private and industrial developers are fencing off the best of it—if not the last of it in any given area—and land prices are spiraling far beyond the means of most urban dwellers.

In this article, Mr. Webster has struck at the heart of the issue from all its crucial aspects. First, the dwindling supply of shoreline recreational areas has been caused in part by the acquisition of coastal acreage for use by large industrial and commercial complexes. Our

⁶ Margaret Mead et al., "Trends in American Living and Outdoor Recreation," ORRRC Study Report No. 22, p. 22 (1962).

⁷ Bayard Webster, "Few Seaside Beaches Left Open to Public in Developers' Rush," New York Times, p. 54, Mar. 29, 1970.

historical emphasis on economic growth and industrial expansion has allowed this to happen without the full realization of the extent to which such uses exclude all others. As a result, 40 percent of all the manufacturing plants in the United States today are located within the borders of the coastal counties. This is clear evidence of the consequences of nonexistent land use planning. The use of coastal acreage for industrial or commercial purposes should be restricted to those enterprises with a demonstrated need for ocean accessibility. For example, some industries (tanker-oriented oil companies and chemical plants) require multifathom harbors, while others (paper, primary metals, power generation) require substantial water supplies in the course of normal operations. Yet use of coastal land for these uses alone has resulted in the loss of many miles of scenic shoreline. In California, for example, power companies have occupied large stretches of the coast for the siting of power generating facilities. Even for industries such as this, ways should be sought out to satisfy the operational requirements for water while minimizing the usurpation of coastal land for this purpose (see accompanying article, ref. 57).

Second, the expanding and coastward-shifting population has placed fantastic pressures on the shoreline for private development. This trend is accelerated by continuing increases in disposable income, leisure, and mobility. The demand for vacation homes and resort communities by the sea have sent land values skyrocketing. In South Carolina, the price of a front foot of shoreline is \$1,600, while in Massachusetts the price of an acre of shoreland has increased by a factor of five since 1965 to \$50,000. Even the relatively wild areas of North Carolina and Maine, far removed from population centers and lacking in good transportation facilities, are now in the hands of speculators who are assured a fantastic profit in the not too distant future. They are well aware of how the craving for vacation space by the ocean "has led to the development in such places as Virginia Beach, Va., and Ocean City, Md., of coastal sections in which houses, motels, and hotels are built as close as 6 feet apart for many miles along the beach."⁸

A third major factor contributing to the decrease in available shoreline areas for recreation is pollution, which has destroyed countless fish and shellfish areas and fouled beaches in and around every major coastal city. In Boston Harbor, many islands would offer excellent opportunities for a variety of water-related activities were it not for the poor water quality, due in part to high bacteria counts resulting from municipal sewage dumping and storm sewer overflow. Oil spills, pesticides, and industrial effluents have also taken their toll of valuable shoreline resources. The case of the death of Lake Erie is probably the most celebrated example of this serious problem.

A final element contributing to the decreasing supply of coastal land is shore erosion, which is often accelerated by improper land use that stems from a lack of knowledge of the dynamics of beach areas. A recent article entitled "America's Shoreline is Shrinking"⁹ points, out the seriousness of this problem:

From Cape Cod to California, America's ocean shoreline is being cut and furrowed by erosion. Much of this is the result of the ceaseless action of waves and

⁸ Ibid.

⁹ John Bunker, "America's Shoreline is Shrinking," *Boston Herald Traveler*, p. 23, Oct. 18, 1970.

wind, a combination of forces as old as the sea itself * * * (an example is) the dramatic case of Cape May, N.J., a famous resort area which has lost a fourth of its land area to the combined action of wind and wave during the last 30 years or so.

The State of Maryland loses about 300 acres of valuable land every year along the shores of Chesapeake Bay * * * Sections of shoreline at Point Hueneme, Calif., * * * have receded as much as 700 feet in 10 years.

The article goes on to point out how the natural forces of erosion are greatly abetted by the actions of man. Joseph B. Browder, a southern field representative for the Audubon Society, has cited erosion in Miami Beach "caused by hotels built almost right in the surf, housing projects built on thousands of once-wild acres of tidal marshes,"¹⁰ Ian McHarg, in his book, "Design with Nature,"¹¹ has pointed out the dangers that trampling dunegrasses, lowering the level of ground-water, and interrupting littoral sand drift pose to the stability of dune formations. He has this to say about such formations in New Jersey:

TABLE I

Shoreline location	Detailed shoreline (statute miles)	Recreation shoreline (statute miles)	Public recreation (statute miles)	Restricted stretches (statute miles)
Atlantic Ocean.....	28,377	9,961	336	263
Gulf of Mexico.....	17,437	4,319	121	134
Pacific Ocean.....	7,863	3,175	296	127
Great Lakes.....	5,480	4,269	456	57
Total.....	59,157	21,724	1,209	581

Note: Mileage of detailed shoreline, recreation shoreline, public recreation shoreline, and restricted shoreline by major coastlines as measured using Coast and Geodetic Survey methods and meeting criteria defined in text.

Source: ORRRC Study Report No. 4, "Shoreline Recreation Resources of the United States" p. 11 1962 (reference 12).

The knowledge that the New Jersey Shore is not a certain land mass as is the Piedmont or Coastal Plain is of some importance. It is continually involved in a contest with the sea; its shape is dynamic. Its relative stability is dependent upon the anchoring vegetation. * * * If you would have the dunes protect you, and the dunes are stabilized by grasses, and these cannot tolerate man, then survival and the public interest is well served by protecting the grasses. But in New Jersey they are totally unprotected. Indeed, nowhere along our entire eastern seaboard are they even recognized as valuable. * * * Sadly, in New Jersey no * * * planning principles have been developed. While all the principles are familiar to botanists and ecologists, this has no effect whatsoever upon the form of development. Houses are built upon dunes, grasses destroyed, dunes breached for beach access and housing; ground water is withdrawn with little control, areas are paved, bayshore is filled and urbanized. Ignorance is compounded with anarchy and greed to make the raddled face of the Jersey shore.

A summary of the tidal shoreline of the United States as reported by the U.S. Coast and Geodetic Survey (excluding Alaska and Hawaii) is given in Table I. The shoreline is one of our most popular resources for outdoor recreation and in heavy demand; yet, as the table shows, it is most scarce in terms of public ownership for recreation. The 48 contiguous States have nearly 60,000 miles of shoreline, of which about one-third is considered suitable for recreational activities. This possible recreation shoreline includes beach, bluff, and marsh areas that must meet the following criteria:¹² (1) the existence of a marine climate and environment; (2) the existence of an expanse of view of at least 5 miles over water to the horizon from somewhere on the shore; (3) location on some water boundary of the United States.

¹⁰ Ibid., reference 7.

¹¹ Ian McHarg, "Design with Nature," The Natural History Press, Garden City, N.Y. (1969).

¹² Ibid., reference 2; p. 11.

The figures presented in the table indicate that less than two percent of the total shoreline is in public ownership for recreation, while only about 5.5 percent of the recreational shoreline is in public hands. On the entire Atlantic coast, only 336 miles of shoreline are publicly owned for recreation, a mere 3 percent of the total recreational shoreline. Yet, this coast contains the population concentration of the sprawling Northeast megalopolis and Florida. It is here, near the metropolitan areas, that the demands are the greatest, yet the available absolute supply is small. Nationally, the coastal areas contain about 15 percent of the total land area, "but within this area is concentrated 33 percent of the Nation's population, with about four-fifths of it living in primarily urban areas which form about 10 percent of the total estuarine zone. The estuarine zone then is nearly twice as densely populated as the rest of the country."¹³ Understandably, the disappearance of natural beaches and other shoreline recreational resources is most evident near these most populous areas. "From Massachusetts to North Carolina, in Florida, in California near Los Angeles and San Francisco, and along the gulf coast, a sprawling confusion of buildings crowd the shore."¹⁴ When the added effects of pollution (most severe in metropolitan areas) and erosion on existing supply are taken into account, the situation becomes even more critical. In the densely settled north Atlantic and middle Atlantic regions, there are 5,912 miles of recreational shoreline, of which 5,654 miles are under private or restricted public control; hence, 97 percent of the shore is inaccessible to the general public! Yet, the pressures on shoreline facilities near metropolitan areas are so great that frequently the waters, even in polluted harbors, are used for recreational purposes by those who cannot afford to go elsewhere, regardless of whether the waters are safe for body contact or not. This points to still another problem, the inability of low income, less mobile groups to find suitable coastal recreational facilities anywhere but in the immediate vicinity of urban centers, where the pollution problems are most severe, and where fewer beaches are available and oftentimes inaccessible due to gross overcrowding.

The critical magnitude of the supply situation with regard to shoreline resources can best be demonstrated by considering what has been happening in the State of Maine in recent years. Maine's varied and beautiful shoreline is its greatest asset. The coastal zone includes 10 percent of the total geographical area, 36 percent of the population, and 127 local governmental units. Forty percent of the wages in Maine are generated in this zone, while 60 percent of all recreational property and seasonal residences are located there. Almost the entire coast is steep, rocky bluff with occasional small beaches of gravel or mud. In many areas, deep water occurs close up to the shore. The coast is very irregular with numerous coves, inlets, small bays, and similar areas serving as harbors or sheltered areas. The shore area is only slightly developed with only 34 miles (or 1.4 percent of the coastline) in public ownership for recreation; the primary uses over the remaining 2,578 miles are private with some commercial resort activity. The shoreline is least suitable for swimming and water sports since there are only 23 miles of beach along the entire coast. The most suitable activities are camping, hiking, boating,

¹³ *Ibid.*, reference 1; p. 28.

¹⁴ *Ibid.*, reference 7.

sailing, and sightseeing, for which the 2,520 miles of ragged, rocky bluff shore provide an ideal setting. However, these activities are severely restricted in many places due to extensive private ownership of prime coastal property.

Pollution has caused serious problems with the taking of shellfish. By 1962, 67,000 acres of tidal flats had been closed to shellfishing, which is both a source of income and enjoyment to residents and visitors alike. In the decade preceeding 1962, the total areas closed due to pollution increased by 12 percent.

By far, the most serious question facing Maine with regard to its shoreline resources is the large percentage of private ownership. In 1967, a land use symposium organized at Bowdoin College by land consultant John McKee pinpointed the issues relating to this question and outlined the successes and failures of Maine's governmental bodies in dealing with it. McKee and his colleagues emphasized the public's right of access to unique shoreline, not only to a "mudflat or a run-down beach, but to a cliff and forest and cove—precisely the places that are selling fastest today Unless Maine decides right now to control the promise of development, Maine's greatest asset will have been squandered, irresponsibly, and definitely."^{14A} Such warnings have been given repeatedly over the last decade by professional planners, newspaper writers, conservationists, and others concerned with the rapid disappearance of Maine's precious, coastal resources into private control. The most recent of these was a series of articles by Robert C. Cummings in the Portland Sunday Telegram,¹⁵ which outlined the results of a survey of real estate agents, developers town and city officials, and county courthouse records:

Maine has probably lost its chance for significant public control over its 3,000 miles of coastline. Indeed, before the end of this decade, it appears certain that people will have to begin lining up before dawn on most good summer weekends if they want a spot at a public beach.

This conclusion seems inescapable. Some waterfront State parks are already turning away visitors by noon or earlier, overall park usage is increasing at the rate of 20 percent a year and State Parks and Recreation Director Lawrence Stuart say flatly that desirable coastal property has practically disappeared.

Campers frequently have to wait in line all night for a campsite to become available at Acadia National Park. Persons who just want to go to the beach for an afternoon will soon face "Sorry, we are filled up" problems.

Dalton Kirk, supervisor of the park district that ranges from Eagle Island off Harpswell to Pemaquid, notes that admissions to Reid State Park at Georgetown are up 20 percent, despite the opening of a new park across the Kennebec River at Popham Beach.

Kirk says that already in his region the State parks provide the only opportunity for most people to get to the beach. But Reid State Park twice this season has been forced to turn away beachgoers when the nearly 900 parking spaces were filled to capacity.

And at Popham, cars are turned away almost every good Sunday afternoon by 1 o'clock * * *

The State has purchased another 25 acres of mostly beach front this summer at Popham, and Kirk believes the facilities there can be doubled eventually. But this adds only 25 percent to the region's park capacity and the number of visitors is growing at twice this rate. Kirk sees no possibilities of further expanding Reid State Park without destroying the naturalness of the area.

"We need to get any beach frontage that is left in Maine," Kirk says. But if and when the State decides to buy, it may find little property for sale.

^{14A} Robert C. Cummings, "The Late Great State of Maine," Portland Sunday Telegram, Aug. 30, 1970.

¹⁵ Ibid., reference 14A; also, "Where Went the Maine Coast," Aug. 16, 1970, and "Maine for Sale: Everybody's Buying," Aug. 23, 1970, Portland Sunday Telegram.

While pessimistic about the future status of the coast for public use, the series stresses the importance of recognizing the critical nature of the problem in order to avoid the same mistakes with inland lake and mountain areas, already under heavy pressures of speculation and development.

While Maine debates the pros and cons of oil refineries, sulfur reduction plants and aluminum processing, a quiet revolution in landownership continues which promises to bar all but the most affluent from our 3,000 miles of ocean frontage.

* * * development has already progressed to the point where, regardless of what the State does, there is unlikely to be enough suitable ocean frontage to serve Maine and its ever-increasing hordes of summer visitors.

Our survey reveals that Maine's coast has been sold, and that the buyers are largely from out-of-State. Big blocks remain in the hands of speculators and developers, and while plans are being made, Maine citizens are wandering at will as before, fishing the rocks, harvesting the crops of wild berries and enjoying secret picnic spots.

But the pattern has been set. Wildland that in some cases was sold for unpaid taxes as recently as a decade and a half ago is about to become sites for luxury vacation and retirement homes with shore frontage selling for up to \$100 a foot—or \$20,000 for a 200-foot lot.

Much of the coastal zone is in out-of-State ownership, which averages 45 percent in the area but reaches 75 percent in many communities. Many real estate brokers reported that 80 percent or more of their business had been with out of staters. This boom is related to all the factors previously mentioned: increasing populations, growing prosperity, and better transportation such as the Maine turnpike and highway system that makes half the State's coastline no more than a 3-hour trip from Boston. These factors, combined with the desire to get away from the hectic metropolitan atmosphere of noise and pollution, have led to the unprecedented demands currently placed on Maine's coastal real estate. As a consequence, "Maine residents, the greatest number of whom find the stakes too rich for their income, have found themselves shut off from the sea and the wilderness by out-of-State buyers who put up a sign before they put up a house."^{15A}

The critical status of shoreline resources as discussed in the preceding sections points to an immediate, urgent need to protect all the shoreline resources still available, and to look for ways to reverse the trends of decreasing supply. "The welfare of American society now demands that manmade laws be extended to regulate the impact of man on the biophysical environment so that the natural estuarine zone can be preserved, developed, and used for the continuing benefit of the citizens of the United States."¹⁶ We might ask why this has not been done in the past. The answer lies partly in the attitudes within our institutional environment taken toward the coastal zone. Until recently, most States and communities were not cognizant of the coastal zone as an environment separate from other regions of the State and in need of special attention. In addition, there has been a lack of cooperation and coordination among local, State, and Federal agencies, and private industries, especially where conflicts of interest (economic or political) existed. Hence, most planning for the use of the coastal zone has been done by bits and pieces, in small increments, and by reacting to crises when they materialized (and usually too late for constructive action to be taken). Prior to World War II, what planning that was done on a national scale had objectives that "were

^{15A} Pat Sherlock, "The Best of Maine Lost to the Rest of Maine," Boston Sunday Globe, Sept. 20, 1970.

¹⁶ Ibid., reference 1, p. 1.

largely resource-protection oriented, and the facility development which took place during the 1930's was directed far more at providing employment than meeting, in a planned fashion, identified outdoor recreation needs." ¹⁷ Such thinking was in evidence when the national park and forest systems were established in western areas of light population, far removed from the recreational needs of urban centers. It seems ironic that planners would recognize the need to preserve vast expanses of untouched wilderness in the remote corners of the Nation while ignoring the necessity of protecting the relatively limited coastal resources in the heart of the country's most rapidly expanding regions. Not until more recent times have investigations by the National Park Service, the U.S. Forest Service, and the Outdoor Recreation Resources Review Commission brought to light the need for a broader concern for all the issues related to satisfying the needs and the demands for all forms of outdoor recreation by present and future generations. These studies for the first time demonstrated the basic causal factors in outdoor recreation demand. In effect, they found that "adequate planning for outdoor recreation required larger concerns than the biophysical environment—that the economic environment—expressing the preference of society for goods and services—and the institutional environment—decisions about the focus and characteristics of agencies charged with the protection of resources and the provision of outdoor recreation facilities—were equally important." ¹⁸

It is in this context that we have identified the area of shoreline recreation to be in critical need of effective planning and active land-use management. We have examined the sociology behind society's need for outdoor recreation, the economics of shoreline supply and demand, and the institutional aspect of coastal zone management, all in recognition of the limited tolerance of this finite and valuable resource to the rude invasion of man, and all in the hope that society will perceive the problems clearly and proceed to do something about them. The results of this analysis are outlined in the next sections of this article.

Summary and overview

The purpose of this section has been to provide a general picture of the national supply of recreational shoreline. While a detailed inventory was not included, it is possible to draw some general conclusions by looking at the overall situation.

The first statement we can make is that the shoreline of New England in particular and the United States in general has been sold. Shore property is highly desirable for recreational use and as long as it is available there will be people to buy it, regardless of the cost. In every State the patterns of private ownership and development are similar: 97.2 percent in Massachusetts with high development; 94.4 percent in Connecticut with high development; 90.4 percent in Rhode Island with high development; 88 percent in New Hampshire with very high development; and 98.7 percent in Maine with initially low but more recently a mushrooming development rate. Only in the northernmost parts of Maine are there relatively large blocks of shoreline that remain undeveloped, and even these are presently in the hands of

¹⁷ *Ibid.*, reference 1, vol. II, pt. IV, p. 321.

¹⁸ *Ibid.*, reference 1; vol. II, pt. IV, p. 322.

speculators and developers. This is compounded by the fact that it is almost universally the case that competing uses frequently preclude use of the shoreline for recreation.

Recreation and commerce, recreation and housing, recreation and industry, recreation and transportation * * * in most cases cannot be carried on in the same place. The practical and esthetic requirements of clean water, adequate land area, safety and pleasant surroundings, and necessary recreation developments can rarely be assured in conjunction with commerce, industry, housing, and transportation.¹⁹

For years many shore owners have permitted public access and use of the beach and bluff areas in their possession. However, as the numbers seeking recreational pursuits in these areas increase each year, many States are finding that their private owners are now limiting such activity to maintain their own privacy. Hence, as the demands increase, this one part of the accessible supply is actually decreasing. The situation is typified in the words of Pat Sherlock of the Associated Press in an article entitled "The Best of Maine Lost to the Rest of Maine".²⁰

The mountains are still there, the Atlantic Ocean still crashes its surf onto the rocks as it has done since the ice age and there is still some wilderness. It's just a little farther away now—on the other side of the fence.

A second major point to be noted is the present saturation of most publicly owned facilities. On the Connecticut shore, where the recreation facilities are under strong demand pressures from the dense New York-Connecticut metropolitan area, local communities find it necessary to institute user fees, parking charges, and other discriminatory devices to preserve for the local residents what small amounts of shore are left open to the public. The situation is much the same near other population centers in New England. Beaches on Narraganset Bay, Cape Cod, and in the Boston metropolitan region are jammed almost every weekend in the summer, while the beaches farther north become more crowded each year as New Englanders search for new, less crowded, accessible recreational areas. This trend is evidenced by the marked increase in traffic patterns this past summer leading from Boston to the southern parts of New Hampshire and Maine.

The third and final major issue in shoreline supply is the influence of pollution and erosion, often caused by heedless development in ecologically delicate areas. Pollution, usually most severe where people are concentrated in large numbers, has closed many city beaches and threatens numerous others. Erosion, too, has closed or destroyed beaches and presents a continuous threat in places like Connecticut and New Hampshire, where available beaches are scarce to begin with.

So this is the overall picture of shoreline supply: Most of the land is privately owned and developed and is becoming more restricted to public access as the demands grow larger; and what is left in public lands for recreation is either saturated by hordes of users or unavailable for use due to pollution or erosion, especially near large cities. All this is to say nothing of the future. While the demands grow at a breakneck pace, the supply, limited to begin with, is shrinking steadily. How can we expect to satisfy the demands of the future when we are having trouble supplying that which is needed today? And all this with practically no shoreline left to do anything with! In the next

¹⁹ Ibid., reference 2, p. 7.

²⁰ Ibid., reference 15A.

section we develop the rationale for national concern for the problems of shoreline recreation while providing a basis for an analysis in section IV of how the present situation has come about.

III. THE NEED AND THE DEMAND FOR OUTDOOR RECREATION

Since the earliest days of planning for outdoor recreation great emphasis has been laid on the value of outdoor recreation in helping cure the ills of society. Many advocates of outdoor recreation described parks, playgrounds, beaches, and other opportunities for recreational activity as "veritable cure-alls which would isolate young people from and immunize them against the delinquency, alcoholism, prostitution, and crime that abounded in the slums."²¹ In later years, the emphasis shifted to the value of outdoor recreation in counteracting the harmful effects of the stress and tensions of life in an urban-industrial society. Recreation generally came to be viewed as a major solution to the problems of mental illness that were attributed to such tensions.

Herbert Gans, the noted sociologist, has taken issue²² with this orientation towards a causal link between recreation and mental health:

. . . [These attitudes were] developed by a culturally narrow reform group which was reacting to a deplorable physical and social environment and rejected the coming of the urban-industrial society. As a result, it glorified the simple rural life and hoped to use outdoor recreation as a means of maintaining at least some vestige of a traditional society and culture. Given these conditions and motivations, no one saw fit to investigate the relationship between outdoor recreation and mental health empirically.

How then can we go about determining what relationship, if any, exists between recreation and mental health, or, in broader terms, the general health and well-being of man in modern society? Most psychologists and sociologists would concur that the human predicament can best be described as the task of maintaining a balance, both internally and externally, between man's often conflicting existence as an *organism* and as a personality. This predicament has been described by Lawrence K. Frank:²³

A crucial problem for mental health is how an individual can resolve this conflict without incurring high costs psychologically and persistent damage to his personality, and what sources he can rely upon for strength and renewal in facing his life tasks.

In the spirit, Herbert Gans has described mental health as "the ability of an individual or an occupier of social roles and as a personality to move toward the achievement of his vision of the good life and the good society . . . mental health is a social rather than an individual concept, because if society frustrates the movement toward the good life, the mental health of those involved may be affected."²⁴ There are considerable present-day indications that society does tend in many ways to frustrate an individual's movement toward the good life, and that it is increasingly difficult to maintain the balance necessary for well-being as described above. The characteristics and intensity of the emotional stresses and strains of modern life have

²¹ Herbert Gans, "People and Plans", Basic Books, Inc. New York (1968) p. 109.

²² Ibid., p. 109.

²³ Lawrence K. Frank, et al., "Trends in American Living and Outdoor Recreation," ORRRC Study Report No. 22, p. 218 (1962).

²⁴ Ibid., reference 21; p. 112.

been stated (and sometimes overstated) by many writers. These "sensory overloads" have particularly severe effects on the low-income, less mobile groups that now dominate the central cities. Here the sensory overload is compounded by extreme crowding and oppressive living conditions, by widespread nutritional inadequacies, and by the frustrations of unemployment, drug addiction, and high crime rates. Today most Americans, when given the opportunity to diminish this overload through a change of routine, "will spend a summer afternoon in a suburban backyard around a barbecue, in a city park, or at the nearest swimming pool or beach. Given the chance and the means for a weekend or a vacation away from home, they will take to the country, the mountains, or the seashore."²⁵

Having established that health can best be understood as a product of the interaction between an individual and the total physical and social environment that he experiences, and recognizing some of the impediments to the maintenance of a healthy sociological balance in this interaction with present-day society, we must now ask: what part can outdoor recreation play in helping the individual maintain this balance so vital to his mental health and physical well-being? While there are obvious positive benefits to be derived from outdoor recreational activity by many persons, it should not be pointed to as a panacea for the many ills of society. Herbert Gans has presented²⁶ the most incisive approach to the issue:

I am saying that *leisure and recreation are a consistent part of mental health*, but they cannot by themselves bring about mental health, cure mental illness, or prevent it * * * they are essential and desirable, but they are not so important as economic opportunity and security, positive family life, education, the availability of a variety of primary and secondary group support, and the like * * * [however] the recognition of the limited significance of outdoor recreation in the treatment of personality disorders should not blind us to the potential significance of it for developing and sustaining healthy personalities. Indeed, we may find that recreation, especially outdoor recreation, *provides one of the most promising approaches to the elusive goal of mental health as a form of "primary prevention" of mental ill health.*

We have concluded that the arguments for the psychological and emotional *need* for outdoor recreation may have been overstated. Each individual takes a different view of recreation depending on his preference and personality, is conditioned by his physical and economic environment, and is influenced by his age and sex. From this we can see that the collection of more extensive data on leisure behavior is immensely important. "If we can discover what needs and aspirations people are trying to fulfill and can recognize what may be blocking or frustrating their quest, we can understand better what provisions to make for future recreation. Also, we may find some clues to the meaning of outdoor recreation for the individual personality and its significance for mental health."²⁷

How then are we to plan for outdoor recreation? It is clear now outdoor recreation presents a wide variety of sociological questions of long-term policy and many subtle problems not easy to define or resolve. Yet it seems undeniable that recreational activity has great social significance and personal value for millions of American

²⁵ Melvin M. Webber, et al., "Trends in American Living and Outdoor Recreation," ORRRC Study Report No. 22, p. 249 (1962).

²⁶ Ibid., reference 21; p. 112.

²⁷ Ibid., reference 23; p. 220.

citizens. While the empirical evidence is relatively sparse in support of the case for the psychological and emotional need for outdoor recreation, it is clear that the *demand* for this type of activity is very strong and is rapidly increasing. This suggests that the best way to plan for recreation is to adopt a *user-oriented* approach that will provide the recreational facilities that are presently used and preferred by those seeking satisfying leisure behavior. Having recognized this, we can now turn to a brief look at the patterns of recreational demands in this country during the recent past. There is unanimous consent, on the basis of these trends, that demands for outdoor recreation in the future will far surpass that which we have witnessed to date.

The demand is surging, spurred by increases in the causal factors of population, disposable income, leisure, mobility, education, and overall standard of living. The Outdoor Recreation Resources Review Commission, in a report to Congress in 1962, entitled "Outdoor Recreation for America,"²⁸ noted and documented these causal factors and their influence on recreational demands. It was the conclusion of this report that, as the levels of these factors rose, the growth of outdoor recreation demand would accelerate even faster, and in a sustained fashion, than the net increase in population. Dr. Marion Clawson,²⁹ in an article entitled "The Crisis in Outdoor Recreation," concluded that the projections of these principal factors to the year 2000 point to a *tenfold* increase in the demand for outdoor recreation from 1950 levels. A report of more recent survey information on recreation trends up until 1965 has indicated "present and anticipated increases in major summertime outdoor recreation activities far surpass predictions made by the ORRRC in 1960."³⁰ This study predicted that, by the year 2000, participation in the major forms of summertime outdoor activities will be four times greater than it was in 1960.

The patterns of demand as expressed in participation rates for the United States in 1960 (ORRRC Study Report No. 19-1962) reveal some major trends. The first major trend of note is the generally higher level of participation rates and user days in the Northeast in the most popular activities such as picnicking, driving, walking, swimming, and playing sports. In metropolitan areas of this region, more people spend more time in these activities, even though in the inner cities (where there is most need for more outdoor recreation) one finds the lowest rates of participation associated with low income and poorly-educated people living in oppressive surroundings. Outdoor recreation does not play an important role in the leisure time of these groups due to the lack of nearby facilities and the lack of money and adequate transportation to get to more distant areas. Both of these observations indicate that outdoor opportunities are most urgently needed near metropolitan areas; yet this is where available land is the scarcest. It is probable that at least 80 percent of the population will live in these urbanized areas by the turn of the century. These people will have the greatest need for outdoor recreation, and

²⁸ Department of the Interior, Bureau of Outdoor Recreation, "Outdoor Recreation for America," a report to the President and the Congress by the Outdoor Recreation Resources Review Commission, January 1962.

²⁹ Marion Clawson, "The Crisis in Outdoor Recreation," *American Forests*, March/April 1959.

³⁰ Department of the Interior, Bureau of Outdoor Recreation, "Outdoor Recreation Trends," April 1967.

their need will be the most difficult to satisfy as suburban centers have the fewest facilities (per capita) and the sharpest competition for land use.

The second major trend is the pervasive attraction of water-oriented activities:

Most people seeking outdoor recreation want water to sit by, to swim and fish in, to ski across, to dive under and to run their boats over. Swimming is now one of the most popular outdoor activities and is likely to be the most popular of all by the turn of the century. Boating and fishing are among the top 10 activities. Camping, picnicking, and hiking, also high on the list, are more attractive near water sites.³¹

Swimming, fishing, boating, canoeing, sailing and water skiing accounted for 26 percent of the total U.S. user days per person during the summer of 1960. Swimming seems to have special importance to urban dwellers since 49 percent of the metropolitan population (versus 38 percent of non-urban dwellers) participated in the activity. In the Northeast, 53 percent of the population swims. For the U.S. as a whole, 17 percent of those not participating expressed a preference for swimming. This points to an extensive need for swimming facilities to be provided close to demand centers, especially in urban areas, where coastal beaches are generally already used to capacity. The 1965 survey reported that swimming, ranked second at that time in user participation, was becoming so popular that it will be our number one outdoor recreation activity by the year 1980.

A final trend of importance to be noted here is the great demand for activity close to home. People seeking outdoor recreation do so within definite time patterns that can be classified as day outings, weekend or overnight trips, and vacations. The most frequent of these is the day outing, which can presently be considered as the fundamental unit of outdoor recreation. Most indications are that, at the present time, people will drive one way about two hours, a distance that may vary from 30 miles to as much as 90 miles, for such outstanding recreation sites as ocean beaches or scenic campgrounds. For the weekend or overnight outing, the median travel distance is about 90 to 125 miles. While many vacationers will travel many miles on week- or two-week-long vacations, by far the greatest demands are placed on the facilities serving daily and weekend outings. Hence, pressures are greatest within about 125 miles of metropolitan centers, with maximum demands at those facilities in close proximity to the central cities. "This points to the great importance of providing outdoor recreation facilities close to where people live so that individuals of all ages can go frequently, as contrasted with the occasional longer trips and annual vacation pursuits."³² Hence, today's problems "do not center on the acquisition of the unique and dramatic resources for the public, but on the broad availability of outdoor recreation for everyone and often; nearby open areas for weekend visits by moderate-income urbanites are more characteristic of our recreation needs than the annual trip to a far-away area of unforgettable beauty by the fortunate persons who can get there."³³

From this outline of the proportions and the problems of future demands for outdoor recreation, we can draw some clear implications as to the future of *shoreline* recreation. With continuing increases in

³¹ Ibid., reference 28; p. 4.

³² Ibid., reference 23; p. 224.

³³ Harvey S. Perloff and Lowdon Wingo, Jr., et al., "Trends in American Living and Outdoor Recreation," ORRRC Study Report No. 22, p. 82 (1962).

population, leisure, income, and mobility, the demands for shoreline recreation should triple before the turn of the century. Such an increase is staggering when we consider that our public coastal facilities are *already filled to capacity*, while there is no room left for expansion through acquisition and development since the remainder of the shoreline has already been sold! Each summer we feel the pinch of this disproportionate situation of shoreline supply and demand as hordes of recreationists crowd the beaches, especially near the cities, along the entire perimeter of the nation.

The preceding discussions on the great social significance of outdoor recreation and the fantastic demands that we now see for shoreline activities point to the unique and intrinsic value of our coastal zone as a recreational resource. This value has been pointed out by the ORRRC:

Of the many outdoor recreation "environments," mountains, seacoasts, deserts, and woodlands, the shoreline appears to have an unusually strong appeal for Americans.³⁴

This is true because of the wide variety of easy, active forms of recreational activity that the shoreline affords. This wide variety includes swimming, skindiving, beachcombing, motor boating, sailing, canoeing, waterskiing, and fishing. Many activities, such as picnicking, camping, sunbathing, and walking are greatly enhanced by proximity to the ocean. Beach shoreline, in most cases, offers the cheapest and most enjoyable recreation uses for large numbers of people.

Going into the surf is fun whether one swims or not. It is not necessary to be a mountain climber to take walks along the beach, and beachcombing is an activity that appeals to everyone from toddler to octogenarian . . . here, land, and water are easily accessible; the violence of breaking surfs and the warm safety of relaxing sands are but a step apart; the stimulation of the foreign environment of the water and the relaxation of sunbathing are nowhere else so easy of choice. Physical sport and mental relaxation are equally available.³⁵

An additional use of coastal areas, and probably the most widespread, is for esthetic enjoyment, especially along bluff shoreline.

Tourists from the interior states are always eager to view such sights as ships coming under the Golden Gate Bridge into San Francisco Bay, the lovely solitude of Fort Sumter as it rests seemingly impregnable in Charleston Harbor, and the parade of ships in and out of New York Harbor. Attractive scenic vistas are not for the tourists alone, but hold a certain magnetism for residents of the coastal cities as well. One has only to scan the real estate advertisements to realize the premium value on waterfront or waterview lots.³⁶

All these values of the shoreline are magnified by its accessibility to large populations. "This unique combination of available resources in close proximity to large population centers offers an unparalleled recreational opportunity for many people who could not afford to travel far from their homes,"³⁷ and as such is an invaluable asset of this nation.

The coastline has great value in another important sense. Although man is a social being, performing social activities such as recreation, he is also a biological organism, "one species among many who depend upon each other and upon the natural environment for their organic needs . . . his very survival depends upon the intricately complex,

³⁴ Ibid., reference 2; p. 3.

³⁵ Ibid., reference 2; p. 4.

³⁶ Ibid., reference 1; vol. II, pt. IV, p. 116.

³⁷ Ibid., reference 1; vol. I, pt. II, p. 32.

ecological balance among all plants and animals within their respective geologic and climatic environments.”³⁸ This points to the unique value of the coastal zone, as an ecological system and as a basic element in the environmental life cycle of all living things. The many forms of fish and wildlife found solely in the coastal and estuarine zones are an integral part of this ecosystem, together with all other life-forms that exist in the beach, bluff, and wetland areas of the shoreline. There is a clear and pressing need to preserve the vitality of all such ecological systems, at the very least until man can determine their ultimate importance as a component part of his own life cycle and those of other forms of life on this planet. “An awareness of man’s place within the total natural environment is clearly essential to an understanding of the very nature of man and to his best adaption to this environment.”³⁹

We have now developed a strong rationale for regarding the coastal areas of America as intrinsically high in value to society on two counts: (1) As an irreplaceable recreational resource; and (2) as a unique component in our ecological and environmental systems. The task at hand is to determine why this high value has not been recognized through the careful preservation of coastal lands for present and future use.

IV. ANALYSIS OF THE ALLOCATION OF SHORELINE RESOURCES

The allocation of coastal resources in this country has always been determined within the economic environment of the private marketplace and the institutional environment of local political decision-making. In the analysis of these mechanisms, we can determine what factors have led to the present shortage of shoreline supply for outdoor recreation uses.

The economic environment

The term “good” refers to anything society desires, be it physical, psychological, esthetic, or otherwise. Since a limited amount of resources is available to our society, goods can only be produced up to a certain maximum level. This level depends on how efficiently we apply our labor force, productivity, and technology to the supply of scarce resources. Given this constraint, there are numerous combinations of goods that can be produced—but to have more of some goods implies that we must have less of others.

The private marketplace is the mechanism through which society exercises the choice among these production possibilities. Taking the distribution of income as given, the private market translates aggregated personal values into desired amounts of production through the workings of the price-profit system. The price mechanism brings about effective proportional representation of individual values through the “vote” of the dollar. The profit mechanism brings about maximum efficiency through the flexibility of decentralized decision-making. In a properly functioning market,^{39A} competition among buyers assumes that goods and services will be allocated in conform-

³⁸ *Ibid.*, reference 25, p. 248.

³⁹ *Ibid.*, reference 25; p. 248.

^{39A} See O. A. Davis and M. I. Kamien, “Externalities, Information, and Alternative Collective Action,” in *The Analysis and Evaluation of Public Expenditures: The PPB System*, Vol. I, Joint Economic Committee (1969).

ity with the relative desires and abilities of the participants to pay. If certain basic conditions are met, there will exist a set of market prices such that profit-maximizing firms and benefit-maximizing consumers who respond to those prices will automatically direct the economic system into the most efficient (consistent with the values of society) allocative position.

Even the most loyal defenders of the competitive market system must admit that there are certain circumstances in which markets fail to provide certain worthwhile outputs and overproduce or underproduce others, in addition to producing outputs in no way considered beneficial. Such situations come about because the conditions and assumptions upon which conclusions about the efficiency of a market system are based are not satisfied in reality! It is important now to investigate when and why private markets might not work well in order to determine the correct steps that might be taken within the institutional environment to correct misallocations of certain scarce resources.

What then are the conditions necessary for markets to function smoothly? ^{39B} The ones most germane to this analysis are as follows: (1) the availability of information; (2) the presence of identifiable transaction costs; and (3) the characteristics of goods and services must meet certain criteria.

(1) Information is an important factor in any efficient operation. Producers need knowledge of available technologies, demand, and potential markets, and the costs of factor inputs. Consumers need to know what goods are available and what their characteristics are. Both need to know the relevant set of prices. In some instances, information may be scarce, costly, unreliable, or hard to understand, interpret, and evaluate without special training.

(2) Identifiable transaction costs mirror the ability of the market to translate (and measure) potential willingness to pay into actual revenues. This means that the price of a good must reflect the true cost of lost opportunity to society, that is, the value that is given up when the good is consumed for a particular use. For the most efficient allocation of resources, the social benefits of consuming a particular good must exceed the social cost of lost opportunity. It is this total cost to society that must be reflected in the price of the goods.

(3) The characteristics of certain goods and services must be such that they do not render them unsuitable for allocation by a private market system. One such characteristic is that there is no violation of the exclusion principle: pricing demands the possibility of excluding nonbuyers from the use of the product. This may be technically impossible or undesirable, as in the case of national defense, where use by one person neither diminishes nor excludes availability to others.

We can generally classify goods that violate these conditions as public or collective goods since they are in need of some institutional involvement to correct allocative deficiencies of the private market. Public goods are most often characterized in the following ways:

(1) It is impossible to price the good correctly due to difficulties in measuring the amount of benefit derived and in translating this into revenues—true social cost not reflected in price.

(2) The basic values of society make it desirable to keep the good out of the private market system. Police and fire protection and public education are ex-

^{39B} Ibid., reference 39A; also P. O. Steiner, "The Public Sector and the Public Interest," *op. cit.*

amples of public goods that could be produced in the private market but are not, since society places large value on the idea that everyone should derive equal benefit from such institutions regardless of income distribution—no exclusion should exist.

(3) There are externalities or side effects associated with the production and/or consumption of the good. These effects come about when the production of certain goods affects other decisionmaking units who are not doing the producing or the consuming. Side effects are not included in the price of the good since there is no mechanism by which the external costs to society can be returned to the producer as the cost of a factor input to production—pollution is the classic example.

These characteristics point to the breakdown of the price mechanism in the allocation of public goods since they all involve violations of the conditions of a properly functioning market. The crucial point that must be reemphasized is that frequently the total costs of opportunities lost to society are not reflected in the price of certain goods. Although the social benefits of having an individual consume/produce (or not consume/produce) a particular commodity may exceed his private benefits, he will base decisions only on his private benefits. Hence, the private market, left alone, tends to produce too many private goods and too few public goods. This happens because the public goods are undervalued within the private market and are unable to compete on an equal footing with other goods in the allocation of scarce resources. For this reason, Government must step in and initiate some form of collective action in order to maintain social balance and achieve an efficient resource allocation consistent with the overall goals and values of society!

We are now in the position to make the connection between shoreline recreational resources and their allocation in a private market economy. It seems clear that the shoreline should be considered as a public good in every sense of the word. We have established that it has an intrinsic value to society as a recreational resource in that everyone in a democracy has an inalienable right to derive equal benefit from the value of shoreline recreation to the physical, mental, emotional, and general well-being of all its members.

A new slogan, declaring that recreation is the fifth freedom that we now urgently need to gain and enjoy the other four freedoms, might elicit a nationwide response and a reaffirmation of our traditional goals and historic aspirations.

Seen as an indispensable, vitally imperative need in the great movement for human conservation, we can say that opportunity for outdoor recreation today is also an undeniable human right in a democracy * * * no one should be deprived of outdoor recreation through which individuals can make human living more significant and fulfilling, more conducive to the realization of their human potentialities and attainment of our enduring goal values.⁴⁰

This tremendous importance demands that such a good be allocated with extreme care to insure that all members of present and future generations can derive maximum benefit from its use. Yet we see that the private market has brought about a serious misallocation of these resources. Why has this happened?

Historically, those uses that could pay the highest prices for the land have preempted most of the shoreline. These uses have frequently been those which entail highly capital-intensive development. Unfortunately, public recreation ranks relatively low on a capital-intensive scale. The highest is industrial development followed by commercial development, housing, private recreation, with public recreation probably ranking near ecology in this respect. The bids

⁴⁰ *Ibid.*, reference 23; p. 231.

for land from these capital-intensive uses far outstrip those of public recreation and have led to the supply situations discussed in previous sections, that is, most of the shoreline is in private hands.

Competition among the highly capital-intensive uses is particularly strong near the metropolitan areas where the demands for private recreation, housing, commercial development, and industrial development are all heavy, and results in severe escalation of shoreline land prices. This happens even at greater distances from urban regions, where the competition is most likely between public and private development for recreation. Even here the demands of private parties for recreational shoreline have forced the prices beyond the reach of many local economies. The Bureau of Outdoor Recreation has pointed out this keen competition between individual developers and public agencies for prime recreation lands, especially those that are water-oriented. In a 1967 report⁴¹ on land price escalation, the Bureau reported that land values were generally rising, on the average, from 5 to 10 percent annually, while the prices of lands suitable for public recreation were rising at considerably higher rates. As an example, the report cited an initial appropriation ceiling of \$14 million dollars established by Congress for the acquisition of land for Point Reyes National Seashore in California, that was subsequently raised to \$57½ million dollars, an amount more than four times the original authorization.

In the past, as long as there was plenty of available shoreline to satisfy all the demands from competing uses while still providing adequate opportunities for those seeking recreational activity, there was no perceived need to abandon the private market as an allocative system. Even today, the market is functioning in a predictable way: as the supply gets smaller in the face of heavy demands, the price goes up. However, it is now clear that the conditions necessary for an optimal allocation of resources consistent with the values of society are no longer fulfilled in the operations of the private market regarding the coastal zone. One difficulty, clearly involved with some aspects of shoreline allocation, is that it is often impossible to put a price on certain values, much less find a way to translate these values into revenue. For example, consider the difficulty in trying to determine the value (in dollars and cents) of bluff shoreline as an esthetic attraction. Conceivably, a developer could provide coastal roadways with scenic vistas and charge user fees, but the uncertainty in setting a fee based on willingness to pay and the prospect of little or no short-term return on a large investment makes this highly unlikely. Another relevant point is that people will often misstate their values, depending on whether or not they think the good will be provided anyway. This would come into play if a State were to try to decide on a tax to be levied to support the provision of recreational facilities. Most people, if they thought a tax would definitely be levied, would understate their values; and the resulting tax revenues (if based on what the people said) would be too low to effectively finance proposed programs.

This fact, together with the large numbers of people that must be polled, lead to high transaction (contracting) costs in the gathering of such information and seems to provide an insurmountable obstacle

⁴¹ Department of the Interior, Bureau of Outdoor Recreation, "A Report on Land Price Escalation," January 1967.

(in many cases) to the gearing of any system that allocates public goods on an individual's willingness to pay. On the other hand, the development of the shore as vacation homesites would provide an immediate return on investment that is determined by a well-defined price. The same is true of all capital-intensive uses for the shoreline: Hotels, motels, factories, and powerplants all begin to show relatively high return on investment shortly after they are put into operation. Recreation in general, such as ocean swimming at a beach, is low on the capital-intensive scale. Unless a developer decides to provide facilities on a large scale (such as amusement parks), there is little chance that recreational uses can compete with private, commercial, and industrial development. Yet, use for recreation may well represent the largest value to overall society although, regrettably, this value is the least quantifiable. As long as a public good such as shoreline recreation is not forced to compete with other uses, there is no need for any valuation at all. In present day circumstances, however, there is not much shoreline left for development, and all uses must compete on an equal footing. Hence, public recreation, undervalued because of the difficulties outlined above and lacking in any mechanisms to discover and translate true values into revenues, has been priced out of the market.

Another way to view this problem is from the standpoint of side effects that accrue to future generations. We have seen that recreational uses, low on a capital-intensive scale and undervalued as a public good in the private marketplace, cannot compete effectively with private development for commerce, industry, or housing, while these activities almost universally preclude other uses, especially recreation. Now, this consumption and subsequent exclusion of the shoreline by private development gives rise to the side effect of lost opportunity to future generations to use this resource in its unique capacity for recreational activity. Under normal conditions (price fixed at proper level), this exclusion would be an indication of a properly functioning market. However, in the context of undervaluation, exclusion results in an allocation of the good in a way that is inconsistent with the overall benefits and values of society, i.e., future recreationalists are denied use of the coast. Since information on the true value of the resource for recreation is hard to determine within the framework of the price system, and since the transaction costs of transferring information of this kind (even if it were available) into revenues are prohibitive, the market mechanism fails to provide reasonable competition in which recreation uses could participate. If recreation values could be handled by the market, it is likely that the private costs for the shoreline would be astronomical (even relative to today's prices) and would greatly alter the patterns of consumption. But since they are not, since the true costs (including the externality of lost opportunity for public recreation in the future) are not generally included in the price of shoreland, the public must bear these social costs while the pattern of private consumption and development continues unchecked. These factors point again to the identification of our natural shoreline as a public good in sore need of a means of allocation other than that provided by an inadequate private market.

This completes the description of the economic environment within which the allocation of shoreline resources takes place. But this is only

half the picture, since historically the private market has been subject to regulation within the institutional environment of political decision-making. This is the topic for discussion in the following section.

The institutional environment

The institutional environment of the American shoreline is made up of a large and diverse group of governmental units having some jurisdiction and control over varying amounts of coastal property, usually through local ownership or State authority. These units establish the political and legal constraints under which the private market operates. From this complex structure of fragmented municipal, State, and Federal responsibilities for the management of coastal affairs stem the barriers to effective resolution of conflicts among different interests competing for the use of the same resource. This is partly due to a lack of cooperation between the various agencies and governmental units, and partly to a general ignorance of the tremendous significance and implications of coastal problems. The planning of public recreational services has traditionally been carried out through the process of local political decisionmaking, while the state of the techniques by which decisions are made is depressingly low. At all levels, shoreline recreation has encountered the common nemesis of all public services—"the stifling effect of jurisdictional boundaries which, by a curious osmosis, permits the diffusion of problems throughout the region, while blocking any corresponding flow of governmental responsibility."⁴³ This points to the natural consequences of fragmented political control. While the shoreline is obviously no respecter of political boundaries, its control is distributed among discrete units. These units are virtually forced to act irresponsibly with respect to the values and interest of overall society of the region due to (1) the nature of the demands, (2) the irregular distribution of the resources, and (3) the particular economic and political context within which each unit makes decisions.

The aspect of *demand* that contributes to an irresponsible allocation of coastal property by local communities has to do with the ever-increasing mobility that brings hordes of recreationalists to any richly endowed area within an expanding radius of urban areas. This, combined with the *irregular distribution* of these areas within the region, results in a steady flow of recreation seekers to prime sites from nearby towns, other States, and even more distant regions. The severe consequences of this situation are described by the ORRRC:⁴⁴

First, there is no logical place in the conventional government structure where responsibility to deal with this mercurial problem has been fixed. The problem certainly transcends the local community; but we find it also overflowing the region and the State, and at the very top, it spills out of the Nation. Then, the richly endowed community finds it increasingly difficult to have its exclusive claim to these riches recognized * * *. What happens, in effect, is that the resource-rich communities find themselves exporting tremendous volumes of free recreation services, frequently at a substantial social cost to themselves from the operation and maintenance of facilities and from the debasement of the recreation facilities to their own residents. One reaction has been to wall out the problem by restricting the use of the resource: Public beaches confined to the use of local residents, stream banks, and wooded areas taken over by private "clubs." Carried to an illogical extreme, as such things sometimes are, the end result of this process is that a few have superlative opportunities for outdoor recreation, while the great

⁴³ Ibid., reference 33; p. 84.

⁴⁴ Ibid., reference 33; p. 86.

majority must compete for the services of a limited supply of mediocre-to-poor recreation resources.

It is not unreasonable to state that we are now approaching (in many ways) that illogical extreme. Already we have noted the "fencing out" tendency of local communities and private residents in Connecticut and even Maine, while fees and other restrictive measures to limit prime beaches to local residents are commonplace on Cape Cod and in many other areas.

The particular *economic and political context* within which local governmental units make decisions about shoreline use will also lead to irresponsible allocation on a broad scale.⁴⁵ The political organization of the coastline is the historical one of many small communities, each with control over a limited segment of coastal property. The only political mechanisms that are available to help correct private market deficiencies in shoreline allocation are the local zoning and taxation policies of this fragmentation of local community control. We have already seen how the uneven distribution of prime recreational shoreline property places heavy demand pressures from the region on specific communities, making their coastal property more valuable (to them *and* to the people of the region) than some neighboring towns not similarly "blessed" with good beaches or whatever. Yet, in the absence of this value being properly represented within the private market (where the local community operates), local governmental units make decisions based on other considerations. This can best be illustrated by looking at the decisionmaking process involving some coastal zone project, perhaps a powerplant project. It is important here to distinguish between two types of benefits (or disbenefits) of such a project—direct and indirect. Direct effects are those that accrue to the consumers or users of the project, the user of the power supplied, the bathers on a closed beach, the swallows of polluted air, the viewers of marsh wildlife, etc. All of these effects are felt by the local community and by the regional society in general. Yet only those benefits (or disbenefits) that accrue to the local populace enter into the decision. The community may be willing to give up beach or bluff property to have a powerplant, but this may not be an optimal allocation of that resource on a regional basis. But the "votes" of the region are not counted—only those of the local community affect the decision!

We might ask why a community would be willing to give up this valuable property in such a way? The answer is that the local community within its particular economic and political context is also subject to a second type of benefits—indirect or secondary effects. These effects accrue to the suppliers of the resource that make the investment possible. Construction workers who build the plant will spend a substantial portion of their paychecks in the locale of the plants, certainly benefiting local merchants, doctors, and business-owners. These people, in turn, spend some of this money in the locale, and so on in the traditional multiplier effect. Values that arise in this manner are called parochial (secondary) effects and include the effects on local payrolls, retail earnings, and the broadening of the tax base (usually a very powerful factor). For the local community, these

⁴⁵ This discussion is based on the treatment found in J. W. Devanney III, et al., "Economic Factors in the Development of a Coastal Zone," MIT Sea Grant Project Office Report No. MITS-G 71-1, Nov. 20, 1970.

benefits are very real; but considering the regional economy as a whole, parochial benefits are not net benefits since the benefits associated with one location will be about the same as those associated with an alternative site (barring large unemployment differentials). Thus, parochial benefits represent a transfer payment from one place in the economy to another, with no net benefit associated with the choice of site (even though there is a net benefit to the community chosen). Hence, parochial benefits can be overwhelmingly important to political bodies representing the local community. As a result, a local community can rationally view a project in a very different manner from the regional economy as a whole. The region and the local community feel positive and negative direct effects—the community alone feels the parochial effects. These added benefits will persuade the community to act in its perceived self-interest and approve the powerplant siting, with no considerations of the negative direct effect to the region as a whole. Such things have happened on the Maine coast where much of the loss of shoreline property came “with the encouragement of State and local agencies and officials eager for new taxable property and the jobs that developments generate.”⁴⁶ John McKee, the Bowdoin land use expert, has said “it is surprising how many people will sacrifice their coast. They say, if it’ll bring in the tax dollar, let’s do it.”⁴⁷

Sometimes other forms of very localized political pressures hinder effective planning for coastal land use and management. A case in point is that of the tiny town of Harpswell on the Maine coast. In 1969, a planning board was created to assist the selectmen in considering some of the questions related to the future growth of the town. By the 1970 town meeting, the board had developed the preliminary plans for a 3-year project and had obtained the needed appropriations from the local voters. A chronology of subsequent events has been described in a recent edition of the *Maine Times*.⁴⁸

With a complete map of the town and a detailed soil map, the planning board plunged into the nitty-gritty of formulating its first land-use ordinance. The threat of unregulated subdivision seemed urgent. Out-of-town developers had purchased a 400-acre plot on Great Island, and some 3,000 additional acres would soon be up for grabs. Less than one-tenth of the town’s 24-square-mile area had already been developed, and there were no local restrictions to inhibit irresponsible exploiters of the land.

The board also sensed some danger from within. Local developers had divided their land into undersized lots for trailers and small houses. Operating on shoestring budgets they built inadequate roads—impassable to school buses and fuel trucks in the spring—and petitioned the town to take over road maintenance and/or improvement.

Slowly working their way through three rough drafts, the board and its consultant, John Atwood, created an ordinance aimed at developers whose land-use practices (insufficient soil surveys, inadequate sewage and water systems, narrow roads) would not be in the best interests of the town of Harpswell. Nine detailed sections dealt with the necessity for both a preliminary and final subdivision plan to be submitted to the board; design standards for streets, sidewalks, lots, schools, etc.; performance guarantee; character of the development; variations and exceptions.

The release of this proposed plan triggered a great deal of political infighting. Some Harpswell citizens, previously opposed to any form

⁴⁶ *Ibid.*, reference 14A.

⁴⁷ *Ibid.*, reference 14A.

⁴⁸ Gloria Hutchinson, “Harpswell: What Went Wrong?” *Maine Times*, vol. 3, No. 2, Oct. 9, 1970.

of land-use planning (and seemingly the word planning itself!), were vociferously against the plan.

Some interpreted the ordinance to mean that they would have to demolish their own homes, remove lobster traps from their yards, receive permission to cut down a tree on their property. Others were moved to protest that it discriminated against the poor, the young, the large family. Discussion was propelled by emotional arguments which the board was unable to direct into more reasonable channels.

The antiplanning group gained strength, including among its supporters several local developers and contractors (who supplied bus transportation for local voters to the town meetings). As a result, the plan was defeated and the planning board was abolished at the next town meeting.

Harpswell's future was on the line, and she stood defenseless before those who cared not for the common heritage of coastal land * * * with no planning board and no land-use laws, Harpswell waits naked for the developers' invasion.

What happened in Harpswell * * * could have happened in any Maine town that has not yet confronted the question of its destiny.

The problems within the institutional environment are further complicated by the attitudes that some States have previously held in failing to regard the coastline as a separate resource in need of regulation on the State level. For example, in 1967 Maine citizens approved a \$4 million bond issue for park and coastal acquisition, even though the legislation insisted on a provision prohibiting the use of eminent domain powers. Yet, up until now, "though prices in the meantime have doubled and quadrupled, and tens of thousands of desirable acres have changed from open space to luxury developments, the State parks and recreation department has spent only \$567,000, less than 12 percent of the money the voters authorized. And only part of the purchases have been coastal property."⁴⁹ This, of course; is only part of a larger overall problem with institutional involvement in coastal allocation. In the absence of any long-range plans, local and State governments usually take an incremental approach to satisfying increasing demands for shoreline recreation (and most other things, for that matter). Most governmental units react only to short-range problems of supply and demand, usually due to a lack of funds. This is understandable to the extent that States and local governments do not have the large amounts of money necessary to compete on the private market for all the coastal land that is needed, for the future uses, since there is no existing mechanism by which the values of the future users of a public beach can be measured and translated into tax revenues. Then, the only choice for Government is to try to buy small stretches of shoreland when it is needed, to plan only for the demands of the next 5 or 10 years. But while this has been going on potential sites have been privately bought and developed to the point where, as we have seen, practically nothing remains to be acquired.

Summary

Having recognized the high intrinsic value of our shoreline as a recreational resource in need of careful allocation, we have found the private market to be wholly inadequate within the socioeconomic and institutional environment. We conclude that market mechanisms

⁴⁹ Ibid., reference 14A.

will result in an allocation of the coastal zone which is seriously inconsistent with the values of regional society. Standard market imperfections such as undervaluation of public goods and side effects work to price the recreational values of the general public out of the market without having a similar effect on private, commercial, and industrial development. In addition, the political organization controlling the use of shoreline land through local zoning and tax policies also contributes to a misallocation of coastal resources, since, even if each community operates optimally within its own bounds, the total shoreline allocation will not be optimal, due to the lack of consideration of alternatives in which one community specializes in certain shoreline functions while another specializes in some other activity. Local planning may even lead to allocations that are worse than an unrestricted market result, since whenever a local board is faced with a development proposal, its first thought is toward the secondary or parochial benefits of the project: the effect on local payroll and retail earnings, broadening of the tax base, etc. Yet, these benefits are not net benefits, but transfer payments from some other part of the economy. In addition, the planning procedure of meeting increasing demands on an incremental, piecemeal basis clearly wastes opportunities for acquisition of valuable coastal acreage that is rapidly bought and developed for private, commercial, or industrial use. The absence of any long-range planning on the part of State and local governments has clearly contributed to the formation of the crisis we face today.

The final question to be resolved is: given the inadequacies of the present system and the critical need for coastal zone allocation consistent with the values of society, what are the alternatives to the present allocative mechanisms? It is clear that something must be done right away to satisfy the demands of the immediate future; but there are also serious questions of long-range policy to be considered along with current needs. The final section of this article will deal both with the short-term and the fundamental issues involved in the making of long-range policy decisions.

V. A NEW FRAMEWORK FOR COASTAL ZONE MANAGEMENT

The short run

Clearly, there is a pressing need for the formulation of long-range policy with regard to our shoreline resources. Such a policy might well entail some radical departure from the currently accepted allocative mechanisms of the private market and local decisionmaking. All indications are that, without such changes, there is no way to provide adequate public recreational opportunities at our coastal shores for the hordes of people who will need and demand such opportunities in the future. But the only way to avert disaster until such a policy is formulated is to buy time with the traditional procedures of short-term planning. Such procedures have helped to get us into this mess, and it seems ironic that they should serve to help us correct the problems. But we must be wary that the problems get worse at an increasing rate; hence, the time that can be bought with each incremental measure gets shorter. Any recreation planner will attest to this—as new beaches open, they are soon used extensively and frequently to capacity, depending on the location. Also, it is clear that we are almost

without room for further expansion in terms of land acquisition. Therefore, we must do two things in the short run: (1) in the face of spiraling prices for shrinking amounts of available coastal land, State and Federal authorities must take immediate advantage of current opportunities for land acquisition, using all the legal tools available to them to preserve more shoreland for public recreational activity, and (2) recognizing the need for a better allocative mechanism, immediate steps must be taken at the Federal level to formulate a policy that successfully comes to grips with the complex issues that are raised when the present system is discarded. The purpose of this section is to focus attention on the political and economic questions that must be dealt with in the formulation of long-range policy.

Establishing a political framework

If the allocation of shoreline resources as public goods is to be handled in the public sector, then the first requisite is the development of some sort of alternative political framework within which management of the resource can take place. We have seen that the present framework of local political decisionmaking is wholly inadequate, while no political mechanisms exist that deal with our coast as a separate and unique entity. Yet, clearly the social costs and benefits of shoreline recreation go beyond every municipal boundary and spill over from State to State. It is clear that new institutional arrangements must be made so that long-range, comprehensive planning policies can be formulated in the development of a recreational system and to determine that allocation of coastal resources among multiple uses that maximizes the general well-being of society. What are these new arrangements to be?

A major criterion that should be applied to new institutions is that the political decisionmaking unit affecting any particular use of coastal resources must be broadly based enough so that the parochial benefits of a given development project are not net benefits within its jurisdictional boundaries. We will recall that a coastal town may decide to zone its coastal property for industry, generating (secondary) benefits for the town, but not for the regional economy as a whole (e.g., if the area is a valuable beach site). If a State or regional body makes the decision, a more broad consideration of benefits to the regional populace would result. In this way a greater range of social costs and benefits can be weighed in the decisionmaking process! The clear implication is that planning for the use of coastal resources must be carried out at a more broadly based governmental level.

Much careful consideration has been given to this issue at the Federal level, beginning with a report⁵⁰ to the President and the Congress in 1962 by the Outdoor Recreation Resources Review Commission (ORRRC). This study outlined the status of outdoor recreation in America, describing in depth the conditions of supply and demand as outlined in this article. To resolve the problems of shoreline recreation, the ORRRC called for the establishment of new guidelines for planning and policy and the design of new institutional relationships to manage the complex set of interdependencies in a systematic way. These relationships would entail a redistribution of responsibility among governmental levels, with the *States* playing the pivotal role

⁵⁰ Ibid., reference 28.

and the Federal Government taking on the responsibility of developing and maintaining the viewpoint and interests of the national system as a whole, while coordinating activities and providing a mechanism for the resolution of conflicts between States.

More recently, a number of other studies have made recommendations as to the proper political framework for sound coastal zone management. These include:

(1) A report by the Commission on Marine Sciences, Engineering, and Resources.

(2) The National Estuarine Pollution Study, sponsored by the Water Pollution Control Administration of the Department of the Interior (November 1969).

(3) The Coastal Zone Management Conference, House of Representatives Subcommittee on Oceanography of the Committee on Merchant Marine and Fisheries (October 1969).

(4) A report to the Committee on Multiple Use of the Coastal Zone of the National Council on Marine Resources and Engineering Development, on "Coordinating Governmental Coastal Activities" (September 1968).

(1) *Report of the Commission on Marine Sciences, Engineering, and Resources*.—This Commission, headed by Dr. Julius A. Stratton, was formed in 1966 by the Marine Resources and Development Act and charged with the responsibility of formulating a program of national action for the most effective use of our marine resources and a plan for governmental organization for the fulfillment of that program. The relevant recommendations of that commission were put forth in a statement by Dr. John A. Knauss, former Chairman, Panel on Coastal Zone Management of the Commission:⁵¹

A major conclusion of our Commission was that the primary problem in the coastal zone was a management problem with all the attendant problems that proper management implies. It is true that the Federal, State, and local governments share the responsibility to develop and manage the coastal zone. In reviewing the situation, we concluded that effective management to date has been thwarted by the variety of Government jurisdictions involved at all levels of government, the low priority afforded to marine matters by State governments, the diffusion of responsibility among State agencies to develop and implement long range plans . . . the Commission was of the opinion that the states must be the focus for responsibility and action in the coastal zone. We believe an agency of the State is needed with sufficient planning and regulatory authority to manage coastal areas effectively and to resolve problems of competing uses.

We recommend that a Coastal Management Act be enacted which will provide policy objectives for the coastal zone and authorize Federal grants-in-aid to facilitate the establishment of State coastal zone authorities empowered to manage the Coastal waters and adjacent land.

(2) *Department of Interior Report—The National Estuarine Pollution Study*⁵².—The recommendations and proposed program outlined in this report put forth the policy objectives for a comprehensive national program for coastal zone management and spell out the suggested responsibilities and roles of the Federal, State, and local governments within such a program.

What is proposed in a program that recognizes the primary responsibilities of the States in a management program for their estuarine and coastal areas, and on

⁵¹ "Coastal Zone Management Conference," hearings before Subcommittee on Oceanography of the Committee on Merchant Marine and Fisheries, House of Representatives, serial No. 91-14, Oct. 28, 29, 1969, p. 11, vols. I, II, III.

⁵² *Ibid.*, reference 1; vols. I, II, III.

the Federal side provides for the coordination of Federal activities in these areas and for assistance to the States in their management activities.

Any comprehensive national program for the estuarine and coastal zone must provide flexibility in many ways to fit regional and local conditions and situations, but regardless of variables it must establish a guiding policy and a set of objectives. Regardless of variables, in order to be effective the program must provide for: (1) Planning and implementation; (2) active administration, coastal coordination, and financing; (3) the development of the knowledge and data necessary as a basis for all action.

The recommended national policy will put in effect a comprehensive national program for the effective management, beneficial use, protection and development of the estuarine and coastal zone of the Nation involving Federal, State, and local governments, and public and private interests in an appropriate manner. It will permit the optimum use of this vital resource by recognizing the existence of competing uses and accommodating them through appropriate management and further, conserve these resources in such a manner as to keep open the options for various uses in the future and not foreclose them. This management system will recognize the primary and constitutional role of the States in managing their resources as well as the role of the Federal Government in protecting the wider national interest. The principal goal of the national program is the use of the estuarine and coastal zone for as many beneficial purposes as possible and, where some uses are precluded, to achieve that mix of uses which society, based on both short- and long-range considerations, deems most beneficial.

(3) *Coastal Zone Management Conference*⁵³.—These hearings brought together a wide range of parties involved in the problems of coastal zone management. The tone of the conference can best be illustrated by excerpts from some of the testimony given therein:

STATEMENT OF DR. SAMUEL A. LAWRENCE, FORMER EXECUTIVE DIRECTOR,
COMMISSION, ON MARINE SCIENCE, ENGINEERING, AND RESOURCES

* * * We need to establish a firmer legal framework for ownership and use of coastal and offshore lands. Above all, the Commission concluded, the pressures for multiple use of these limited coastlands require an organized approach in order to coordinate the separate plans and activities of Federal, State, and local government agencies and of private persons and corporations.

STATEMENT OF JOHN R. QUARLES, ASSISTANT TO UNDER SECRETARY FOR ENVIRONMENTAL PLANNING, DEPARTMENT OF THE INTERIOR

There appears to be developing something approaching a consensus that responsibility should be vested primarily in the State government and exercised at the State level.

* * * I don't believe anyone who has seriously focused on the problem thinks that the Federal Government can, from Washington and from the Federal level, devise management plans which properly would anticipate the use that each acre of land should be devoted to over the years ahead, so the Federal Government needs to be ruled out as being the primary responsible agency in management of coastal areas.

* * * The localities, I would suggest, are not suitable for exercising these functions. It has been fairly widely recognized that localities suffer from deficiencies of not having strong staffs, skilled people to deal with some complex problems. Also, of course, they are extremely concerned with development of their individual tax bases of assessable property within the town limits.

These considerations, however, I would suggest, overlook the principal difficulty with leaving responsibility at the local level, which is that good planning from this time forth needs to encompass a range of vision beyond town limits * * *. Development cannot be done well on a local basis * * *. I think that, regarding this problem on a national level, serious consideration must be given to whether we can continue to allow areas which can be seen as needed to meet other needs to be used for residential development.

(4) *Report to Committee on Multiple Use of the Coastal Zone of the National Council on Marine Resources and Engineering Development on*

⁵³ Ibid., reference 51.

*"Coordinating Governmental Coastal Activities."*⁵⁴—The primary aim of this study can be described as follows:

To recommend means of coordinating governmental agencies acting in the coastal zone;

To identify gaps, overlaps, and inadequacies of coordination in the activities of Federal agencies in the coastal zone and to recommend appropriate solutions;

To identify the need for improving Federal-State relationships in the coastal zone and to recommend appropriate solutions.

The report identifies four basic uses of the coastal zone: enjoyment, transportation, national defense, and land use. Some of the recommendations and conclusions regarding land use and enjoyment are directly pertinent to this study. One such recommendation urged that the Department of the Interior lead a multiagency study to propose national objectives and goals for enjoyment of the coastal zone. This study would "address such matters as, (1) the relative roles and values of low-density enjoyment, such as preservation, conservation, hiking and hunting vis-a-vis high-density enjoyment, such as bathing beaches, marinas, athletic facilities and entertainment; (2) future recreational requirements, their types, quantity, and distribution; and, (3) rational, measurable objectives, related to economic benefits achieved and foregone, to help fill the partial void now facing Federal agencies when tradeoff decisions must be made between quantifiable economic effects and many as yet unquantified enjoyment values."

The report goes on to conclude that considerable effective Federal-State coordination can be obtained "through improved, tempered use of such means as the normal course of business: informational services, mutual assistance, grants, subsidies, and regulations. Where interstate conflicts arise that could not be handled by existing institutions (river basin commissions, etc.) new institutional arrangements should be created.

As a result of the conclusions and recommendations set forth in these and other studies on coastal zone management, considerable attention has recently been devoted to the forming of new legislative proposals at the Federal level. Among them are:

(1) A bill (S. 2802) to assist the States in establishing coastal zone management programs—introduced by Senator Warren Magnuson (Democrat, Washington), August 8, 1969.

(2) A bill (H.R. 14730) to provide for the effective management of the Nation's coastal and estuarine areas—introduced by Representative Alton Lennon (Democrat, North Carolina) November 6, 1969.

(3) A bill (S. 3183; H.R. 14845) to provide for the establishment of a national policy and comprehensive national program for the management, beneficial use, protection, and development of the land and water resources of the Nation's estuarine and coastal zone. Introduced in the House of Representatives by Representative Fallon, November 18, 1969; introduced in the Senate by Senator Hale Boggs, November 25, 1969.

It would be useful to examine the provisions included in these bills so that we can compare them to the emerging concepts that make up the new political framework for coastal zone management

(1) *S. 2802*.—This bill, recognizing the harmful side effects of unplanned and poorly planned development of coastal resources, de-

⁵⁴ "Coordinating Governmental Coastal Activities," a report by the Task Group on Interagency Coordination, Federal-State Relationships and Legal Problems (COSREL), of the Committee on Multiple Use of the Coastal Zone, National Council on Marine Resources and Engineering Development, September 1968.

clares that the policy of Congress is to "preserve, protect, develop, and where possible restore the resources of the Nation's coastal zone . . . through comprehensive and coordinated long-range planning and management designed to produce the maximum benefit for society from such coastal areas." To facilitate such planning at the State level, the National Council on Marine Resources and Engineering Development may award grants-in-aid (or underwrite bond issues or loans) to coastal authorities (designated by the Governor of a coastal State through legislative or other processes) to assist them in developing a long-range master plan for the coastal zone and in implementing a development program based on such a plan. To secure the Council's approval the State plan must—

Set forth desired goals and standards.

Promote the balanced development of natural, commercial, industrial, recreational, and esthetic resources to accommodate a wide variety of beneficial uses.

Estimate future population and the needs of the above competing uses for coastal land.

Include diagrams for the most efficient, beneficial, and liveable interrelationship of these uses.

Gather information on the existing land use regulations and consult with various governmental bodies whose jurisdiction extends over territory located in the coastal zone (local, regional, port, intrastate, and Federal authorities).

In addition, the bill provides authority for the development of the coastal zone in accordance with the master plan through the use of land use and zoning regulations, acquisition of lands through condemnation or other means, and the issuance of bonds. Also, the coastal authority has the authority to review all State and local projects and to reject developments that do not comply with the principles and standards set forth in the master plan.

(2) *H.R. 14730*.—Finding that the rapidly intensifying use of coastal and estuarine areas has outrun the capabilities of Federal, State, and local machinery to plan their orderly development and to resolve conflicts, this bill declares to be the policy of Congress to foster the effective utilization of coastal and estuarine areas through assistance to coastal States in the development of a management system permitting conscious and informed choices among development alternatives. This act would empower the Administrator of the National Oceanic and Atmospheric Agency to make grants (or underwrite bonds and loans) to state coastal authorities provided that the authority submit and obtain approval of a long-range planning proposal that must incorporate a number of particular considerations as outlined in the bill. These include:

Identification of the coastal areas requiring concerned attention and development of a plan for their most effective utilization.

Provision of machinery for the resolution of conflicts arising from multiple use.

Provision for necessary enforcement powers through zoning, permits, licenses, easements, acquisition, or other means to assure compliance with plans and resolve conflicts in uses.

Provides for coordination with local, State, and Federal agencies, research institutions, private organizations, and other groups as appropriate to provide a focus for effective management.

Fosters the widest possible variety of beneficial uses to maximize social return, achieving a balance between the need for conservation and for economic development.

Takes into account the rights and interests of other States and respects Federal rights.

(3) *S. 3183; H.R. 14845*.—This legislation, submitted to the Congress by former Secretary of the Interior Walter J. Hickel, is based on the findings of the National Estuarine Pollution Study and an interdepartmental Coastal Zone Task Force chaired by Under Secretary of the Interior Russell E. Train. Under the provisions of the bill, the Secretary is authorized to make grants to any coastal state for the purpose of assisting in the development of a comprehensive management program for the land and water resources of the coastal zone. In order to qualify for such grants, the coastal State must demonstrate to the Secretary compliance with the following requirements:

The coastal State must be organized to implement a management plan.

The agency or agencies responsible for implementation must have the regulatory powers necessary to implement the plan, i.e., permit authority, authority to acquire interests in land through eminent domain and zoning, authority to require conformity of local zoning to the State plan.

The coastal State has developed and adopted a management plan for its coastal zone.

The plan must include identification and recognition of National, State, and local interests in the preservation, use, and development of the coastal zone.

The plan must identify and describe means by which the management proposal will be coordinated with interstate and regional planning.

The plan must be developed in cooperation with relevant Federal, State, and local governments, and all other interests.

The plan must develop a feasible land and water use plan, reasonably reflecting the needs of industry, transportation, recreation, fisheries, wildlife, natural area protection, residential development and other public and private needs, both in the short and the long term.

The bill makes additional provisions for interagency coordination and cooperation on the Federal level.

The Secretary shall not approve the plan submitted by the State . . . until he has solicited the views of Federal agencies principally affected by such plan or his evidence that such views were provided the State in the development of the plan. In case of serious disagreement between any Federal agency and the State in the development of the plan, the Secretary shall seek to mediate the differences . . . Federal agencies shall not approve proposed projects that are inconsistent with the plan without making investigation and finding that the proposal is, on balance, sound. The Secretary shall be advised by the heads of other agencies of such problems and be provided an opportunity to participate in any investigation.

Based on the analysis in this article and the conclusions and recommendations of the aforementioned studies, we are now in a position to outline some of the considerations that would go into the legislative formulation of a new political framework for coastal zone management. It is clear that the destiny of shoreline resources should be removed from the hands of local decisionmaking and entrusted to a broader based governmental unit.

Many of our present-day problems, such as air and water pollution, electric power production, and land use, are inherently regional in nature and could seemingly be handled most efficiently by regional governmental bodies. But if we are to assume that it is desirable to work within the existing governmental structure, then it is clear that the States should play the primary role in coastal zone management. We must be careful, however, to realize that even the State may not be broadly based enough to handle many coastal land-use problems. We have noted how the trend toward increasing mobility and the uneven distribution of suitable coastal opportunities has made the problems of shoreline recreation ignore all State and local boundaries,

especially in New England where coastal facilities are often within a 2-hour drive from many parts of the region. The problems of inefficient allocation, which arise because decisions are based on considerations of secondary benefits, are not restricted to the local communities. This could happen at the interstate level, especially when there is a large discrepancy in the economic posture of two nearby States. For example, Massachusetts is a well-developed and economically healthy State with a large population, while Maine is economically depressed and low in population. Hence, these States might take a different orientation toward the development of the Maine coast. The State of Maine might welcome oil refineries and industrial complexes as a stimulus to the State economy, while the residents of Massachusetts value the coast as a unique recreational opportunity, especially since Massachusetts' shoreline facilities are already used to capacity. But the benefits and disbenefits to the regional society outside of Maine's boundaries will not be included in the determination of the costs and benefits of particular development projects. Hence, the State will make decisions based only on the parochial effects to the State economy. Yet this could very well constitute an inefficient use of the resource and an irreversible depletion of a unique and valuable asset! Any new political framework for coastal resource allocation that has the State as the focal point for management must devote careful attention to problems of this sort.

A second major consideration pertinent to the management of the coastal zone in the public sector is the question of that decisions are to be made regarding shoreline resource allocation between competing uses. If we conclude that the allocative mechanisms of the private market are to be abandoned, then the State and Federal management authorities must have some alternative means for determining what is an efficient allocation of the shoreline. This must necessarily involve the determination and articulation of the public interest. In the private market, goods have a mechanism (price-profit system) whereby the demands of individuals can be felt; when the aggregate of individual demands is high enough, private producers will attempt to satisfy those demands. Thus, many individual preferences can be satisfied, since each individual's "vote" (in dollars spent) goes relatively far in determining the supply. Whenever enough individuals want something at a price, there is an incentive for someone to produce it at a profit. Public goods differ in that private markets fail to respond to the entire range of individual demands, giving rise to a need for collective action. The question is, how can individual preferences for these goods be summed to determine if the aggregate benefit is sufficient to justify the total cost? This is a central question in the area of welfare economics, and the resolution of the issues involved must play an important role at the Federal and State levels in the formulation of management policy concerning coastal land use.

A number of theories have been set forth involving this crucial determination of the public interest. The point of view of an aggregated social welfare function holds that society maintains a hierarchy of priorities based on collective values, inviting a search for the articulation of these priorities. A fundamental question to be dealt with in this regard is: Are these social priorities effectively articulated through the democratic political process as it now exists so that decision-

makers are adequately equipped to act in the public interest? Another point of view is that of willingness to pay, which holds that the maximum amount of resources that consumers are willing to pay for a good is a good measure of its value. This can be expressed as a willingness to pay additional taxes, user fees, and other charges, to give up the consumption of certain goods, or to pay a higher price for other goods. The primary objection of this scheme is based on the difficulty in measuring the willingness to pay for public goods that are not "unitized" and whose benefits to an individual are hard to determine. Cost-benefit analysis uses willingness to pay and appears to have some potential for effective simulation of the working of a properly functioning market in the allocation of public resources on a project-by-project basis.

Such an analysis has been demonstrated and recommended, in a report ⁵⁵ to the Water Resources Council by the Special Task Force on Evaluation Procedures, as a way to improve the policies and procedures followed by Federal agencies in the formulation and evaluation of projects for the use and development of water and related land resources. More recently, a report ⁵⁶ on economic factors in the development of a coastal zone has described a preliminary effort at the development and application of such analysis to particular coastal zone development proposals:

The basic premise of this report is that economics in a sense wide enough to cover all significantly important values, both market and nonmarket, can be usefully applied to coastal zone allocation, that is, to the problem of determining the mix of uses of a particular coastal zone which is most consistent with the values of the economy which uses that coastal zone.

Given the inefficiency of the private market with respect to the coastal zone and the inefficiency of local control, the only feasible alternative appears to be control at the State level with some Federal influence to prevent secondary benefits from being used against an entire State. We strongly support the Stratton Commission's recommendations concerning the establishment of State coastal zone management authorities.

However, the establishment of such bodies implies some rather heavy responsibilities. Once the discipline of the private market is abandoned, coastal zone analysis requires conscious economic analysis, for it is not enough to show that the present system is seriously nonoptimal. One must also argue that the proposed changes in the allocation process will result in coastal zone usage which is more consistent with the economy's values than the old.

Insofar as coastal zone allocation can be regarded on a project-by-project basis, the methodology for implementing this conscious economics is cost-benefit analysis. Unfortunately, the present state of the art with respect to cost-benefit analysis and the coastal zone leave much to be desired and, until a State coastal zone authority can reliably determine the use of the coastal zone most consistent with people's values, it cannot promise to do much better than the private market or local political entities.

Another problem with locational cost-benefit analysis is that, if performed too narrowly, seriously inefficient suboptimization can occur. The problem is to approach coastline allocation comprehensively while, at the same time, retaining analytical feasibility. Given the compromises that must necessarily occur, the results of cost-benefit analysis must be used with some judgment.

While there seem to be no clear-cut indications that any method of determining the public interest is superior to the others, this is no excuse for inaction—attempts must be made to determine the public interest. Perhaps the answer lies in some combination of the viewpoints of representative political consensus (based on overall social priorities)

⁵⁵ "Procedures for Evaluation of Water and Related Land Resource Projects," Report to the Water Resources Council by the Special Task Force on Evaluation Procedures, June 1969.

⁵⁶ *Ibid.*, reference 45.

and cost-benefit analysis (based on willingness-to-pay) as effective measures of the public interest. The important point is that some determination must be made, both at the Federal and the State levels, before we can claim that the new framework for coastal zone allocation is better than the old one of the private market and local political decisionmaking.

Having warned of the dangers of interstate side effects and the need to determine carefully the public interest, let us now attempt to outline the roles of the State and Federal Governments in a sound coastal land use management system.

The State role

The role of the States in coastal zone management is recommended to be as follows:

(1) To assume primary responsibility for the planning and implementation of a comprehensive coastal land use management plan to bring about effective utilization of shoreline resources most consistent with the values and interests of national, regional, State, and local society.

(2) To establish some form of coastal zone authority empowered to develop a master plan for coastal and and water management and to implement this plan through the use of any legal means, such as zoning, permits, licenses, eminent domain, easements, acquisition, issuance of bonds, etc.

(3) To develop a master plan that has the following characteristics:

Sets forth desired goals and objectives consistent with the values of society on a local, State, regional, and national level;

Establishes guidelines for the determination of the public interest consistent with similar efforts at the Federal level.

Provides a mechanism by which decisions can be made regarding the most efficient allocation of coastal resources among the competing uses and needs of industry, recreation, commerce, transportation, residential development, wildlife and natural area protection, etc., based on the established goals and guidelines for the determination of the public interest.

Provides for coordination and cooperation in the development of the plan with local, State, regional and Federal agencies and any other public or private organizations with a vested interest in coastal land use management, and is consistent with planning efforts at all the various governmental levels.

Provide up-to-date inventories and evaluations of the status of shoreline resources within the State's jurisdiction, including the accessibility and suitability of beach, marsh, and bluff areas for various uses.

The Federal role

The role of the Federal Government in land use management in the coastal zone is recommended to be as follows:

(1) To provide the overall political framework within which the planning efforts of the individual coastal States and the various Federal agencies can be coordinated in the development of an efficient land use program that is compatible with not only state-wide, but also regional and national interests and values.

This first function of the Federal Government in land use management in the coastal zone entails substantial responsibilities. These responsibilities come directly from the need to coordinate the planning activities at the State levels and to resolve serious conflicts that might lead to grossly inefficient allocation of resources due to the existence of statewide secondary (parochial) benefits. The key concept here is coordination; since many of the problems of coastal land use management are inherently regional in nature, it is not enough to stop at the establishment of State coastal authorities in the formulation of a political framework. While such authorities seem to provide an effective means to overcome the problems attendant upon local decisionmaking

in the presence of secondary benefits, they do nothing to solve the problems of interstate conflicts of interest that come about for the same basic reasons. Indeed, the issue is the same but occurs at a different governmental level. Yet there is no political mechanism at the regional level, where these problems might best be handled, to resolve such conflicts. This underscores the necessity of the Federal Government's taking an active role in coordinating the planning efforts of States and to fill the void created by the absence of regional decisionmaking units. This might be effectively realized through the creation of a national land use agency or commission, subdivided into groups that are to take a regional orientation toward the coordination of State land use management programs. The characteristic activities of such an agency would include the following:

(a) It would provide the financial and informational basis of support for the planning and implementation of State and regional land use plans, based on a review and approval of such plans.

(b) It would encourage the cooperation of neighboring States in the development of a regionwide land use master plan, possibly through the formation of regional land use authorities.

(c) It would coordinate the activities of all the Federal agencies in relation to land use management and develop mechanisms to resolve interagency and Federal-State conflicts.

Up to this point, the formation of a new political framework has dealt primarily with the problem of more effective government coordination of activities with regard to coastal zone management. We have given considerable attention to the need for a more broadly based governmental body to manage coastal land resources and to avoid the gross inefficiencies that have come about due to the uncoordinated activities of local political decisionmakers. But again, we must remember that this is only one side of the story; we have also decided that the private market is unsatisfactory in the allocation of scarce shoreline resources.

This presents us with the difficult circumstance of having to make decisions in the public sector based on trade-offs between some very quantifiable benefits and other inherently nonquantifiable values. The fact that we have abandoned the discipline of the private market does not mean that the circumstances that led to its failure as an allocative mechanism must no longer be confronted. The same kinds of decisions remain to be made. Indeed this is an indication that we must redouble our efforts concerning the identification and articulation of the values and interests of society, since we no longer can rely on the relatively automatic workings of the price system, which has performed this function for us in the past. We cannot assume that the problems of inefficient coastal zone management can be solved by political reorganization alone. Poor decisions have been made in the past by local governmental units and by the economic system itself. Correcting the political problem is only half the solution, we must now face the issue of how to make decisions in the public sector that are consistent with the values of society. This is, as we have seen, no easy task. It requires concerted effort at both the State and Federal level. This points to the second major function of the Federal Government in coastal zone management, to be carried out within the coordinating framework outlined above:

(2) To help establish uniform goals and objectives that are an effective articulation of the values of society at all levels, and to set forth consistent guidelines for the State to follow in the formulation of coastal land use management programs that will lead to the achievement of these objectives.

This implies that it is not sufficient to assume that the States on an individual basis can provide mechanisms through which decisions as to the most beneficial allocation of a particular coastal resource can be made. The States must have the capacity to make decisions based not only on intrastate values, but also on regional and national interests. Yet the orientations of different States toward what is really in the national and regional interest are likely to be widely divergent and heavily biased by the particular values of the people of each State. The other implication is that the States need help in determining how to measure and weigh the values of the people within their own jurisdiction. This gets back to the ideas of representative political consensus and cost-benefit analysis as effective articulations of the public interest. The failure of any one State to handle this crucial issue in a successful way would necessarily have a deleterious effect on an entire region due to the intraregional nature of land use management problems. To assist the States in activities of this sort, the proposed national land use agency should support in-depth investigations into a number of substantive issues of concern regarding coastal land use management with the purpose of establishing guidelines in the following areas:

(a) How to make decisions in the public sector that involve trade-offs between quantifiable economic benefits and nonquantifiable economic values.

(b) How to deal with circumstances in which trade-offs between basic rights in a free democratic society seem unavoidable; that is, the right to own, control, and develop personal property versus the right to swim at an ocean beach or explore a rocky bluff.

(c) How to eliminate as many conflicts in land use as possible through the implementation of innovative technology, for example, by encouraging the siting of electric powerplants or other industrial complexes at off shore locations rather than in ecologically fragile estuarine zones.⁵⁷

(d) How to include both the quantifiable and nonquantifiable values of regional and national society in the decisionmaking process at the State level.

(e) How a regionwide plan, once determined, might effectively be implemented using the legal tools at the disposal of each individual State; that is, effluent discharge fees, zoning, easements, et cetera.

This completes the outline of a new political framework for the allocation of shoreline resources and the management of land use in the coastal zone. Let me now turn to a comparison of these concepts with those set forth in the coastal zone bills cited previously.

It seems clear that while the various coastal zone management bills now under consideration have established the role of the States in a substantive way, they have at the same time ignored the most

⁵⁷ D. W. Ducsik, "Offshore Siting of Electric Power Plants", Jan. 15, 1971. See accompanying article, this publication.

crucial recommendations set forth in every study as to the role that the Federal Government must play in the overall management system. Each bill calls for State coastal authorities to develop plans that set forth objectives consistent with regional and national interests—yet none provides for the establishment of uniform guidelines for the States to follow in the determination of these interests. Each bill calls for the States to provide a mechanism for the resolution of conflicts, fostering the widest variety of beneficial uses to maximize social return—yet none suggests the mechanism by which the needs and values of neighboring States can be effectively included in the trade-off analysis.

In addition, none of the bills makes provision for the establishment of national policy objectives and guidelines for planning by which the plans of the various coastal States can be coordinated. Nor is there any indication of how the administrator at the Federal level is to go about determining whether or not each individual State's master plan is consistent with the national interest. Only one bill suggests a mechanism for the resolution of Federal-State conflicts while none tackles the crucial issue of inefficient allocation due to secondary effects between States. While all these bills seem to effectively spell out the roles of the States in coastal zone management and establish the financial and informational bases of support for such efforts, they are seriously deficient in providing for a strong Federal involvement that is necessary for two important reasons: (1) to establish substantive policy objectives and guidelines for effective coordination, on a regional basis, of the separate activities of the individual States; and (2) to take the lead in tackling the difficult issue of *how* to make decisions (at State, regional, and Federal levels) based on trade-offs between measurable and nonmeasurable benefits and costs to society at all levels. Unless this involvement is provided for at the Federal level any political reorganization that relies on the primary role of the States attacks only half the problem. Thus, we would have to be prepared to accept, at best, halfway solutions. There is doubt in my mind that this would be any improvement over the situation as it exists today, as inefficient and deplorable as it certainly is. There is real danger here for we run the risk, for all our well intentioned efforts, of creating more serious problems than those we are striving to solve.

B. PRICING POLICY FOR PUBLIC RECREATION LANDS

(By W. Robert Patterson, MIT)

I. INTRODUCTION

The guarantee of open spaces and recreational areas is not an isolated policy on which politicians and government agencies can act independently but is just one of many policies to be evaluated, having as their common denominator the resource land. Open spaces and recreational areas are lands to which people can go for the enjoyment of their beauty, or recreational areas where people can appreciate the pleasures of outdoor activities and living. Recreational areas can also be the black-topped basketball courts stuffed into the heart of the ghetto, for this area serves a similar purpose to its users. The urban recreational area is more a function of city planning and land resource reutilization within the urban-industrial core and, as such, will not be treated in this paper.

Open space land development involves the trading of costs and benefits between agricultural and nonagricultural land uses. Non-agricultural land uses include urban developments, public facility developments, industrial usage, wildlife reserves, parklands, and Federal, State, and local recreational areas. Some of these are for direct consumptive use such as homesite establishment, while others use land as the necessary resource in the process before the end product reaches the ultimate consumer. By measuring the benefit-cost ratios for all those competing uses, the land manager can determine which use best meets the demands for the future. Land for parks and recreational areas must compete for existing available land on this basis.

The demand for parks and recreational areas depends upon many factors. The most important ones are the size of the population, the level of income, the amount of leisure time, and the type of transportation available to the users. Social, cultural, and physical factors like the level of education, the amount of physical activity on the job, and the level of community participation in recreation, influence the demand to a lesser degree.

Over the years, these factors have been changing so that the demand for recreational areas and parkland has increased. This trend does not seem to be leveling off, but rather all indicators point to greater rates of growth in the demand for the future. The problem is one of providing the new facilities and maintaining the existing ones to meet this demand. The supply of land for recreation and open spaces is a fixed quantity. Also, it is a characteristic of much recreational and open space land that many uses render them economically unsalvageable. The recreational use of these available lands must compete with all other possible uses. In the long run, the people must indicate how they would like these lands to be used, by their preference in the market place or indirectly through the political process. Their demands for recreational lands are shown in their willingness to sacrifice

the use of these lands for those competing applications, in order that they can develop parks and recreational facilities. The magnitude of their demand is reflected in the price they are willing to pay for the recreational activities available to them.

This paper focuses upon the pricing policy in the establishment and management of parks and recreational areas. What price should be charged the users of these areas and how does the price set influence that use? Pricing is one of the key issues in the present utilization of recreational lands and in the development of facilities for the future. Should the price charged reflect in any way the benefit accrued to the user? This type of pricing policy treats the recreational experience as a private good. The opposite position can also be taken. Charging the users very little and collecting taxes from everybody to pay for these facilities. In this case, the recreational facility is a public good. This paper looks specifically at the public versus private good arguments relative to pricing.

In order to understand the problems in pricing, an overview of the trends, past, present, and future, of recreational demand is given. Following this, the pricing history of parklands and recreational areas is documented to complete the background. The current problems of pricing are discussed and conclusions are drawn on the best method to price the use of public recreational lands. The discussion and analysis continues by formulating several objective functions for parkland use, then setting forth the pricing policies required to meet these objectives. In conclusion, the future trend in recreation is reiterated along with a summary of the key issues of public recreation and the pricing policy best for the development and maintenance of recreational areas.

II. DEMAND—PAST, PRESENT, AND FUTURE

Open spaces and recreation areas are economic goods which the people of this country desire along with all other goods. The benefits of these recreational goods are far more intangible than most commodities and very difficult to evaluate due to the treatment of these as public goods. Accordingly, the demand for lands as recreational areas is a most complex problem to appraise.

In the early years of this country, the demand for land as homesteads was great. It was one of the prime motivating forces behind the dynamic movement of the economy. This land not only supported the family, but also provided the necessary place for outdoor activities. The goal for each individual then, was to own his land. Frederick Turner noted in his book,¹ "The Frontier in American History" that "the existence of an area of free land, in continuous recession, and the advance of American settlement westward, explain the American development." Thus, along with economic and social growth of the country, the available lands for open spaces were dwindling. The "continuous recession" ¹ of free land is most relevant to our demand for recreational areas today.

The actual demand for recreation in the 1800's was limited, although public policy for city recreation areas dates back as far as 1828 in Philadelphia. It was not a widely demanded good, because of

¹ Turner, F. J., "The Frontier In American History," Henry Holt, New York, 1920.

the puritanical concepts of the people who regarded hard work as virtue and leisure as something to be shunned. At the same time, the very activities, which are demanded today for recreation, such as hunting and fishing, were just part of the everyday life then.

It was not until the urbanization of the late 1800's and early 1900's that the demand for parklands and recreational areas started to materialize. The concentration of people in cities and their increased affluence, created different needs in society. The establishment of professional sport teams helped counter some of the puritanical attitudes. The major impetus came during the 1910's and 1920's. Population concentration in the urban areas was reaching 40 to 50² percent, and the mobility of the people improved with the development of the automobile. In 1916 the National Park Service³ was founded, with 17 national parks and monuments being established before 1932. Many other Government departments have been established since to develop parkland and multiuse areas for recreation and conservation.

What are the causal factors in the demand for recreation? First and foremost is the population and its demographic distribution. In 1850 there were 23.2 million² people in the United States. Over the interim years there has been a rapid increase to the current 220 million.⁴ This number is projected to reach 351 million by the year 2000.² In 1850 only 15 percent of the people were urbanized while by 1900, almost 40 percent lived in cities.² Today over 70 percent of the population live in the urbanized areas and by year 2000 the concentration could exceed 80 percent.² This means a critical congestion of people onto a small percentage of the available land and a continuous reduction, due to the increasing numbers, in the land available.

Another of the causal factors that influences the demand for recreation is the level of affluence in our society. There has been an upward sweep of both the real personal income per capita and the percentage of it spent on recreation. Adjusting for the depression and the war years, expenditures on sports equipment as a percentage of disposable personal income rose on the average of 1 percent per year during the 1930's and 1940's and increased to 1.5 percent during the 1950's.⁴ The demand for recreation is keeping up with the 1.5 to 1.75 percent increase of population annually.⁴ The current trend in real income per capita is nearer to 2 percent.

Leisure time is also a most important causal factor. With the continual shortening of working hours, the hours of leisure available to each person are increasing. Recent proposals for converting to a 4-day workweek indicate how strong this trend may be. Over the 50 years from 1900, leisure time per capita rose about 27 percent, while real incomes increased about 150 percent.² Today the rate of increase in leisure time is changing even faster and is expected to increase by 12 percent by the year 2000.⁴ The working week in the year 2000 may be only 32 hours long.

The mobility of the population is another of the causal factors in the demand. As transportation systems improved, the relative cost per person in traveling to and from his favorite recreation area decreased.

² Ottoson, H. W., *Land Use Policy and Problems In The United States*, University of Nebraska Press, Lincoln, 1963.

³ Barlowe, Raleigh, "Land For Recreation," *Land Use Policies and Problems In The United States*, University of Nebraska Press, 1963.

⁴ Clawson and Knetsch, "Economics of Outdoor Recreation," *Resources For The Future*, The Johns Hopkins Press, Baltimore, 1966.

Before the First World War, travel by all mechanical means averaged 500 to 800 miles per person per year.⁴ During the twenties, travel by Americans made rapid increases so that by 1930, the average travel per person was 3,000 miles per year. Presently, this value stands at 5,000 per year, and by the year 2000 it may be as high as 9,000 miles per year per person.⁴ With the continual increases in real per capita income, more persons will be able to own their own means of transportation and the traveling in leisure hours will rise significantly.

Many secondary factors affect the demand for recreation. Some of these are, however, extremely difficult to quantify. For instance, total participation in outdoor recreation generally rises as the educational level of the participants rises. The correlation here is not clear since the level of income also increases with the level of education. The demand for recreation may change, as the relative position of the individual and the group changes in the whole social situation. Mass congestion may create abnormal demands for open spaces and physical activity in the outdoors. These demands may be channeled into other directions through communications media, but it may not be enough to control the large increases forecasted in the demand.

How large an increase is very much debatable. Marion Clawson, in his article "The Crisis in Outdoor Recreation,"⁵ foresees a fivefold to fifteenfold increase, from 1960 to the end of the century. The U.S. Forest Service is planning in terms of a fourfold projection for the same period while the ORRRC looks for a threefold increase. The ORRRC projection comes from the 95-percent increase in population from 1960 to the year 2000 and a 184-percent increase in the participation rate. Even the most conservative of those estimates is a disturbing realization for those who must create, develop, and maintain the parklands and recreational areas necessary to meet this demand. At the same time, consideration must be given to any decline in recreation facility use due to the increase in the number of people visiting the areas and to any downgrading in the quality of the environment from crowding or overuse. Education, mass media efforts, and community restructuring could bring about a marked reduction in the growth of the demand. It is impossible to imagine that the growth could change so drastically that the current facilities would suffice. Even in this case any restructuring in the type of demands would also necessitate a change in the recreational areas and parklands. Besides the causal factor influencing the demand, there are several significant features of the demand for recreation which must be noted.

The demand for recreation is unequally distributed throughout the population. The very young and the very old desire less recreation than do those in their teens and middle years. The type of recreation demanded by teenagers and young adults is much more physically active than for those of middle age. Participation by income shows that as the family income increases so does the demand. Barlowe in his article "Land for Recreation"³ states that for families whose income is under \$3,000 there are 18.5 days of participation

³ Barlowe, Raleigh, "Land For Recreation," Land Use Policies and Problems In The United States, University of Nebraska Press, 1963.

⁴ Clawson and Knetsch, "Economics of Outdoor Recreation," Resources For The Future, The Johns Hopkins Press, Baltimore, 1966.

⁵ "Crisis In Outdoor Recreation," American Forest, March-April 1959.

per person. For families with incomes between \$3,000 and \$6,000, the days per person increase to 33.4; and for families of \$6,000 or more, the averages are from 40 to 50 days per person. Within this level of participation the type of recreation enjoyed by the various income-level families changes. Quite obviously, yachting would not be one of the activities chosen by the lower salaried classes.

Other patterns exist in the demand. Cyclic fluctuations in the demand occur over the period of a day, a week, a month, and the year. Patterns also exist in the areas to which the people visit. Some recreation or park areas are used only in the summer, while others find use spread out more evenly during the year. The local areas are used during the year while people vacation to some of the more scenic parks. The reason for visiting the recreation area also changes over the season. The fishermen in the summer are replaced by the hunters in the fall.

The distribution of the demand over the type of recreation area available in the intermediate and resource base classes can be shown by the National Park Service statistics.⁶ Back in 1926, the demand for these parkland and wilderness areas was approximately 4.6 million visits. In 1956, it had increased to 52.5 million and is expected to reach 230 million visits by 1976. These visits were divided between improved public areas (areas improved by public funds), and unimproved public areas (wilderness areas). In 1936, one-fifth of the visits were to unimproved public areas but by 1964, twice as many visits were made to unimproved areas as were made to improved areas. This indicates either an interest of the people in wilderness areas or the lack of improved areas to go to. Of the total national park visits in 1965, one-third of these were to national parks, one-quarter to historical sights, and 10 percent to national monuments. Wildlife refuges for hunting and fishing have seen an increase in visitor days from 3.4 million in 1951 to 11.1 million in 1961, a threefold increase over 10 years.⁶ Over the 10-year period from 1955 to 1965 this value only doubled. Many factors could influence this demand, thus reducing its growth rate. Most important in this respect would be the adequate supply of areas available to fulfill the demand. If this supply were not sufficient, many people would have to do without.

The land required to increase the supply of land available for recreation must come from the existing 2,274 million acres in the United States. Of this total, 282 million acres is already available as nonurban public designated outdoor areas as of 1960, or slightly over 12 percent of the total.^{7a} The governments, Federal, State, and municipal own 34, 4, and 1 percent of the lands respectively. Of the 59 percent in private hands, 50 percent is designated farmland. Thus for future expansion of recreational lands, the Federal or State governments could increase the supply or farmers and private landowners could be convinced that it is beneficial to open their land for recreation. The policy to guarantee open spaces and recreation areas for the future

⁶ Clawson and Held, "The Federal Lands: Their Use And Management," Resources For The Future, University of Nebraska Press, Lincoln, 1957.

⁷ Outdoor Resources For Recreation Review Committee Reports, (ORRRC), GPO, 1962.

(a) ORRRC #1, "Public Outdoor Recreation Areas: Acreage, Use, and Potential."

(b) ORRRC #3, "Wilderness and Recreation—A Report On Resources, Values and Problems."

(c) ORRRC #12, "Paying For Recreation Facilities."

(d) ORRRC #19, "National Recreation Survey."

(e) ORRRC #22, "Trends In American Living And Outdoor Recreation."

must define which of the two is the most beneficial source and how the necessary lands should be made available and where.

III. PRICING HISTORY OF FEDERAL LANDS

A prime policy concern is with the issue of what direct charges should be made for the use of public recreation facilities. To set this discussion in perspective it is necessary to understand, at least in broad terms, the system of user charges that presently exists. Before commencing a discussion of this point, however, it seems desirable to first discuss the context within which the present system evolved.

First of all, the sale of Federal lands, resources, and its uses has never properly fit the economists' model of perfect competition. While it is true that in the early history of this country competitive sale of the original public lands was tried, little was disposed of in this fashion. There were several reasons for this. For one, the concept of selling land on the frontier at the greatest possible price conflicted with the whole prevailing social value system of the era. The idea of competitive sale was replaced with a system of fixed low prices, which became lower yet since they did not keep pace with the rising price level. Gradually, through the passage of years and through the homestead and other laws, the idea of the public domain as free land came to be accepted. Significantly, these along with other factors, gave rise to the attitude that public domain was common property, available on a first-come-first-served basis with little regard for the interests of the public at large. This attitude is part of our heritage and, to this time, still has its effects on Federal land policy.⁶

For the most part, the idea of free land is no longer valid today, but it has had an evolutionary impact on present pricing policies of Federal lands. Acts have been passed giving the Federal Government the authority to levy charges for the use and sale of Federal lands and resources; however, they have frequently been resisted and the charges that have been made are in many instances very low. The pricing policy of Federal lands has developed along other lines than the maximization of revenue. This has been especially true for recreational users of the public lands.

For example, the National Park Service has collected entrance fees at some major parks for quite a long time. Yet, prior to 1956 less than 10 percent of total expenditures on the national park system came from this source; receipts per visit averaged about 10 cents, and car entrance fees for the entire system averaged out to less than \$1 per car. In more recent years, entrance fees to the national park system have covered 5 percent or less of total expenditures. The National Forest Service, has also made some charges—although rather low ones—for some campgrounds and other areas. Receipts from this source were too small to be even shown separately until after 1956. Other Federal agencies, in general, made no charges for recreational use of land and water properties under their management prior to the midsixties.⁴

A significant development occurred in the area of pricing of Federal recreation lands at this point. This was the passage of the Land and

Water Conservation Fund Act in 1964. This act permits and encourages user or admission fees to Federal recreation areas when certain broad conditions are met; moreover, the imposition of admission fees does not preclude levying additional charges such as a camping or boat-launching fee. The passage of this act has stimulated to some extent the use of fees by a number of Federal agencies.

One reason to expect an increase in user charges is that funds raised from fees at Federal recreation areas, along with certain other revenues, are placed in the land and water conservation fund. Subject to congressional approval, these funds are available for recreation purposes as grants-in-aid to States as well as for the acquisition of additional Federal lands for recreation. It would not seem unlikely then, that faced with an increasing demand for recreation the Federal agencies would be under considerable internal and external pressure to increase the importance of user fees, in order to increase the land and water conservation fund.

The use of recreation fees and charges is, of course, not confined to Federal lands. A 1962 mail survey made by the Division of Parks of the State of Ohio, for example, indicated that 17 of 45 replying States made some charge for use of their parks, at that time. The proportion has no doubt increased since then. The survey also revealed the great diversity in the kinds of fees charged, ranging from a \$10 annual entrance fee to a 25-cent daily parking fee. Neither is the use of fees confined to the public level. Fees are commonly charged at private campgrounds or for activities such as hunting and fishing on private land.⁴

In summary, then, user charges for recreational lands are evolving from the point where essentially no charge was made to the present situation where they have become quite common. They are still far from universal and in most cases not a major source of revenue.

IV. PRICING: ITS DETERMINATION, APPLICATION, AND EFFECTS

Introduction

The intended effect of any free market pricing mechanism is to maximize the utility or social welfare function of the individual consumer or recipient of goods and services. The free market assumption, when related to recreational goods and services, may be challenged on the basis of numerous market imperfections that nullify competitive market theory application. Political processes, as history points out, dominate the less persuasive forces provided by economic analysis in allocating resources to satisfy an elusive demand for recreation that may often be characterized as a nonrevealed preference good.

Limiting this discussion to national (resource-oriented) and State (intermediate) facilities, it will be demonstrated that the arguments for classifying recreational goods as public commodities dominate those favoring a private categorization. The structure of pricing is clearly sensitive to the merit of this conclusion. The application of a user fee appears to contradict the philosophy grounding pure public commodities as exemplified in the rationale of the price theory of

⁴ Clawson and Knetsch, "Economics of Outdoor Recreation," Resources For The Future, The Johns Hopkins Press, Baltimore, 1966.

value in public finance in which taxes, either general or special, are considered the price paid for a collective good which may be regulated via legislative influence, by the buyer-voter. A balance sheet must be constructed to reflect the trade-offs involved with both user fees and taxation.

The effects of any pricing policy applied to recreational lands and services are quite pervasive. Investment decisions, mostly at the State level, often rely heavily on projected returns which might be required to retire bond issues. As a management tool, pricing can be used in rationing demand to prevent overuse, thereby maximizing total user satisfaction. By varying the pricing structure discriminately, user types can be regulated and various income distribution goals met.

It will be the purpose of this section to explore in detail the various introductory issues, applications, and effects influencing the pricing policy decision as related to resource-oriented and intermediate recreational areas. The public versus private good issue will be documented and a balanced opinion formulated. The implications on pricing policy generated by the public good classification will be researched highlighting the taxation or free access versus user fee issue. Finally, a cursory treatment of the various objectives and their pricing policy means will be offered as a basis for more detailed treatment in the section to follow on objective functions.

Recreational goods and services—Public or private?

The exact nature of, and justification for, a public good or service has been the subject of much economic theory and debate. Fiekowski sets three criteria which an intended public service must meet to justify its collectivity:^{7a}

1. It must be impractical to collect fees;
2. Benefits from consuming the good must extend beyond the individual to other members of society; and
3. The individual can have little knowledge of the effects of such consumption on his own welfare.

Samuelson, in his theory of government expenditure, defines collective consumption goods as those "which all enjoy in common in the sense that each individual's consumption of such a good leads to no subtraction from any other individual's consumption of that good." Downs further clarifies "collective goods" as those whose cost all citizens should be coerced to pay since an individual's share of the benefits is larger than the cost he alone would agree to pay.^{7a} He suggests intermediate cases of goods as well, noting that not all members of society benefit equally from public services which are limited by capacity. Margolis goes furthest in stating that there is no "technical" reason why services furnished by the Government could not be provided by private concerns.^{7a}

When focusing on recreation as a "collective good," as defined by the theorists, several inconsistencies are apparent. Fees can be collected in many cases. Increased consumption of any one resource

will ultimately reduce the satisfaction derived from that resource, on an individual basis. Such technical flaws do not preclude use of the public good concept in recreation, particularly in light of the numerous market imperfections inherent in a "private good" approach. It will be useful to methodically pursue the technical and practical arguments which have been put forth in defense of each.

The case for the public good

Competitive market imperfections abound when recreational services are considered. In pure competition, the seller must be able to withhold his product or service to force buyer prices up. Like national defense, the more esthetic pleasures of wilderness (clean air, panoramas, wildlife) could be withheld only at great cost, thereby destroying the marketability of the recreational "product." Public opinion also exerts market distorting forces as witnessed by the number of private landowners who have been coerced into opening their lands to hunting, fishing, etc. As Ely put it in 1935:⁸

Even though we respect the private owner's rights to land for productive purposes, we often experience a feeling of resentment whenever land is "posted" to keep out picnickers, hikers, hunters, and nature lovers whose use of the land does not and need not interfere with commercial land utilization.

Such opinion, though attenuated by increased urbanization, persists today. Clawson sums it up nicely:

All in all, the market structure of the outdoor recreation "industry" does not favor private suppliers of recreation opportunity.⁴

A number of practical investment considerations contribute to the lack of attractiveness of private recreational wilderness development. In the resource and intermediate parks, demand generally lags physical development of a facility, forcing the private operator to sustain losses during an uncertain number of years, during which volume must build to permit an eventual profit margin. Often the large size of recreational ventures, both physically and monetarily, present a risk factor great enough to deter investor pools. Even with government-sponsored risk insurance, which has been adopted in some European countries but not yet in the United States, the return on investment remains sufficiently low as to encourage enterprise to enter a host of alternative industries rather than put capital in wilderness type recreation. The present government concession system which is receiving much current support, is strictly a compromise measure and cannot be considered a viable investment in the context of this pro-public good reasoning, it should be pointed out.

Another valid argument points up a defect inherent in the free market system, namely the production of objectionable facilities under free enterprise due to the profit motive under which most managements must operate. By catering to those who are most willing and able to pay, recreational facilities will develop that do not appeal to the majority of prospective users. Cultural and esthetic aspects of the environment, it is reasoned, will be neglected as the construction of hotels, motels, and resort-type areas proliferates. An unequal income distribution would be the overall economic effect with the rich monopolizing the panoramas of the country's resource based parks. A public

service treatment properly administered, would therefore move toward income equalization.

Perhaps the most critical argument regarding pricing theory is based on the social externalities of consumption; i.e., the general public benefit that is derived from wilderness recreational areas. Such benefits include the building of a full and well balanced personal life, the vicarious pleasure involved in just knowing that such wilderness areas exist, and the improved welfare of the Nation in the aggregate. Such philosophic reasoning is difficult to justify quantitatively and the absence of empirical data on the subject is obvious to these researchers. Long ago, public schools were created out of similar reasoning over the objections of many who thought it immoral to be forced to pay for another child's education. In this case, the electorate and economists agreed that the general public benefits were so great as to justify whatever inequalities that developed from a general tax. Many experts in the field of recreation believe that their commodity produces similar benefits. The force of public opinion in the United States, however, has not yet rallied in this direction. Increased population densities of the future with the attendant frictions may very well provide the impetus necessary.

A final argument uses the efficiency of centralization as its premise. Global control of recreational projects and facilities permits the sensitive balance to be maintained between types of areas. The services of specialists such as archaeologists, geologists, and historians are available to a large management, services which would prove prohibitively costly to the private developer.

The case for the private good

The proponents of recreation as a private good rely on the more general attributes of the competitive market structure to justify their position. It is implicit in their reasoning that the social externalities for the consumption of recreational goods is exaggerated and that the consumer can display a preference for the commodity which is reflected in user data compiled by past researchers. By permitting the free market forces to operate, the most efficient allocation of nature's resources will be attained, and with a minimum of expensive government intervention. The problem of overuse would be rectified by the high prices that would accompany excessive demands.

A second line of reasoning attacks the government's, or any centralized management's, for that matter, ability to accurately determine the specific needs of its people in a timely manner. The free market would be more sensitive to changing patterns of demand, it is argued, and at the same time would eliminate the steel-grey uniformity that seems to accompany most products of bureaucracy.

The balance

A resolution of the public-private good issue clearly involves qualitative judgments which draw heavily on the personal character, experience, and motivations of the individual. In my opinion, the implementation of recreational facilities of the resource and intermediate types is best accomplished through a central authority. The problems outlined which would result from private control under free enterprise are very real as can be witnessed in areas outside of the recreational sphere; i.e., pollution. The adverse income distribution

effects created by free enterprise in this application are offensive to our senses of equality and social justice.

Pricing policy implications of the public good concept

Under a pure public good system, free access to all recreational facilities should be the rule, regardless of the costs involved in the initial purchase, in construction, and in continuing general maintenance of an area. A general or special tax levy would provide the funds for such an undertaking and everyone would be charged, independent of the amount of individual benefit accrued. This "pure" pricing policy must be modified, however, to accommodate several very practical problems.

Overuse, resulting from excessive demand, quickly despoils the esthetic quality of a wilderness environment. Several of our biggest resource parks (Yosemite and Grand Teton, in particular) are currently in danger of such overuse as automobiles choke terrain-limited roadways during peak periods. Expansion of such areas is an impossibility due to the physical constraints involved, leaving price as the most obvious rationing mechanism. Valid philosophical arguments again appear, decrying the reliance on social externalities of consumption as being excessive. Fairness dictates then, that some form of user fee be implemented to impart some element of individual (versus group) justice.

The arguments supporting user fees are entirely compatible with a modified public good concept. Advocates, referring specifically to State intermediate areas, reason that user fees make the person who lives out of State contribute, in some measure, to the cost of the area, relieving local taxpayers of the entire burden. Federal grants-in-aid to States cannot be expected, in this case, to alone eliminate this inequality. User fees will insure that the poor will not subsidize the rich, given the demand patterns across income levels that presently exist for outdoor recreation. User attitude will be improved, it is believed, if some fee is levied, causing a respect to develop for the facilities that otherwise would not have existed. (One can think of the opposite case here, where users consider the charge to go toward clean-up men's salaries, hence demonstrating less respect for an area.) As a management tool, fees could control use of parks, equalize income distribution, or accomplish a host of other policies that the central planning agency might promulgate. In a strictly practical vein, user fees would raise the necessary revenue to finance future expansion in the absence of government allocated funds, funds which require legislative sanction centered on the arousal of public opinion which may be difficult to generate.

Opponents of user fees resort to the broad economic principles surrounding the pure public good concept. The price theory of value in public finance, although not generally accepted by economists, provides the backbone for the "free access" ⁹ arguments. According to it, the Government acts as a producer or firm in the economy, providing public goods and services to the "buying" citizenry. Taxes are viewed as the price paid for such goods and services while the taxpayer is really a taxpayer-buyer. The determination of what quantities of goods and services to be supplied is then based on the

⁹ Escarrez, Donald R., "The Price Theory of Value In Public Finance," University of Florida Press, Gainesville, 1966.

taxpayer's vote in the political process, and the individual's taxes constitute the allocation of the value or cost of the goods and services. Theoretically, the majority will be satisfied with the results of their own voting recommendation.

Such a view is too abstract to be useful. Specifically, voters rarely cast their ballot solely or even remotely on the recreational policy stand of their candidate. Other more important issues dominate and the decision of the voter can be assumed to be relatively insensitive to the pressures of recreational demands. Letters to Congressmen and other forms of political influence are generally biased toward usage by the upper socioeconomic classes, in effect defeating the income equalization argument which "free access" is designed to engender.

Opponents of user fees also cite funds created by the practice as being subject to wild fluctuation in times of economic depression, causing havoc within the financial structure of the managing agency which will not be able to meet even fixed costs. This argument is not supported by demand figures, it should be pointed out. Park usage, save during times of declared war, has maintained a constant growth rate, independent of the state of the economy at any point in time.

It can be concluded that the need for user fees is a relevant one, considering the conditions threatening our parks due to increased population. In our opinion, user fees, coupled with other rationing devices, represent valuable management tools to the administering authority. This compromise of the pure public good "free access" policy carries benefits far in excess of costs and should be implemented, consistent with broader recreational policy goals.

User fee composition and other rationing devices

The amount of user fee to be levied is a function of general policy and the geographic makeup of the recreational area. Section V will outline this relationship in more detail. Similarly, the composition of the fee can be adjusted to implement such policy and is limited in variability only by the imagination of the governing authority. Entrance charges per car or per person are feasible in limited access situations. Passes, either hand held or of the decal type, can be issued annually or semiannually as an alternative to the pay-as-you-go structure. Specific activities within the park can also bear fees. Differential charges, based on the time of week, the geographic origin of the visitor, or, perhaps, the income of the user are other alternatives. Across the country to date, there are some 40 combinations of these basic fee structures that have been implemented with varying degrees of success.

Other rationing devices have found widespread use as well. In camping areas, maximum stay times can be enforced. For single-day activities such as boating, hiking, picnicking, or just sightseeing, upper limits on number of persons or cars can be set, turning away all excess demand. In an extreme case, the transportation to an area can be established by the authority (train line, shuttle busses, etc.), thereby limiting the density of the visiting throngs.

V. THE SIGNIFICANCE OF PUBLIC POLICY OBJECTIVES

As stated before, the purpose of this paper is to look at what role user charges should play in public recreational policy. Up to this

point, the analysis has been set against the background of (1) the development and expected increase in demand for recreation in the future, (2) historic governmental pricing policies as they apply to the sale and use of Federal lands, and (3) some of the commonly presented arguments in support of different user charge policies. If such a policy is to be formulated on a rational basis, however, it is necessary to take into consideration an additional factor: namely, the overall objective of recreational policy, as differing objectives will call for a different system of user fees.

The goal of public recreational policy in society, moreover, is but one aspect of the more general governmental problem of allocating resources among various competing uses. Thus, governmental policies influencing public recreation should desirably be consistent with this larger problem of maximizing social welfare, and the specification of what objective function should be operative is not an intuitively obvious one in this context.

One way to gain some appreciation of the variations in user charges that would result from different objectives is simply to list a set of objectives and hypothesize what pricing policies would be consistent with each. Before doing this, however, it should be interesting to look at what the stated objectives are of an agency such as the National Park Service, for in this case it is possible to make a comparison between the pricing policy we would assume to be appropriate with the system of actual fees.

One of the main problems in doing this is to formulate some definitive statement of what the operating objective of the National Park Service is. This is because usually multiple objectives are stated. To establish some understanding of what these guiding principles are, two quotations are presented below. The first is from the act establishing the Park Service wherein Congress said:

The Service thus established shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations, hereinafter specified by such means and measures as conform to the fundamental purpose of the said parks, and reservations, which purpose is to conserve scenery and the national historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.

A more recent statement of what the proper objectives of the Park Service should be was made by Secretary of the Interior, Stewart Udall, in a memorandum on June 10, 1964. He listed six objectives, three of which are noted below:¹⁰

(1) To provide the *highest quality* of use and enjoyment of the National Park System by increased millions of visitors *in years to come*. [emphasis supplied.]

(2) To conserve and manage for their highest purpose the natural, historical, and recreational resources of the national park system.

(3) To develop the national park system through inclusion of additional areas of scenic, scientific, historical, and recreational value to the Nation.

Both of these statements place a great deal of emphasis on objectives such as conservation and the maintenance of a high quality of use for

¹⁰ "Administrative Policies—For Natural Areas of the National Park System," U.S. Department of the Interior, NPS, GPO, 1968.

future generations. The statement by Secretary Udall also brings in the idea of expanding the park system presumably for the purpose of conserving these new areas and to add to the future enjoyment of the society.

If user fees were the only available policy instrument these objectives would seem to require fairly significant charges for at least two reasons:

(1) To serve as a rationing device to prevent overuse of the park system and subsequent deterioration.

(2) To yield a source of revenue for—

(a) Investment in the present park system to improve and maintain the quality of the parks; and

(b) Financing the addition of new areas to the park system.

Pricing policies are not the only available instruments, of course, and they are not the only possible source of revenues, and indeed for some conceivable objective functions pricing policies may not be very effective. But in this instance, with these stated objectives, and the facts that revenues from user fees represent such a small fraction of total expenditures,⁴ little attempt is made to regulate usage with the amount charged, and to ease the peaks in demand. It would seem that user prices and revenues are far below what they should be and inconsistent with the stated objectives of the National Park Service.

There are a number of other possible objectives than the official ones of the National Park Service. It is interesting to look at some of these and see what pricing policies they imply. In doing this, it may be convenient to reference figure 1 which attempts to portray graphically the total usage (or perhaps enjoyment) that may be expected over all time versus different levels of user charges, for say one park. This is admittedly extremely simple and restrictive but it brings out some qualitative effects.

(1) Conserve the natural state of the park. In this case very few people if any would be allowed into the park. This would be the case where extremely high user fees are levied.

(2) Maximize the usage of the park in the present. This is the opposite extreme to the previous alternative and is the case where so much use is made of the park in the present, that deterioration becomes so great the park is less attractive to people in the future. This policy would imply a zero or very low fixed fee charge.

(3) Maximize the usage of the park over time. In figure 1, this point is represented by Q_m . There are several aspects that should be noted about this case. First of all, there is no guarantee, unless cost functions can be specified, that the amount of revenue generated at this point will be sufficient to cover costs. Therefore, this case may represent some form of subsidy operation, as indeed may alternative 1 and as will alternative 2.

Furthermore, if the goal was to maximize usage of the entire system and not just this one park, the decision would be even more complex. For in this instance, a trade-off must be made between visits to this park and profit generated that can be invested in additions to the park system, which in turn, would bring in more people.

TOTAL LONG-TERM USAGE vs. USER FEE

FIGURE 1

(4) Maximize the profit of the park over time. This would involve setting usage at the point where the marginal net present value of benefits of additional use equals the marginal net present value of costs of additional use. In order to do this realistically an extensive cost-benefit analysis would have to be made analyzing future usage affects on expected costs and what pricing levels would lead to what usage in the future.

It is, of course, possible to extend such a list of alternative objectives almost indefinitely. However, the point to be made is that user fees should play an important role and exactly what form they do take will be influenced by the objectives society sets. Moreover, any realistic system of user fees would most likely want to take into account many factors not possible to show in figure 1, such as the attempt to even out peaks in demand and equating individual usage with incremental costs incurred, if this was consistent with the desired objective function.

VI. SUMMARY AND CONCLUSIONS

Participation in outdoor recreation has expanded rapidly in the United States in recent times and is expected to continue to do so in the foreseeable future. As projections of future recreation demand are related to changes in population, leisure time, income, and education, all of which are expected to increase significantly, even the more conservative estimates predict very large increases in future recreation demand.

Satisfying this demand and preserving the quality of our natural resources and open spaces at the same time is indeed a challenging problem. It will require large expenditures for new facilities and better management of the existing ones. Moreover, a number of practices that have been carried over from earlier years will need to be re-evaluated in the light of present and future demand to insure they are consistent with national goals.

One practice that deserves serious consideration is that of charging user fees for public recreation area. This has been done on only a very limited basis in the past, while somewhat more extensively recently. Revenues collected from this source cover only a small fraction of actual costs, however, and there would seem to be a large incentive to bring costs and revenues more into line. Such an action would have several beneficial effects. It would serve as a rationing device, a source of revenue, and to eliminate the degree of unfairness that presently exists. The present system is unfair in the sense that some persons are able to use resources at less than full value, while others cannot be equally accommodated.

It should be remembered, however, that public recreation is not a completely private good, and as such it has a number of collective aspects and externalities that must be taken into account with any system of user charges. Recognizing this, present charges and revenues are still much too low for the effective operation of the park system and should be raised.

PART III. ECOLOGICAL PROBLEMS OF COASTAL LAND USE

We have come to realize in recent years that pressures of development on our coastal lands have resulted in critical strains upon many of the unique and limited resources these lands provide. The proximity of coastal lands to the resources of the sea and to convenient water transportation have historically generated early concentrations of population along the coasts of our Nation. Low-cost transportation for industry, recreational values for individuals, and the indefinable amenities of the sea have nurtured the massive development we see today.

Multitudes of coastal dwellers have been prodigal users of the unique resources of the land. They have used the estuaries and the sea as garbage dumps and filled the marshlands to increase industrial acreage. Now the consequences are becoming evident. Life cycles of valuable fish and wildlife have been disrupted by pollution, dredging, and filling. Access to clean beaches and unpolluted water is far short of public demand.

The critical situation of our coastal lands is now widely appreciated and attention is being given to emergency measures at all levels of government. The situation can be instructive, however, because it demonstrates the evolution of a crisis in land use, a crisis which might have been averted with an appreciation of the limits of the resource and with thoughtful, comprehensive planning for its highest use. Consideration of the coastal lands situation should raise the question of what other classes of lands—perhaps less easily defined and recognized—may also be in critical supply. What other scarce land resources are we currently putting to inferior uses today?

The group of papers in this part were prepared by students working with Dr. John Teal of the Woods Hole Oceanographic Institution, Woods Hole, Mass. They describe some aspects of the importance of estuarine areas and the relation of land use practices to the estuaries. They also demonstrate the complexity of the problems which arise when ecological considerations have been ignored in the development of land for narrow purposes.

OVERVIEW

(By Prof. John M. Teal, Woods Hole Oceanographic Institution)

Some sort of sensible land use policy for the United States is clearly necessary. To decide what shall be done with our supply on land only on the basis of how the owner can make the most money is no longer suitable, if it ever was. This is true of all of our land but particularly so of the limited land associated with our coastline. For example, it makes a great difference to people throughout the country whether or not the

citrus groves of California are maintained for growing citrus or are sold for housing developments. But even if the best citrus lands are converted to growing houses and people, there are yet outer lands which can be used for growing citrus. The same sort of argument does not hold for our coastal areas (nor, for that matter, for any of our wetlands). The coastal wetlands are our most productive natural systems and a considerable amount of this production is, and much more could be, used by our citizens. Most of our fish and shellfish production depends on these areas. A considerable part of our recreational activities are concentrated at the edge of the sea. A number of industries cannot be located anywhere but directly on the coast, the most obvious examples being ocean shipping and fishing.

The limited nature of the coast which is essentially a linear rather than an areal feature of the landscape, and the greatly increased pressures which our growing population and economy are putting on the coast make it imperative that we plan to preserve these areas.

The student papers that accompany this note detail in brief form some of the problems associated with the coastal areas. Perhaps they overemphasize our lack of knowledge, for several seem to indicate that we would have to do years of work before making reasonable recommendations about coastal land use. I believe the intention was merely to emphasize the difficulty of the problem which became apparent to the students as they tried to find definite answers to the problems and questions they encountered.

A number of general conclusions can be summarized from these reports:

The coastal ecosystems of the United States are adapted to the changing conditions that are found in the coastal lands and waters throughout the year. Many of the kinds of animals important to us depend upon these seasonal changes to coordinate their lives. People may like to live in constant climates—air conditioned when hot, heated when cold—but many animals do not. Changes which we make in coastal climates which tend to even out the extremes, or to make changes more abrupt will be generally detrimental to the organisms living there.

Not only are changes in climate important, but interactions in various aspects of climate are important. For example, the interactions of temperature and salinity determine the survival of the young of many estuarine species of commercial importance.

Actions taken in one relatively small area of the coast may have consequences over a much larger region. The circulation of water along the coast and the migrations of animals up and down the coast distribute the effects of human action over a wide area.

Actions taken anywhere and everywhere in the watershed of a river will have their effects concentrated into the estuary into which the river empties. Thus land use many miles from the coast may be critical to the health of the coastal region.

An accidental event, such as the introduction of a new species of algae, may have important effects on the ecology and even the geology of the coastal region. I think the point to be made is that land use policy must be sufficiently flexible to adapt to such accidental, unpredictable changes as will certainly occur.

Of all our land types, the coastal regions are one of the most limited. I think a reasonable land use policy with respect to such a limited resource, would be to restrict its use to those things which must be there because they, by their nature, cannot be located anywhere else.

A. LAND USE—ESTUARINE INTERACTIONS: SOME CONSIDERATIONS

(By Bradford Butman, MIT)

INTRODUCTION

The biologic importance of the estuarine zone has often been neglected or overlooked when planning land use. This has occurred primarily for two reasons: first, the ecological value of estuarine land is not generally reflected in the market price, and second, it is often difficult to predict whether a land use will have a significant effect on the estuarine environment. A simple scheme is proposed which will identify when a land use could affect estuarine biology. Identification of possible land use—estuarine interaction is a necessary start toward intelligent land use planning. To determine the actual magnitude and significance of the interaction in any particular situation will require further detailed study.

BACKGROUND

Pritchard defines an estuary as follows:

An estuary is a semienclosed coastal body of water which has a free connection with the open ocean and within which sea water is measurably diluted with fresh water derived from land drainage.¹

In general, an estuary exists where the land meets the sea and there is fresh water inflow. Estuaries are mixing zones where fresh water containing 1 part per thousand or less of dissolved salts gradually mixes with sea water containing 35 parts per thousand dissolved salts. Much of the estuary is under tidal influence. Estuaries have also been defined as areas where there is significant fresh water influence. These areas may extend many miles offshore. This paper will be concerned primarily with the more conventionally defined estuaries, but it should be kept in mind that the influence of land activities on the ocean does not stop at the coastline.

Development in the United States has historically been on the coastline and particularly near estuarine areas where both river and ocean transportation are easily accessible. The coastal counties of the U.S. contain 33% of the population, four-fifths of it in urban areas, but only account for 15% of the land area.² Forty percent of all manufacturing is located in the coastal counties. With such dense population and industrialization, estuarine regions have many use conflicts. Use of the estuary for cooling water supply, waste disposal, urban development, transportation and recreation *compete with its natural function* as a biological habitat.

Estuaries are ecologically important because they are tremendously fertile regions, producing more food than is usable in the estuary itself.

¹ D. W. Pritchard, "What is an Estuary: Physical Viewpoint" in *Estuaries*, ed. by G. H. Lauff, American Association for the Advancement of Science, publication 83. (Baltimore, Md.: Horn-Schafer Co., 1967), p. 3.

² Federal Water Quality Administration, U.S. Department of Interior, *National Estuarine Pollution Study* (Washington, D.C.: U.S. Government Printing Office, 1970), p. 143.

and because many species inhabit the estuary for all or part of their life cycles. Conditions (light, nutrient levels, circulation, etc.) in an estuary-salt marsh region are such that plants can readily capture the sun's energy and store it for use by other organisms in the community. Estuarine regions produce about ten tons of organic matter per acre per year, whereas agriculture produces about one and one half to five tons per acre per year.³ Open ocean production is generally less than one half ton per acre per year. Ryther has estimated that the coastal regions of the world (which in his definition include a large part of the continental shelf, total about 10% of the ocean) support approximately half of the ocean's fish supply.⁴ Much of this production is in the estuarine zone. Thus a small area supports a great deal of marine life.

Many species inhabit the estuary for all of their life cycle. Others use the estuary for a spawning ground, a nursery, or as a means of passage to fresh water rivers. Table I lists the dependence of important sport and commercial fish on the estuarine zone.

TABLE I.—ESTUARINE DEPENDENCE OF IMPORTANT SPORT AND COMMERCIAL FISH

Biophysical region	Type of dependence		
	Permanent residence	Passage zone	Nursery zone
SPORTS FISH			
North Atlantic	Croaker, Atlantic mackerel, bluefish	Atlantic salmon, shad	Striped bass.
Middle Atlantic	Croaker, drums, Atlantic mackerel, spot, bluefish.	Shad	Do.
Chesapeake	Crabs, croaker, drums, spot, bluefish	do	Do.
South Atlantic	Crabs, croaker, drums, spotted sea trout, spot, bluefish.	do	Do.
Caribbean	Spotted sea trout, spot, bluefish		
Gulf of Mexico	Crabs, croaker, drums, spotted sea trout, spot, bluefish.	Shad	Do.
Pacific Southwest	Abalone, rockfish, barracuda		
Pacific Northwest	Abalone, rockfish	Salmon (chum, coho, king, red).	Pink salmon.
Alaska	Crabs	do	Do.
Pacific Islands	Barracuda		
COMMERCIAL FISH			
North Atlantic	Oysters, clams, croaker, flatfish	Atlantic salmon, eel	Menhaden, lobsters.
Middle Atlantic	do	Eel	Menhaden.
Chesapeake	Oysters, clams, crabs, croaker, flatfish	do	Do.
South Atlantic	Oysters, crabs, croaker, flatfish	do	Shrimp, menhaden.
Caribbean	Flatfish	do	Lobsters.
Gulf of Mexico	Oysters, crabs, croaker, flatfish		Shrimp, menhaden.
Pacific Southwest	Clams, abalone, flatfish		
Pacific Northwest	Oysters, abalone, crabs, flatfish	Salmon (chum, coho, king, red).	Pink salmon.
Alaska	Crabs, flatfish	do	Shrimp, pink salmon.
Pacific Islands	Oysters, flatfish		Lobsters.

³ From FWQA, p. 116.

The commercial value of estuarine dependent species is large. The U.S. fishing industry landed \$438 million of fish in 1967. Two thirds of the catch were estuarine dependent species. Five of the top six species by weight spend some part of their lives in estuarine waters (menhaden, crab, shrimp, salmon, flatfish). Seven of the top nine species by value also depend on the estuary in some manner (shrimp,

³ John and Mildred Teal, *Life and Death of the Salt Marsh* (Boston, Mass: Little Brown and Co., 1969), p. 196-197.⁴ John H. Ryther, "Photosynthesis and Fish Production in the Sea," *Science*, vol. 166, (October 3, 1969), p. 72.

salmon, oyster, crab, clam, menhaden, flatfish).⁵ The recreational value resulting from estuarine dependent species is difficult to estimate; however, salt water fishermen spent \$800 million in 1965. A user benefit scheme developed by the FWQA gives a crude estimate of the recreational value of estuaries as \$300 million.⁶ None of these estimates of estuarine value include multiplier effects.

Species utilize and depend on the estuarine environment in different ways. The variability of temperature and salinity, both seasonal and spatial, appears to be an important factor in the lives of estuarine species. The estuary is a fertile region, protected from outside predators that cannot stand the fluctuations or absolute levels of temperature and salinity characteristic of an estuary. The marsh grass *Spartina* inhabits the muddy banks of the estuary and is a primary source of food for many organisms. Oysters and clams use the estuarine bottom and depend on the tidal currents to circulate food to them and carry away their wastes. The menhaden requires the lowered salinity of estuarine water for proper metamorphosis and growth. The striped bass and the shrimp use the estuary as a nursery. The salmon uses the estuary as a passage zone to the fresh water in which they spawn.

THE ESTUARINE ENVIRONMENT

The estuarine environment can be characterized by three parameters: the shape of the estuary, the water of the estuary, and the circulation in the estuary. The ecology of the estuary depends significantly on each parameter. The parameters are listed below and their biologic importance is indicated. The parameters interact to some degree as a result of the variability and complexity of the estuarine environment. Although superficial, these parameters help to describe the important aspects of the estuary.

Estuarine flow

Circulation pattern—direction and speed of currents. Tidal flow generally dominates. Circulation influences the sedimentation pattern. distribution of water properties, temperature, salinity, etc.

Flushing time—how fast estuarine water is replenished and replaced by new river water and seawater. Important for pollution and plankton growth.

Variations in flow, seasonal and tidal—variations are characteristic of estuaries.

Turbulence—degree and rate of vertical mixing. May affect plant growth, chemical distributions.

Stream inflow—amount of fresh water entering the system, time distribution of flow. Strongly affects salinity distribution.

Estuarine water properties

Chemical content—

Dissolved oxygen—may limit animal populations, strongly affected by sewage discharge.

Toxic pollutants—may be lethal or harmful to populations. Oil, heavy metals, pesticides.

⁵ FWQA, p. 151.

⁶ FWQA, pp. 153-155.

Nutrients—may limit or enhance plant growth. Nitrogen and phosphorus are especially important.

Salinity—varies with season and tide. Tolerance varies with species. Salinities less than seawater characteristic of estuaries. Extremes are lethal to estuarine organisms. Variations are important.

Temperature—varies with season and tide. Tolerance varies with species. Variations are important to some species.

Transparency—clearness of water, may limit vertical extent of plant growth.

Estuarine form

Shape—influences circulation, number and size of habitats available.

Size—influences circulation, area available for productivity, habitats.

Character of bottom and topography—influences circulation, determines suitability for benthic habitats.

LAND USE—ESTUARINE INTERACTION

The survival of estuarine species depends on the estuarine parameters listed above. Land uses which affect these parameters will alter the ecological balance and may reduce the value of the estuarine area. Important effects may range from changing the absolute levels of of certain parameters to increasing or decreasing the variations of these parameters. The specific effect that a change will have on the biology of an estuary cannot be generally determined. However, once the interaction is identified, research can be initiated to determine the extent and significance of the effect. It is important to know whether an interaction will occur, and through what mechanism.

Table II summarizes various land uses and their effects on the estuarine environment. The primary influence is marked with a (1), secondary effects are marked with a (2). An (s) under form indicates that the change results primarily from sedimentation.

TABLE II.—LAND USE—EFFECTS ON ESTUARINE PARAMETERS

Activity and location	Flow	Water	Form
Watershed activity:			
Dam construction	1	2	
Streamflow augmentation	1	2	2(s)
Land use:			
Agriculture	1	1	2(s)
Industrial		1	
Urban	1		2(s)
Power generation (heat discharge)		1	
Mining		1	2(s)
Heavy construction, roads	1		2(s)
Estuarine activity:			
Marine construction (breakwaters, barriers)	1	2	2(s)
Land use:			
Agricultural	1	1	2(s)
Industrial		1	
Urban	1		2(s)
Power generation (heat discharge)		1	
Landfill			1
Transportation:			
Dredging (if required)			1
Pollution hazard		1	
Mining:			
Sediment			1
Pollution hazard		1	

Some of the mechanisms through which land activities affect the estuarine environment are poorly understood. Many activities remove the natural vegetation from the land. This results in increased runoff and thus increased fresh water flow into the estuarine system. Agriculture, road construction, and urban development all affect the estuarine circulation and the distribution of water properties through increased runoff. Artificial regulation of streamflow will also alter inputs of fresh water, particularly seasonal inflow. Impoundment of water in a reservoir may change chemical and thermal properties. Runoff, particularly from agricultural land, contains nutrients leached from the soil, and pesticides. These constituents directly affect water quality. Another class of activities introduces quantities of sediment into estuarine systems, affecting both water quality and estuarine form. Urban development, construction agriculture and mining fall in this category. It should be noted that the form of an estuary can be changed by direct means—filling, dredging, etc.—or by sedimentation. The process of sedimentation is complex, but intimately connected with the circulation. Thus a change in form through sedimentation can result from a change in circulation, or from increased sediment loads in the water. All the secondary changes in form listed in table II result from increased sedimentation, either as a result of circulation or increased sediment in the water, not as direct alteration of form.

The direct effects of estuarine and watershed activities listed in table II are obvious. Discharge of toxic substances, heat or wastes will affect water quality. Generally these discharges are a result of urbanization or industrialization in the estuarine area. Dredging, construction and landfill operation in the estuary will affect estuarine form. Finally, construction, dredging and mining will affect estuarine circulation and sedimentation.

CONCLUSIONS

Estuaries are a valuable resource. An estuary can be described with three parameters. Land uses in the watershed of an estuary and in the estuary itself should be examined to see whether they will affect any of these parameters. This procedure should reduce the number of land use—estuary interactions which are overlooked when planning land use. The more difficult problem of determining the specific effect on the estuarine environment due to specific changes in these parameters must still be studied.

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B. THE ECOLOGICAL IMPORTANCE OF A SALT MARSH

(By B. W. Tripp, Massachusetts Institute of Technology)

The salt marsh, for the nearly 200 years of our history, has been considered wasteland and of little value to man. Except for the earliest settlers who used marsh hay for their livestock, we have considered the marsh only as an undesirable breeding ground for noxious insects and fit only for waste disposal. To be of any value, the marsh needed to be "reclaimed." I intend to discuss a few of the environment-biosphere relationships that occur in a salt marsh and to indicate some of the vital aspects of marshes that have been ignored.

A salt marsh is an integral part of the estuarine system which it borders. An estuary by definition is a protected, semienclosed bay that is open to the sea and is diluted by fresh water derived from land drainage. The distinctive characteristics of the estuary make it an ideal spot for salt marsh formation. Geologically, the marsh is a transitory feature and will eventually transform into upland. Salt marshes are formed in sheltered areas behind sand spits and at the heads of bays. Material that has been eroded from the continent settles out from the water and the bay bottom rises to the low tide level (fig. I). At this level, the exposed flat can be colonized by pioneer species of plants and in vegetated areas of the mud flat the sedimentation rate is accelerated.

The vegetation causes the marsh to grow vertically upward and laterally outward to include the entire area of sediment deposit. As the marsh rises, a drainage system develops in the form of creeks which follow the previous channels of the bay. The new marsh is regularly inundated by the tides, and as the creeks carry the bulk of water in and out of the marsh, they are kept open by the scouring action that results. We now have a salt marsh—an intertidal plateau of silt and sand, covered with vegetation and regularly flooded by the tides.

This new salt marsh has the appearance of a meadow, as the only macro plant is a grass. Two species of the genus *Spartina* predominate in the marsh: *S. alterniflora* (cord grass), and *S. patens* (marsh hay). Zonation in the marsh is associated with dryness as the tall cord grass grows in the wetter, low marsh while the shorter marsh hay grows in the upper part of the marsh that is less often inundated by the sea. The other marsh plants are less obvious but they are also ecologically important and include mud algae and phytoplankton. The marsh is also an essential habitat to a large animal population that includes both marine and terrestrial species. Waterfowl such as the heron, egret, osprey, duck, and rail, can be counted in a wildlife population of insects, muskrats, deer, racoons, and skunks. Marine species that call the marsh home, are crabs, terrapin, snails, shellfish, and fish (especially during the juvenile stages of development). Between the two groups of macro flora and fauna we find the bacteria, which also fill a critical role in the system (fig. II). The salt marsh ecosystem supports

fewer species than a terrestrial ecosystem might because only a few plants or animals can adapt to the extremes in temperature, salinity, and wetness that a marsh undergoes.

Plants

Macro plants.—Cord grass, marsh hay.

Micro plants.—Blue-green algae, filamentous algae, green algae, phyto plankton.

Bacteria.

Animals

Wildlife.—Ducks,* heron,* egret,* osprey, rails,* sparrow, raccoon, deer, mouse, opossum, skunk.

Fish.—Minnow,* menhaden,* flounder,* striped bass,* bluefish.*

Insects.—Grasshoppers, mosquitos,* leaf hopper.

Mud Dwellers.—Clams,* mussels,* snails,* sea anemones, blue crabs, worms, fiddler crabs,* protozoa, hermit crabs.

FIGURE II. A partial listing of the flora and fauna of a Salt Marsh. An asterisk indicates species for which the marsh is an essential habitat.

However, this implies that these relatively few species are free from their natural competitors and enemies; hence they are more abundant in the salt marsh than they otherwise would be. Using this brief description of a salt marsh as a starting point, I will now expand on some of the specific interrelationships that occur within the system and try to show how these relationships create a balance that is of acute importance to man.

The primary production of a marsh is mainly accomplished by the marsh grasses, with secondary importance given to algae and phytoplankton. The growth of marsh plants is like other plants and is affected by the supply of nutrients, availability of sunlight, water, and by temperature. Given the proper growing conditions, the plants, as primary producers, synthesize inorganic materials into plant material that is usable to animals. The nutrients are available from the sediment deposits upon which the marsh is built, they are recycled from decayed organic matter, and are found in solution. Many nutrients are brought to the estuary via the river and, as a result of the currents caused by the mixing of fresh and saline waters, these nutrients are trapped and used rather than being swept out to sea. As previously mentioned, plant species that inhabit the marsh are found in certain areas, depending on the amount of wetness present. Cord grass, which grows as tall as 6 feet, covers the low marsh and the banks of tidal creeks where the soil is premanently moist.

Salt hay grows in the upper marsh where the soil is drier and less saline. Both of these species are perennials and begin growing in the spring but are dormant in the winter. Together they account for two-thirds to three-fourths of the total production. The mud algae produces less material than the marsh grasses, but it is productive all year long and this fact makes it an important factor in the salt marsh ecosystem. In the summer, algae produces fastest at high tide and in the winter it produces fastest at low tides in order to take advantage of the limited warming of shallow water. The unicellular phytoplankton which grow suspended in the water are the least important contributors to the primary production of the marsh. This is due to the fact that the turbidity of the silty waters reduce their photosynthetic ability, to the fact that constant mixing by the tides keeps the population dispersed, and to the fact that the volume of the tidal creeks is relatively small compared to the total volume of the marsh.

The salt marsh system is extremely productive and it compares favorably with agricultural areas. The results of chemical analysis of plant materials varies with species, but all of the plants produce protein, fat, carbohydrates, and vitamins in substantial amounts. On the basis of dry weight of material produced, the marshes surpass most agricultural lands, including intensely farmed areas of developed countries, (fig. III). It must be noted that this high production is realized without any effort by man and that this production is available to be utilized by man.

It should also be noted that this productive system is a self sustaining one and does not need to be constantly and artificially maintained as does an agricultural system. The utilization of the very high salt marsh production is especially interesting because in this system, unlike most others, production gets ahead of in situ consumption and there is an excess of energy-bearing material. This material can be stored for later use or can be exported, and it is the export of material from the salt marsh to the estuary that makes the system so important. The salt marsh production is utilized in two ways. First, and least important, is direct consumption of fresh plant material by herbivores and plant parasites. This path way accounts for about 5 percent of the total crop. The second type of consumption is that of detritus feeders (crabs, snails, mollusks, worms), who utilize the material after it has been broken down by bacteria and fungi. Decomposition of marsh grass and algae occurs in the gut of plant grazers, and the residue is available to other organisms in the form of feces. Decomposition of the actual plant by bacterial action begins with the rupture of cell membranes and subsequent release of cell components to the environment. Fresh detritus is especially nutritive for detritus feeders because it still contains protoplasmic material and adhering bacteria which are easily digested. Older detritus contains relatively more carbohydrate and less protein, but because decomposition is a continuing process there is usually a mixture of both old and new on the surface of the salt marsh.

<i>Grams of organic material per meter ² per year</i>	
Marsh	2,000
Ocean, Continental Shelf	300
Ocean, open	100
Wheat, world average	340
Wheat, maximum yield	1,400

FIGURE III.—Table showing annual production (dry weight) of marsh land, oceanic areas, and agricultural land.

Fig. IV: diagrammatic representation of the flow of energy-bearing materials through the salt marsh system. (after Teal).

Detritus is critical to the estuarine ecosystem because it is the main pathway by which energy flows from plant producers to animal consumers (fig. IV). It serves to store the energy for later use, to transport it to less rich areas of the system and as a buffer mechanism against lean periods. The marsh exports 45 percent of its net production, and most of this is transported in the form of detritus. I would like to emphasize this important fact of marsh export. A useful analogy would be that the marshes are the "wheat fields" that give sustenance to the "teeming cities" of fish in the estuaries. In comparison, a forest is also a balanced system but its total production is utilized in situ (there is no excess of material for export) and agricultural lands which are unbalanced, operate at a net loss, requiring the artificial replacement of nutrients. Although the nutritive value of detritus has been described, the actual pathways of utilization are not fully understood. Detritus may be reused or used partially by one organism and then passed on to another. For example, a crab may ingest large detrital particles, assimilate some of their components and then excrete a residue that is further utilized by snails or worms.

Besides the instrumental role bacteria play in the formation of detritus, they are important in other respects. Because of their large numbers, their rapid rate of multiplication, and their intense biochemical activity, they have a pronounced effect on the chemical and biological conditions of their environment. As has been described they break down plant material into usable components for animal consumption and they add to the nutritive value of detritus when adhering microbes are actually ingested. In addition, bacteria are responsible for the remineralization of organic matter—thus completing the circuit by making nutrients again available for utilization by plants. Finally, some species of bacteria are able to synthesize vitamin B₁₂, which is also a valuable export of the salt marsh and is utilized by all of the animals that come to feed in the estuary.

The salt marsh, discussed in abbreviated form above, is of vital importance to man and this can readily be seen when commercially important organisms and their relationships to salt marshes are studied. The coastal fishery has its beginnings in the marsh. It has been shown that at least 60 species of fishes are dependent on the estuarine-salt marsh ecosystem at some stage in their life cycle. Such species as flounder, menhaden, bluefish, anchovies, and striped bass, all spawn offshore but send their young up into the estuary where they attain most of their growth. Tidal creeks are actually "nurseries" for the juvenile of these species.

Of economic importance is the fact that about 90 percent of the total harvest taken by commercial U.S. fishermen is dependent on the estuaries. In 1960, sport fishermen in New England landed 800 million pounds of fish, worth over \$60 million—500 million pounds of this catch consisted of species that depended directly on the energy excess produced in the salt marsh. The menhaden has been studied rather closely and McHugh estimates that an estuary can produce 780 pounds per acre of this fish. Using shelled hybrid corn as a food source, man can produce 1,000 pounds per acre of poultry, 540 pounds per acre of pigs, and 270 pounds per acre of cattle. Menhaden reared naturally do not differ greatly in overall production from livestock reared by man's efforts. In addition to the various fish that need the

estuary, other economically important species such as shrimp, clam, blue crab, and oyster could not exist without its supply of nutrients and its protected waters.

The salt marsh serves man in other ways besides supplying most of the seafood that is consumed by him. Its resiliency serves as a buffer zone that protects the upland against disastrous flooding and erosion. The marsh is a natural safety valve that dissipates the energy of storm waves before they can damage coastal structures and cropland. The marsh vegetation acts as a sediment trap and contributes to the settling out of suspended material. If the marsh is destroyed, sediment normally deposited here becomes available for deposition in channels, harbors, and other navigable areas. Hence, marsh destruction intensifies silting problems elsewhere.

In summary, the marshes add a fringe to the continent and form a feature of great ecological and economic magnitude. High productivity is maintained by—

1. The ebb and flow of tidal action which serves to transport nutrients.
2. An abundant supply of nutrients.
3. Rapid regeneration and conservation of nutrients due to the activities of micro-organisms and filter feeders.
4. Three types of primary producers (marsh grass, mud algae, and phytoplankton) that insure maximum utilization of sunlight in all seasons.
5. Constant, year-round production of plant material.

This high level of production is naturally maintained by a dynamic system of continuous interactions, and the effects of man on these interactions generally leads to a general deterioration of the marsh's functions.

In spite of man's general attitude that wetlands were fit only for dumping, human effects on them were unimportant until the 20th century. The great expansion of power production, increased industrial activity, increased movement in navigable waters, higher fishing intensity, and more sewage discharged into natural waters all have combined to put strains on the estuarine system. It may be noted here that one-third of the U.S. population lives and works close to an estuary. The estuarine ecosystem is a limited vital resource and decisions concerning the use of this resource are not now made in a rational manner. To date, man's effects on the marshes have been unimaginative, poorly planned, and frequently destructive. Many uses are served by the wetland-estuary system and the system is under ever-increasing pressure from many sources. Intelligent management is imperative, but for this to be realized, more basic research is needed to produce facts upon which to base rational decisions (fig. V). Human influences on the marshes fall into the following categories:

1. Modification of river influx, resulting in salinity changes.
2. Organic enrichment, mainly through the discharge of municipal wastes.
3. Addition of heated waters from powerplants.
4. Alteration of the drainage system.
5. Addition of noxious compounds such as industrial wastes, pesticides, and oil.

RESEARCH NEEDS

Physical processes.—Flushing, circulation, mixing, diffusion, light absorption, sedimentation rates.

Chemical processes.—Fate of terrigenous compounds, fate of man-made chemicals.

Biological processes.—Reactions of various species to pollutants such as oil, heavy metals. Nutrition, genetics, general physiology, growth of wetland species—including those not directly useful to man. Interrelationships between species energy flow.

FIGURE V. A list of basic research that must be accomplished before intelligent decisions concerning multiple use of the wetlands can be made.

A few examples from this list should show how many of our actions, including those not directly related to wetlands, often have very serious effects on them. Marshland can be destroyed directly by dredging it for harbor and marina construction or it can be reclaimed to make space for houses, highways, industry, golf courses, etc. Many of man's activities produce more subtle effects and nearby highway construction, erosion of agricultural lands, or sand and gravel operations may increase silting to the point where it smothers the marsh and the marsh grasses are replaced by less productive species. Drainage of the marsh for mosquito control often has mixed effects. It usually results in improved flushing action which makes more area available for food and habitat but vegetation changes also can result in less productive grasses being introduced. This is especially true when salt pans are drained and the wigeon grass they contain dies, making the marsh much less suitable to migratory waterfowl. The introduction of pesticides or industrial wastes such as heavy metals and petrochemicals has been well publicized, along with the resulting destruction or closing of shellfish beds. Pollution by such chemicals drastically alters the salt marsh system and destroys its function by damaging flora and/or fauna species that are critical in the food web. In Connecticut, the average annual value of the shellfish crop between 1900 and 1920 was \$20 million. As a result of the direct destruction of marshland and the destruction of its functioning by pollution, the average annual value of shellfish since 1955 has been \$1.5 million.

The decision that usually must be made is whether to maintain the wetland area in its natural productive state or to alter it to make it more directly useful to man. Cost-benefit ratios that are used in making this decision are usually computed on a short-range, purely economic basis. We must reverse this policy and begin to include all of the costs, including the concealed social and long-term costs, when making decisions that may cause alterations of the wet lands. Usually "development" of wet lands yields substantially increased profits for the developer, but if all the costs of the resulting damage are totaled, the net loss to other users would greatly offset these private gains. This does not imply that we cannot utilize wet lands to a greater extent than we do now, but any increased utilization must be based on ecologically sound principles. For example, usable "crops" such as oysters, crabs, and clams can probably be more intensively produced but to do this we must first learn more about the energy-flows within the system. The diversity of the salt marsh reduces the usable production because organisms other than man remove energy from the system. However, it is this diversity that gives stability to the

system and concentrating on the increased production of a single crop would destroy this stability and lead to a boom and bust economy.

Simplifications of the present system by man may destroy the self-fertilizing and energy transport systems that are currently functioning and quite possibly the extra input required to maintain a one-crop estuary would be more than the benefits gained by the increased production of this crop. Another possibility is that wet lands can be used as a natural tertiary treatment plant for municipal wastes. The detritus system of energy transport and storage could probably handle the increased nutrient load without upsetting the existing balance. However, more research is again needed before this can be accomplished without resulting in the destruction of the marsh. Are some municipal wastes incompatible with the system? How does the system react to the increased nutrient load? What changes occur in floral and faunal populations? Can the increased production be utilized? These and many other such questions must be answered before we can extend our wet land utilization into such an area.

Expanded utilization of wet lands will require knowledge of long-range effects and coordination between the various agencies and organizations that make land use decisions. The entire ecosystem must be evaluated, as sound decisions cannot be made by considering only bits and pieces of it. At present the multitude of private, local, State, and Federal agencies that have some control over wet lands are operating without a coordinating philosophy, with no intercommunications, and often with opposing mission. Mosquito control commissions operate solely to eliminate this one insect, and ignore hydrology and pesticide pollution. The Army Corps of Engineers bases its decisions on navigation and engineering factors only, and gives no consideration to the ecological changes that may result. Private organizations too often base their decisions purely on economic gain without regard to the environmental deterioration they may cause. Town zoning boards usually are interested in public health and overall population density, and make their decisions accordingly. I have tried to show that the marsh is an important resource to a large segment of our population and to a broad section of our coastal region. This general importance of wet lands makes the establishment of a council with an overview philosophy a necessity. Review and control of existing and proposed projects and activities by the many wetland users should be the main function of this council. Decisions made by mission-oriented agencies that result in alterations of the wet lands should be subject to review by someone who has the data to evaluate such decisions from the broader viewpoint of general effects on this vital and limited resource.

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C. THE EFFECT OF SEDIMENTATION ON PRIMARY PRODUCTION IN THE WETLANDS

(By J. MacIlvaine, Woods Hole Oceanographic Institution)

INTRODUCTION

There is presently no standard by which to measure the value of wetland areas. The value assigned to a given piece of land is commonly dependent upon the use to which the land is put, and much of the wet lands, especially such areas as swamps, marshes, and shallow bays are considered more valuable after they have been drained, dredged, or filled to allow commercial development. While fulfilling the demands of short-ranged economics, there are obvious shortcomings to such a system of land value appraisal, and in response to these, a program to establish a more realistic land use policy is developing. If such a program is to succeed, a much more widely based land appraisal system must be developed. It seems clear that the biological community in the wet lands will be considered in future evaluations. When such policies are formulated, therefore, it will be necessary to have as thorough an understanding as possible of the biological community in the wet lands, and the factors which are likely to influence that community.

This paper presents some of the information which has been collected dealing with the effect of sedimentation upon the wetlands community. Specifically, the nature of the interaction between sedimentation and food production is discussed. The implications of these interactions for the formulation of land use policy will be touched upon.

While it is not within the scope of this paper to discuss in any detail the genesis of the various communities, it should be noted that many arise from the interaction of sedimentation, plant growth, and tidal action as primary factors. A reasonable starting point is the estuary. Estuaries are the wide mouths of rivers, where the tides meet the river currents; or more broadly, an estuary may be defined as a body of water in which river water mixes with and dilutes sea water. This latter definition aptly suits the requirements of this paper, and can be taken to include areas commonly termed estuaries, lagoons, and lower deltaic regions. In addition, it sets no lower limit on the size of these features.

Estuaries are areas of sedimentation; since they are often protected from surf action by their shape or by sand spits or bars, the water is quiet in at least some parts of the estuary. In addition, there is abundant sediment available to the estuary, from the watershed draining into the estuary, and from seaward, in some cases. The combination of abundant sediment supply and quiet water conditions causes deposition of sediment. Tidal action is strongest in the central channels, and may resuspend sediment in these areas, reducing the net deposi-

tion. In most estuaries the bulk of sedimentation takes place in the peripheral, quiet areas, producing shallow flat sand banks. These, in turn, offer support for rooted marsh plants, which act as sediment stabilizers and accumulators, leading eventually to the development of the salt marsh. In areas of the United States where mangroves thrive, this process may be enhanced by the seeding of mangroves on sandy bottoms, followed by sediment accumulation and the buildup of a community.

PRIMARY PRODUCTION

The primary producers of the estuaries and associated salt marshes are of three types, including higher plants, algae, both on and in the sediments, and phytoplankton. Because of the basic instability of the environment, caused in part by the constantly shifting balance of deposition and erosion, the number of species in any wetland area is small. The competition between species is characteristically not intense, but rather the ability to withstand high salinity, strong winds, erosion or burial, salt spray, and periodic inundation is essential to the survival of higher plants. Likewise, algae must be able to withstand high turbidity, low salinities, tidal, and other environmental fluctuations. Many plants found in the wet lands have worldwide distributions within their physical tolerances. Widespread dispersal is due in part to oceanic circulation, which distributes resistant seeds and plant parts, and in part to transplantation by man¹. The uniformity of wetland communities offers considerable encouragement, since this would indicate that implications from detailed studies may be generalized with more certainty than is generally possible in nonmarine ecosystems.

Among the higher plants, the distribution of species in a given area is controlled largely by the range of tides, and a succession of plant groups generally can be discerned proceeding from the deeper estuary, through the tidal flats and up onto the meadowy surface of the higher marsh. Below low tide levels, only those plants capable of withstanding continued submergence are found. Eel grass (for example *Zostera marina*) is a typical representative of this group. It flourishes on the muddy substrate found in protected estuaries, and grows in depths from slightly above mean low tide level downward to considerable depths, perhaps 75 feet in some areas².

In the region extending from low tide level upward to about mean sea level, including the areas of mud flats, seed plants are often absent except for local colonies of eel grass or salt marsh grass. Tidal flats present an unusually harsh environment for plants, with characteristic extreme temperature fluctuations and rapid water movements.

Salt marshes are typically developed on mud or muddy sand, between mean half tide and high tide levels, where perennial grasses or grass-like plants predominate. Lower levels within the salt marsh are exposed to the greatest influence of tidal influx, and coarse, reedy grasses predominate, while at higher levels, finer, lower grasses are found. Various varieties of *Spartina* are characteristic of the salt marsh vegetation².

Mangrove communities constitute a separate class in this discussion, which to this point has dealt with plants typical of temperate wetlands, similar to those found on the eastern coast of the United States. In

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areas favorable for mangrove growth, seedlings become established on shoals, banks, bars, and in bays and estuaries, on sandy soils which are commonly below sea level, but are moderately protected from waves. The young plants send out tiers of prop roots which act as traps for sediment and organic debris, and given proper conditions, the soil level may be built up into the mature swamp profile. After some 20 to 30 years growth, the mangroves become so thickly tangled that their roots act as highly effective sediment traps, and the community becomes extremely resistant to the erosive forces of storms. Plants invade the swamp, taking advantage of the accumulating soil, and in the mangrove regions mature communities consist of salt marsh associations grading into mixed salt marsh and mangrove types.³

The second major group of wetlands primary producers are the algae. These may occur as attached macroscopic varieties, microflora living on or in the substrate, or as free living phytoplankton. The distribution of these types is dependant upon a variety of factors. For example, the attached forms may be limited by tides, substrate, turbidity, temperature, salinity, pH, illumination, and wave height, among other factors. Red and brown algae are, on the whole, less able to adapt to reductions in salinity than are green algae, and thus those red and brown varieties which occur in the wetlands tend to predominate in subtidal and lower zones near the mouths of estuaries and lagoons. Green algae, on the other hand, tend to predominate in the higher zones and near river mouths.⁴ Some algae live on the soil, forming dense carpets in shallow water when conditions are favorable, and tend to stabilize marsh sand and mud; others live attached to stones or shells, and some are epiphytic on other algae or higher plants. Some types break loose from their substrate in rather large masses, and accumulate in deeper water.

Microscopic algae living on and in the sediment of the intertidal zone constitute an important part of the wetland flora. Pennate diatoms, green flagellates, dinoflagellates, and blue-green algae are common varieties. Diatoms migrate vertically each tidal cycle, moving downward a few microns into soft, wet sediments before inundation by the rising tide. Shortly after the sediments are exposed by the falling tide, they migrate to the surface, forming a layer one to five cells thick.⁵ The distribution of the benthic microflora is determined by a complex interaction of factors similar to those cited above for attached forms.

The phytoplankton in estuaries is predominantly marine in origin, adapted to withstand greater or lesser dilution by fresh water. These forms are closely dependent on nutrients supplied from land by the inflowing rivers, and great increases in phytoplankton concentrations often occur following the flooding of streams, bringing a large influx of nutrients, or following artificial fertilization by sewage containing nitrates and phosphates. Offsetting the effect of increased nutrient supply accompanying periods of great river discharge, is the inhibiting effects of increased turbidity, which reduces the light penetration. Thus the phytoplankton in estuaries is generally more abundant in the lower estuaries or immediately outside, than at the head. The reduced salinities at the heads of most estuaries is probably a contributing factor in this respect.

This brief review of the primary producers should give an indication of the variety of plants which live in the wet lands. While it is by no

means exhaustive, it is well to have a general feeling for the distribution of the flora which supports the wet lands community before proceeding to a discussion of the factors controlling the processes of production.

FOOD PRODUCTION

Studies of primary production carried out in the wet land tend to be of a few types, including measurements of photosynthetic activity and concurrent measurement of factors which the experimenter suspects of influencing this activity. Most studies on the actual production are limited in time to the duration of the experiment, which may be a few hours, and in space to the area under the bell jar, or the volume of the sample bottle. Care must be exercised, therefore, in generalizing the results of these experiments, which may or may not be representative of the area of study. There have been a sufficient number of productivity studies in some regions, however, to warrant generalization. Production studies can be divided into those studies which measure the total net production of plants in and on the sediment, including higher plants, attached algae, and microscopic benthic algae, and those which measure phytoplankton production.

Production studies of the first type commonly deal with salt marsh productivity. Pomeroy⁵ made bell jar experiments on algal productivity in Georgia salt marshes. Photosynthesis during low tide was significantly higher than at high tide in winter, while photosynthesis at high tide was higher in late summer. This is because illumination is inhibiting both in excess and insufficient quantities. Taken over a tidal cycle, the gross productivity is almost constant throughout the year, at about 1800 kcal/m² yr. The net production he calculated to be not less than 90 percent of this gross production. Smalley, and Teal and Kanwisher⁷ have investigated the productivity of *Spartina*, both by harvesting at regular intervals, and by respiration methods. Unlike algal production, the production by higher plants varies seasonally. For example, short *Spartina* may give values of respiration of 235 kcal/m² for 2 months of winter, and 6450 kcal/m² for 4 months in the summer. Averaged over the salt marsh, the gross production was calculated to be 24580 kcal/m² yr. of which net production constituted less than 25 percent. Thus, though the higher plants have much greater gross production, the net production of higher plants is some 6580 kcal/m² yr.⁶

Studies of plankton productivity in estuarine waters near salt marshes have been made by several workers.^{8,9} Using light and dark bottle measurements, Ragotzkie obtained slightly negative values of net production in the estuary for the plankton community including organic detritus and its associated bacterial flora.⁸ He cited the salt marsh as the probable outside source of organic material required by his results. Whether these results can be taken to indicate that there is actually a negative net production in the estuary is doubtful, in view of the time limitation in the experimental technique and the extreme variability of phytoplankton production. It is clear, however, that taken over its entire depth, the estuary has a much lower net production than the salt marsh.

Pomeroy compared the relative importance of various plant populations in Boca Ciega Bay, Fla.,⁹ and found that in waters less than 2 meters depth (which constitutes some 75 percent) of the area, phyto-

plankton, marine spermatophytes, and benthic microflora are about equally important as primary producers. He found that the compensation depth for phytoplankton is 5 to 7 meters, but the critical depth (of Sverdrup) is never less than 25 meters, and is typically much deeper. He concludes that the entire bay is productive throughout the year, with the greatest production between 1 and 7 meters depth.

THE ROLES OF SEDIMENT IN THE WET LANDS

The sedimentary nature of the estuaries is dependent upon complex interactions between the physiography and geology of the estuary and the watershed draining into the estuary, the circulation of the estuarine waters, climatic factors, and biological processes. Good detailed discussions of the sedimentary regime can be found in Lauff.¹ This paper will consider the sediments themselves only in so far as they affect productivity.

Sediment in the estuary may be suspended in the water or deposited on the bottom, and in either case it affects primary production. In addition, the active processes of sedimentation, such as erosion, deposition, and transportation also affect energy flow. To some extent, this discussion must also consider the processes taking place in the local environment of suspended particles, in so far as these affect productivity.

It seems obvious that if a large concentration of sediment particles (for example clay and organic detritus) is suspended in the water, then penetration of light will be sharply reduced. There have been numerous studies of the effect of suspensoids in scattering and absorbing light, but these results are somewhat superfluous to this paper. More to the point are studies which relate light penetration directly to the concentration of suspended particles. A good example of this type of study is by Chandler,² who determined turbidity (the inverse of transparency), temperature, standing crop of phytoplankton, and quantity of suspended matter, both organic and inorganic, at depths from the surface to 10 meters over the period of a year. He found that light penetration varied by a factor of 10 depending on the concentration of suspensoids: the depths to which 1 percent of the light penetrated varied from 9.7 to 0.8 meters; the percentage of light reaching a depth of 1 meter varied by a factor of 10.8, and the maximum light reaching 2 meters depth was 86.6 times greater than the minimum. Chandler showed that these differences are caused by variations in turbidity, which when expressed in terms of suspended sediment varied from 5 to 230 parts per million, and not to changes in the nature of incident light. Fluctuations in turbidity took place seasonally, the water being most transparent in winter, spring, and early summer, and least transparent during late summer and autumn. Further changes in turbidity took place weekly or daily due to changes in meteorological conditions. In areas where tidal currents are exceptionally strong, such as the Bristol Channel and Severn Estuary,³ turbidity may vary much more markedly, by a factor of 30, for example, between daily samples.

Such variations in the turbidity can be expected to have important effects upon photosynthesis. Pomeroy⁴ has shown that production by the marine spermatophyte *Thalassia* showed a linear relation to the intensity of radiation reaching the plants. The restriction of

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Thalassia to waters of 2 meters or less depth is most probably due to this effect. *Thalassia* is not inhibited by strong illumination as is much of the wetlands population, so that it grows best in very clear, shallow water. A small average increase in the turbidity of the water in which *Thalassia* is growing could therefore be expected to inhibit net production by this group, and perhaps reduce the area over which it is viable.

The turbidity of the water might be least important to those microscopic algae which migrate downward into the sediments during periods of inundation, and at the other end of the spectrum, the turbidity of the water has a salutary effect on those plants for which the incident radiation is great enough to be inhibiting during summer months. Pomeroy⁵ has presented photometric measurements which indicate that incident radiation may exceed the optimum value (cf. Ryther, 1956) by 0800 hours, and remain above optimum until 1600 hours during the spring and early summer in Georgia salt marshes. He postulated that when the marsh is under water, much of the sediment surface is within the optimum illumination range.

For those plants which live on or in the bottom, the effect of suspended sediment may vary according to the plants' light requirements. In some cases, increased turbidity may be inhibiting, for other plants it is not. This would suggest that long-term variations in suspended sediment concentrations might cause changes in the community of primary producers, giving an advantage to certain groups. Thus a decrease in average turbidity would favor the spread of plants such as *Thalassia*, since the increased illumination would have an inhibitory effect upon competing species.

The effect of suspended sediment upon phytoplankton growth is similar, since like most of the benthic microflora, attached algae, and higher plants, phytoplankton productivity is inhibited by excess as well as insufficient illumination. Verduin,⁶ for example, has shown that during early spring, before the phytoplankton pulse develops, growth is low regardless of turbidity; but as the season progresses, phytoplankton crops develop most rapidly in waters of intermediate turbidity. The crops remain low in the most turbid waters, and show only slow growth in the clearest waters. In considering the effect of turbidity upon phytoplankton growth, the entire water column must be taken into account, since in most estuaries mixing insures that the phytoplankton will be distributed more or less uniformly in the vertical direction. Thus if the light is essentially extinguished at half the depth of the estuary, the average time per day spent in light is reduced to some 6 hours. This type of argument may be extrapolated for any turbidity, and it is evident that increased suspended sediment not only diminishes the light available to plants in the upper waters, but also decreases the average time spent by plants in lighted water. It is well to note at this point that though the control of photosynthesis by illumination is obvious, there are other factors which are at least as important, any one of which may inhibit growth. Verduin⁶ reports low phytoplankton crops in Lake Erie which were obviously not limited by high turbidities.

To this point we have treated the suspended matter in the water as a passive element, affecting primary production indirectly through the reduction of light transmission in the water. While it may seem strange to visualize the sediment particles as very active agents in the

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wet lands, they are part of a dynamic system and in fact have an active role as well as passive in the biological community.

Shallow parts of the wet lands owe their existence to the balance between erosion and deposition. Thus in the steady state, tidal flats, even those with no protective vegetation, are maintained at a fairly constant level, the sediment eroded during storms, and carried seaward is replaced by new sediment from the estuary. There is constant deposition over the shallow wet lands (since some material must always settle out of suspension), and there is likewise constant erosion, the two processes acting in turn. The balance between these processes is largely dependent upon the amount of material suspended in the water. Erosion is largely independent of the concentration of suspensions, so that given constant physical conditions (range of tides, current velocities, wave height), erosion will remain unchanged, even if the amount of suspended sediment is altered. Deposition, on the other hand, is highly dependent upon the concentration of suspended sediments, both because the number of particles which settle to the bottom is proportional to the concentration of particles, and because various physical and chemical processes increase deposition as particle concentration is increased. Since sea level is rising slowly (it has been rising since the last glaciation), deposition must slightly exceed erosion for balance to be achieved. The factors controlling the balance of sedimentation and erosion are in fact much more complex than this, but for our purposes, we may assume that undisturbed, the wet lands will reach some sort of equilibrium, in which the various parts of the environment, the marsh, tidal flats, and open estuary achieve a stable configuration, more or less. In the next section the impact of man upon this equilibrium will be considered.

Considerable attention has been given in the literature to the effects of the biota upon the processes of sedimentation, but much less work has been done on the converse problem. Erosion of the salt marsh surface must affect productivity; burial of the benthic microflora must affect their growth. The solutions to these problems await further research, but some speculations are in order. Ranwell⁷ has measured rates of sediment accretion in British salt marshes, and found rates of up to 10–12 cm./yr., supporting similar reports of much earlier workers.⁸ There seemed to be no adverse effect of such high rates of sediment accumulation upon *Spartina*, indicating that higher plants may not be limited by high rates of deposition. The effect of this rapid deposition upon the microflora was not studied. Richards⁹ arrives at somewhat different conclusions from his studies of the Dovey Estuary, which indicate that in areas of rapid accretion, most of the energy of higher plants is required for upward growth of the main stem, with little development of branches. Faster accretion could presumably overwhelm the plants, leaving a barren surface. It is clear, however, that this would not represent an equilibrium condition: the factors controlling deposition will not allow continuous rapid accretion in the wet lands for long periods, especially if plants are absent. Thus we may conclude that rapid deposition may curtail the net production of higher plants, but will probably not eliminate their growth.

It would seem that rapid accretion might affect the benthic microflora more markedly than the higher plants. The ability of diatoms to

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migrate, for example, is limited to a distance of a few microns per day, which could easily be exceeded by fairly rapid accretion. Whenever the deposition rate exceeds the ability of the microflora to migrate upwards, the population at the surface will be a function of how rapidly the microflora can recolonize the mud surface, since new populations must be continuously established to replace those buried. The periodic nature of accretion could be important in this respect if, for example, colonization takes place sufficiently rapidly for a large population to become established and do considerable growth during those seasons when accretion is relatively slow. There is not enough data yet to indicate whether or not rapid accretion is severely limiting to the benthic microflora.

The process of erosion presents similar problems. There is ample evidence indicating that rooted vegetation affects the rate of erosion in tidal and supertidal ranges. There is an additional suggestion⁷ that the benthic microflora may stabilize the mud surface, even where rooted plants are absent. Again, the converse of these relations have not been sufficiently analyzed. We know that marsh and estuarine plants have a considerable ability to resist erosion, but there is no way to predict the point at which this ability will be exceeded and erosion will become dominant. Yet we do know that this situation is possible; indeed it can be observed along much of the coast of Louisiana. As with deposition, erosion has a potentially important but virtually unstudied impact upon the process of primary production.

The phytoplankton, too, is influenced by the processes of sedimentation, and the detritus which has been shown above to constitute a vital link in the energy flow is also affected by these processes, but here again there is insufficient data to draw significant conclusions. Weiss,¹⁰ has shown that when silts are centrifuged from river waters, as much as 50 percent of the population of *E. coli* may be removed. Fox and others¹¹ have demonstrated the potential significance of the sorption of organic dissolved substances to clays in the estuarine environment. Macroscopic organic-inorganic complexes occur mainly in the form of loosely aggregated, flaky, sometimes frothy mixtures of organic molecules, including vitamins, organic colloids, and organic fragments intermixed with various proportions of clay, silt, fine sand, and living microbiota. These detrital aggregates typically have a specific gravity approaching that of sea water, and settle out very slowly.¹² There have been no studies dealing with the direct interaction of sedimentary processes and energy flow through the agent of detritus.

These results imply that there are processes taking place in the local environment of suspended particles which could have important implications for the energy-flow system. In the estuary where both dissolved organic matter and inorganic sediment are abundant in the water, the concentration of organic matter by sorption onto clay particles may provide an important food source for estuarine filter feeders. Likewise, the process of adsorption of bacteria upon inorganic grains, and the composition and distribution of detritus are closely related to processes involving suspended sediment. The exact nature and importance of these processes remain uninvestigated, but these results indicate potential interactions of inorganic suspended sediment with biological processes related to primary production sufficient to warrant further research. At present we cannot speculate with

any certainty upon the possible effects of variation of the concentrations of suspended sediments.

THE ROLE OF MAN

I have discussed, where sufficient evidence exists, the possible roles of sediments and sedimentary processes with regard to primary production. This final section deals with the ways in which man may influence the productivity of wet lands through actions which influence the sedimentary regime. Man's influence may take two basic forms: (1) He may vary the amount of sediment in the estuary (or its distribution), and (2) he may alter the nature of the material entering the wetlands system. The latter would include sewage and industrial waste problems, problems involving insecticides and other particulate toxins, and so forth. These topics are receiving considerable attention, and will not be discussed here.

Man may alter the amount of sediment in the wet lands by a wide variety of actions, which may be divided into those actions which increase the sediment supply, and those which decrease it. Among the former, deforestation, agricultural practices, dredging, filling, and in some cases flood control, are among the most important. Of those actions which decrease sediment supply, flood control is the most important, involving the construction of dams, canals, spillways, and levees.

It is difficult to estimate the degree to which man can increase the amount of sediment reaching the estuary with any precision, because there are so few estuaries which have relatively undisturbed watersheds to use as references. For example, virtually all the virgin forest in the Chesapeake Bay watershed had been utilized before 1900, and erosion, siltation, and sedimentation which accompanied the deforestation increased throughout the 1800's. The magnitude of the cumulative effect is suggested by the estimate that half of the former upper estuarine areas for fish spawning and shellfishery areas for oysters have been destroyed or shifted downstream in Chesapeake Bay.¹³

There is no doubt that deforestation and poor agricultural practices increase wetlands sedimentation. What is more difficult to establish is the effect, in the long run, of such increases. It is also clear that if it can be shown that increases in sedimentation are detrimental to primary production, then a case can be made for measures such as effective soil conservation, small watershed dams, and larger reservoirs, all of which are effective in retaining silt.

Dredging and filling are now common wetland "reclamation" techniques. Due to the possible deleterious effects on the commercial shellfishery, the effects of dredging operations has been investigated^{14 15 16}, but there is as yet no study relating dredging operations to primary production. Generally, the effects of channel dredging are relatively local, but silt deposition has been reported as thick as 27 centimeters and as far as 0.5 mile from the dredging site.¹⁶ In addition to the stirring up of sediment by dredging, wave action resuspends sediment from the spoil bank for long periods after the operation has ceased, creating a possible long-term increase in suspended sediment concentration.

Footnotes at end of article.

Especially deleterious to primary production are dredging and filling projects on submerged banks, tidal areas, and salt marshes, where the effects of such operations are painfully obvious. It is testimony to the public's ignorance about the value of the wet lands that such operations continue to be so common.

On the other end of the spectrum are those projects which reduce the supply of sediment to the wet lands. While such practices have been cited just above as possible remedial measures for overabundance of sediment, there are instances in the United States where flood control has been championed to the exclusion of all other considerations, most notably along the Louisiana coast. Gunter¹⁷ has studied extensively the effects of flood control projects on the Mississippi Valley. In its natural condition, the Mississippi flooded annually, overflowing its natural levees and spreading out over its flood basins for many miles on either side. From the first settlement of the area, therefore, levees have been built; the present system exceeds 2,500 miles in length, and is up to 35 feet high. As the river was cut off from its flood basins, flood levels grew even higher, in New Orleans from 14.9 feet in 1882 to 21 feet in 1912. Gunter estimated that present flood heights are 10 times greater than before the levees were constructed, because some 35,000 square miles of overflow areas have been walled off and receive no flood water.

It is this overflow area which most concerns us here, much of which was formerly floodplain swamps and lower delta marshes. One effect of the almost perfect canalization of the Mississippi is the annual loss of about 730 million tons of fine soil, which is presently washed into the Gulf of Mexico each year. Much of this soil was formerly available to aggrade the swamps and marshes of the lower delta, and the loss to this area is equivalent to 380,000 acres of soil, 3 feet thick. There is clear historical evidence that these areas are indeed no longer aggrading, but are being destroyed by erosion caused by the slowly rising sea level on the Gulf Coast.

CONCLUSIONS

The insufficiency of the present data has been a recurrent theme in much of this paper. There is no conclusive evidence that sedimentary processes are being disturbed to the point of elimination of the wet lands entirely, but I think it has been demonstrated that this situation is not entirely impossible, either. Problems related to sedimentation and primary production will doubtless be low on the list of priorities when money is allocated for environmental research, perhaps because the problem seems inconsequential to many people. This, in turn, is a function of the present commercial appraisal of the value of these areas.

In the event that research were carried out, and even assuming that it indicated unambiguously that sedimentary processes must be considered in managing the wet lands, it would be a task of monumental proportions to include such considerations in land-use policy. The area of the wet lands is minute compared to the area of its watershed, and activities anywhere in that watershed may be concentrated at the estuary. Effective management of the wet lands is therefore

Footnotes at end of article.

inseparable from the management of a much larger area, and on this scale of management, there is little probability that the problems discussed here will be taken very seriously. Problems arising within the wet lands, such as dredging and filling are much more likely to receive serious consideration, since they may be resolved among a relatively smaller group of interested parties.

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D. SOME CONSIDERATIONS ON THE EFFECTS OF NATURAL AND MAN-MADE ANOXIC CONDITIONS ON THE SURROUNDING ENVIRONMENT

(By Kenneth Mopper, Woods Hole Oceanographic Institution)

INTRODUCTION

Nature has a tremendous capacity to recover from the abuses of domestic pollution so long as the rate of addition does not exceed the rate of recovery of the environment. When this limit is exceeded, however, the deterioration of the environment is rapid and sometimes irreversible.—B. H. KETCHUM.

An anoxic condition in the marine environment occurs when the concentration of dissolved oxygen has diminished to zero. Processes leading to anoxic environments have been initiated either by nature or by man. This paper discusses these processes and also with the consequences of anoxic conditions on the surrounding environment. Stress is placed on ecological effects of the New York Bight waste and sewage sludge disposal area. The water directly above the sludge is rapidly becoming anoxic and no bottom life, with the exception of anaerobic bacteria, has been found. Possible dangers of heavy metals in the sludge to the surrounding environment are explained.

PROCESSES LEADING TO ANOXIC CONDITIONS

Natural

Permanent natural anoxic conditions originate when the water circulation is restricted horizontally by a physical barrier (i.e., a sill) and vertically by either a strong halocline or pycnocline. Examples are: the Black Sea, the Cariaco Trench in the Caribbean, and Lake Nitinat on the coast of Vancouver Island, British Columbia. Figure 1 shows a plan view and a cross-section of Lake Nitinat. Although called a lake, it is in reality a fjord which has been cut off from the Pacific Ocean by a 2.7-kilometer long sill. Horizontal water circulation across the sill extends to depths of about 4 or 5 meters. Because the water circulation is restricted, the water in the lake below 30 meters is stagnant. Once the dissolved oxygen below this depth became consumed by biological processes, the water became anoxic. The anoxic zone is essentially abiotic; the only organisms capable of surviving are anaerobic bacteria (ZoBell, 1942). Photosynthetically produced organic debris rain down into the anoxic zone and collect on the bottom. Some of this organic matter is oxidized by anaerobes via nitrate, sulfate, carbonate (or CO_2), and phosphate reduction, in order of decreasing free energy (table 1). That is, most of the available dissolved nitrate is consumed before sulfate is reduced, and so on. Nitrate and sulfate reduction are the most important sources of oxygen for the anaerobic bacteria. Ammonia and molecular nitrogen are products of nitrate utilization, while hydrogen sulfide results from sulfate reduction. For details of these processes see: Richards (1965a, 1965b); Richards et al. (1965); Redfield, Ketchum, and Richards (1963); and Richards (1968).

FIGURE 1. Richards (1965a). Map of Lake Nitinat, Vancouver Island, and the distribution of oxygen and sulphides observed there June 10–12th, 1964. Oxygen and total sulphide isopleths are in $\mu\text{g.-at./l.}$. The map and profile are reproduced through the courtesy of Dr. T. C. Northcote of the University of British Columbia. —, O_2 contours, $\mu\text{g.-at./l.}$, - - - ; S_T contours, $\mu\text{g.-at./l.}$.

Table 1.—Order of oxidation of organic matter in the marine environment

	$\Delta G^\circ(w)$ Kcal
$\text{CH}_2\text{O} \rightarrow \text{CO}_2/\text{O}_2\text{H}^+ \rightarrow \text{H}_2\text{O}$	— 29.85
$\text{CH}_2\text{O} \rightarrow \text{CO}_2/\text{NO}_2^- \rightarrow \text{N}_2$	— 28.85
$\text{CH}_2\text{O} \rightarrow \text{CO}_2/\text{MnO}_2 \rightarrow \text{MnCO}_3$	— 22.70
$\text{CH}_2\text{O} \rightarrow \text{CO}_2/\text{NO}_3^- \rightarrow \text{NO}_2^-$	— 20.88
$\text{CH}_2\text{O} \rightarrow \text{CO}_2/\text{NO}_2^- \rightarrow \text{NH}_3^+$	— 19.05
$\text{CH}_2\text{O} \rightarrow \text{CO}_2/\text{FeOOH} \rightarrow \text{FeCO}_3$	— 8.88
$\text{CH}_2\text{O} \rightarrow \text{HCOO}^-/\text{CH}_2\text{O} \rightarrow \text{CH}_2\text{OH}$	— 5.95

Fermentation is an organic redox reaction where 1 organic substance gets reduced by oxidizing another organic substance. In alcoholic fermentation the products are metastable with respect to CO_2 and CH_4 .)

$\text{CH}_2\text{O} \rightarrow \text{CO}_2/\text{SO}_4^{2-} \rightarrow \text{HS}^-$	— 6.06
$\text{CH}_2\text{O} \rightarrow \text{CO}_2/\text{CO}_2 \rightarrow \text{CH}_4$	— 5.53

(methane fermentation)

Oxygen-deficient marine environments have developed when the water circulation is so slow that oxygen consumption is greater than oxygen replenishment. Such conditions can occur in the open ocean. For example, the eastern tropical North Pacific Ocean has such low oxygen concentrations that denitrification is taking place (Brandhorst, 1959). This situation occurs intermittently in protected fjords, inlets, and gulfs such as Dramsfjord (Norway), Saanlich Inlet (Vancouver

Island, British Columbia), and Gulf of Cariaco (Caribbean). However, at certain times of the year, these areas are flushed out with heavier, oxygenated water. When flushing occurs rapidly, poisonous sulfide-bearing waters impinge on the productive surface layers resulting in massive fish kills. Several such catastrophies have occurred in the Norwegian fjords.

Man made

When water circulation is restricted by the construction of man-made barriers anoxic conditions may develop. An example of this is the Charles River Basin and the Charles River Dam in Boston (see fig. 2a). As in the example of Lake Nitinat, the horizontal circulation is severely restricted. Only the top few meters of the water are sufficiently oxygenated to support a fish population. If this stagnant water is overturned (as in the Norwegian fjords) by displacement with heavier waters, large volumes of noxious hydrogen sulfide gas will be released into the Boston air. The gas would be immediately oxidized to equally noxious sulfur dioxide. The above situation could have been readily avoided by construction of ducts in the lower portion of the dam which could be opened periodically to allow mixing to occur (see fig. 2b).

Figure 2 Charles River Basin. Not drawn to scale:
A. Present situation
B. solution

Anoxic conditions can be initiated by excessive dumping of organic wastes into the marine environment. Excessive dumping means the rate of accumulation of nutrient-rich organic wastes in the sediment is so high that a large biological oxygen demand (BOD) results. That is, oxygen is consumed through biological activities at a rate higher than can be supplied by normal circulation. As in natural anoxic environments, the normal marine benthic population dies off and is replaced by anaerobic bacteria. Examples of the above situation are common in waters of large coastal cities. Many estuaries and bays are extremely

polluted by sewage and industrial wastes. The sediment-water interface in these areas has become permanently or intermittently anoxic (Wheatland, 1954). A specific example of this is the sewage sludge and dredge spoils dumping area in the New York Bight region. Fourteen square miles of sea floor at water depths of 60 to 90 feet have received domestic and industrial solid wastes from New York City for several decades. Figure 4 demonstrates that the water directly above the sludge is well on its way to becoming anoxic. The data were taken by the Woods Hole Oceanographic Institution and the Sandy Hook Laboratories and are plotted in the figure as the degree of oxygen saturation in the water. From this diagram, one can readily see the relevancy of the opening quotation. The environment can be pushed up to a certain limit; once this limit is exceeded rapid deterioration ensues.

Figure 4. Oncoming of anoxic conditions in the water over the sludge dump in the New York Bight

My concern is not the destruction or the effects of this destruction on 14 square miles of sea floor, but rather the effects on the complexly interrelated ecological cycles in the surrounding coastal regions. For example, the land-sea interface (i.e., coastal waters) has greater biological productivity and diversity than any other area in the world. Ryther (1969) has made estimates of fish production in three major oceanic provinces: open ocean, coastal areas, and areas of upwelling. His results are summarized in table 2. It is obvious from this table that although coastal regions occupy less than 25 percent of the total world ocean system, they produce 100 times more fish. The larger fish density is due to the greater primary productivity (e.g., phytoplankton) which in turn is related to greater nutrient concentrations in the water.

TABLE 2.—ESTIMATED FISH PRODUCTION IN THE 3 OCEAN PROVINCES.

Province	Primary production [tons (organic carbon)]	Trophic levels	Efficiency (percent)	Fish production [tons (fresh weight)]
Oceanic.....	16.3×10^9	5	10	16×10^9
Coastal.....	3.6×10^9	3	15	12×10^9
Upwelling.....	0.1×10^9	$1\frac{1}{2}$	20	12×10^9
Total.....				24×10^9

Note: Table 2, Ryther (1969).

It is exactly at the land-sea interface that pollution and exploitation by man is causing severe and perhaps irreversible destruction to one of his major food supplies. The potential for cultivating coastal regions to feed future generations can be greatly diminished by the continued practice of dumping highly toxic materials in the form of industrial and agricultural wastes into these waters.

Our society has the misconceived attitude that the environment is infinitely capable of producing goods for man and dispersing his wastes. It is easy to say that the ocean can handle pollutants, even resistant ones such as chlorinated hydrocarbons (DDT and its derivatives), and radionuclides (plutonium 239, strontium 90, cesium 137, etc.), by its great dilution powers. However, such statements ignore the fact that there are natural processes which can concentrate diluted pollutants to a point of being lethal to some organisms.

Anoxic basins provide an excellent example of the process of concentration. Anoxic basins act as sediment traps because of sluggish circulation and lack of benthic animals. Any pollutant which enters this system is also trapped and thus concentrated. In this instance, however, as long as the water column in the basin does not overturn, such pollutants are not a hazard to the surrounding environment; but the possibility of an overturn is always a real danger.

Another example is the concentration of DDT and its derivatives, DDD and DDE, in food chains. Figure 5 shows that DDT is taken up by plankton and other plants from sea water. These small organisms serve as a food source for small fish and zooplankton which are in turn eaten by larger fish and sea birds and so on. DDT is resistant to metabolic degradation, and will be passed up the food chain becoming concentrated in more complex organisms at the top of the food chain (Woodwell, 1967). For example, humans have concentrated DDT to the extent that female milk is unsafe for infant consumption (Radonski and Deichman, 1969). The concentration of DDT in the ocean is less than a part per trillion; the final concentration in man is on the order of 10 to 50 parts per million (Woodwell, 1967).

Figure 5
Woodwell (1967)

CONCENTRATION of DDT residues being passed along a simple food chain is indicated schematically in this diagram. As "biomass" or living material, is transferred from one link to another along such a chain, usually more than half of it is consumed in respiration or is excreted (arrows); the remainder forms new biomass. The losses of DDT residues along the chain, on the other hand, are small in proportion to the amount that is transferred from one link to the next. For this reason high concentrations occur in the carnivores.

Figuro 6

Sandy Hook Report, 1970

TOXIC METALS^T IN NEW YORK BIGHT DUMPING AREA

Analyses of sewage sludge for toxic metals have been conducted by G. G. Gross at Stony Brook and by the Sandy Hook Laboratory. Figure 6 shows the concentration in parts per million of lead and chromium in an east-west transect through the sewage sludge dumping area. Table 3 demonstrates some additional analyses for heavy metals in the sludge and surrounding sediments. The wide variations indicated in the table result from inhomogeneities in the sludge material.

TABLE 3.—HEAVY METALS IN SEDIMENT; (2 PERCENT HNO₃ EXTRACTION), SANDY HOOK REPORT, 1970

[In parts per million]

Station	Transect		
	Cr	Cu	Pb
Northernmost:			
48.....	0.35	0.42	1.30
101.....	.66	.028	1.69
47.....	.99	.016	2.98
107.....	.93	.052	3.35
Near north:			
106.....	.70	.027	1.99
105.....	1.12	.073	5.71
104.....	2.04	.13	6.49
109.....	12.3	12.3	30.1
Sewage sludge:			
36.....	.66	.23	1.33
39.....	11.9	10.3	26.1
59.....	37.9	58.3	151
70.....	16.1	35.9	67.9
63.....	2.34	.103	3.58
53.....	.25	.024	.55
Southern:			
38.....	.63	2.87	2.47
49.....	1.46	.43	3.97
50.....	1.17	.318	8.25

The water just above the center of the dumping area is almost anoxic and inhospitable to benthic animals. The periphery maintains a limited benthic community. As long as sufficient oxygen is available in the water, these sediment dwellers will ingest the nutrient-rich sludge matter as a food source. At the same time, heavy metals from the sludge are becoming incorporated into the body tissues of these animals. Table 4 contains metal analyses of a worm (*Neanthes* sp.) and a pelecypod (*Cyprina icelandica*) which were taken from the edge of the sludge dump. The values for chromium are an order of magnitude greater than FWPCA maximum allowable concentrations; and for lead, two orders of magnitude greater. More analyses are needed although the general trend is already discernable: heavy metals are becoming concentrated in the tissues of benthic animals.

TABLE 4.—SANDY HOOK REPORT, 1970

Animal	Concentration, (p.p.m.)		
	Cr	Cu	Pb
<i>Neanthes</i>	9.3	24.5	125.0
<i>Cyprina icelandica</i>	11.7	0.0	51.3
FWPCA manual concentrations.....	0.2-1.0	4-50	0.5

The exact nature of these heavy metals is still unknown. The metals can be present in either ionic solution or as an organometallic complex such as a chelate. Because of the abundance of organic materials in the sludge and dredge spoils, the latter form seems more probable. The toxicity of heavy metals and heavy metal chelate complexes lies in their ability to inhibit enzymes functions. Enzymes act as biological catalysts; that is, they increase the rate of essential biochemical reactions without themselves being transformed. Most enzymes are active only when they are complexed with a specific metal; i.e., copper, (Swelter, 1970). When complexed with other metals they are biologically inactive. When chelate complexes from the sludge are taken into this biological system they are capable of

losing their metals. If a metal, such as lead, is equally capable of forming a complex with the enzyme, it can compete with the biologically active metal for the enzyme site. The degree to which this competition occurs is dependent upon the concentration of the lead. A certain critical lead concentration will be reached beyond which the enzyme will no longer function properly and thereby upset the biochemical balance within the system. This type of poisoning is usually irreversible.

Poisoning of animals in the New York Bight region will have serious repercussions elsewhere along the coast. Most animals and plants in the marine environment are a part of a complex food web. Animals living in the polluted area will be eaten by others higher up in the food chain, perhaps from outside the area. Toxic materials will be passed along, as described earlier for DDT, and eventually man may be affected. This situation is aggravated by the abnormally high nutrient concentrations in the water (concentrations of 50 to 100 times that of normal sea water were recorded by Sandy Hook scientists). These concentrations are a result of the high percentage of nitrate and phosphate in the sludge material. Nutrient-rich waters usually result in high primary productivity which in turn, results in increased predation (Ryther, 1969). Higher organisms, such as the fish, will be attracted to the area for feeding. Increased biological activity in the general area of the sewage sludge dump increases the probability of the spread of toxic materials and the possible contraction and spread of disease.

In addition to the heavy metals, other poisonous and noxious substances are being dumped into the waters of the New York Bight. These include persistent pesticides and petrochemicals. The effects of these substances on the environment are only now being determined and more research is needed.

In conclusion, the 14 square miles of ocean floor in the New York Bight used for sludge disposal is irreversibly destroyed. Even if dumping practices were to cease today, the effects of the noxious substances present in the sludge already would be felt in this environment for an unknown length of time. However, if dumping is continued in the same manner, the situation can become even worse.

Domestic wastes should be separated from industrial wastes since the latter contains most of the toxic metals. The domestic wastes contain large quantities of nutrient substances, and therefore, can be recycled in the environment. This sludge can be dried, ground, and sterilized, then packaged as fertilizer or soil conditioner. In addition, predetermined limits should be set on the concentrations of heavy metals in industrial wastes. These limits will depend upon such factors as relative toxicity and methods of dispersion in the environment. The metals concentrated from the wastes can also be recycled. Industries which do not monitor their wastes should be severely penalized.

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PART IV.—OFFSHORE SITING OF ELECTRIC POWERPLANTS

Electric powerplant siting has emerged recently as one of the most difficult, politically heated issues of our Nation. As we have grown richer and more populous, we have witnessed a mushrooming growth in demand for electric power. At present growth rates demand is doubling every 7 to 9 years!

The resulting pressure on land resources for powerplant siting has become most noticeable in the heavily populated coastal regions of the country. The paper within addresses the possibility of using offshore sites as possible locations for these powerplants.

A. OFFSHORE SITING OF ELECTRIC POWERPLANTS

(By Dennis W. Ducsik, Massachusetts Institute of Technology)

ABSTRACT

It is increasingly evident that electric utility companies are hard pressed to satisfy the rapidly multiplying demands of modern American society for electric power. While the technology associated with power generation is well developed, the industry has encountered major stumbling blocks involving social, political, and economic issues. The most severe difficulties have been associated with questions of environmental quality, public safety, and land use priorities in relation to the selection and approval of sites for new generating facilities.

The siting of electric power facilities at offshore locations is an interesting concept that has emerged in the recent past and which seems to hold great potential for the effective solution of the land use problem while having extremely attractive additional features in the areas of environmental protection and public safety. A number of studies have indicated that this concept is within present technological capabilities and is potentially very attractive economically.

What is needed is a careful evaluation of this concept as part of a coordinated effort at the Federal level directed toward long-range planning and the formulation of a national energy policy. At present, no governmental mechanisms have taken on the responsibility for the consideration of national priorities in this crucial issue of electric power production. Yet, this issue is closely related to the problems of environmental quality and efficient land use that are being addressed in the formulation of a national land use policy program. The proposed Land and Water Resources Council can foster effective land use management in relation to powerplant siting (especially in the coastal zone) by sponsoring a coordinated, in-depth study of the offshore concept as a viable alternative to land-based installations.

I. INTRODUCTION

The rapidly increasing demands of our automated society for electric energy are relatively well-publicized yet nonetheless staggering. These demands for electric power in the United States double every 10 years while increasing at a faster rate than the population, the gross national product, the research and development budget, the supply of scientific manpower, or almost any other measure of growth in our affluent society. We can comprehend the immense proportions of the power production task by considering that, in the next decade, "we must add as much new generating capacity as has been constructed since the invention of the light bulb. If the increase continues at the present rate, the same amount of capacity—as much as has been constructed through 1969—would then have to be added in the following 5 years." (1) This translates into an estimate of future loads that will require over 1 billion kilowatts (electric) of installed generating capacity by the year 1990.

Needless to say, the fulfillment of these requirements will place sizeable burdens upon the resource base of our economy and, indeed, that of the world. First, if present trends continue for the next 15 years, we will need approximately 67 percent more oil, 33 percent more coal, and 100 percent more natural gas than we have consumed to date, while continuing to deplete our stockpiles of fissionable materials. Second, the construction of large powerplants is an extremely expensive affair (\$200 million for a new nuclear plant) requiring large capital expenditures. In 1969, utility companies accounted for 20 percent of all new U.S. corporate bond financing, and each year 80 percent of the industry's new money needs come from the bond market. (2) Third, the site requirements for large generating stations entail the purchase of several hundred acres of land, frequently near heavily populated metropolitan areas where land is at a premium. Estimates of future demands indicate that over 250 new plants will be required by the year 1990. (3) Fourth, power production places severe demands upon our environmental resources of air and water. It is estimated (4) that power stations burning fossil fuels are responsible for one half of the sulfur dioxide and one quarter of the nitrogen oxides that contaminate our nation's air. The air pollution problem is compounded by the fact that it is most economical, in the conventional sense, to locate generating plants as close as possible to the load; yet it is here, in the heavily populated, industrialized metropolitan areas that the air pollution problem is most severe.

Another matter of great concern is the effect of discharge of waste heat from nuclear power facilities to local cooling water supplies. Such plants operate at thermal efficiencies much lower than those of fossil plants, thereby producing more serious temperature increases in cooling waters. It is estimated (5) that, by 1980, the electric power industry will require about one-sixth of the total available fresh water runoff in the entire Nation for cooling purposes, and this demand for water will continue to grow. While cooling towers and cooling ponds are technically feasible, they can involve cost increases of up to 20 percent of the capital cost of an installed generating plant, an extremely undesirable (albeit necessary in some cases) additional economic burden. Apprehension over the impact of the resulting

temperature increases imposed upon bodies of water whose life-sustaining capacity is more often than not already badly weakened by other pollutants (sewage, industrial wastes) has led to both national and local restrictive legislation.

To meet the projected demands of the future, the technology of nuclear generating plants has forged ahead rapidly since their introduction to the power market in 1964. Currently a number of 1,000-megawatt (electric) plants are under construction, while it is the general consensus that the 2,500-megawatt (electric) liquid-metal-cooled fast-breeder reactor will replace present light-water units by the 1990's. Clearly the advent of nuclear technology has been a major contributing factor in the emergence of our Nation into what is commonly known as the space age. Yet, for all our technological capabilities, there is doubt for the first time that the electric industry's capacity will be able to keep up with the rapidly escalating per capita demands of our population, which is growing both in numbers and in affluence. Each summer, evidence accumulates indicating that the power companies are hard pressed to keep up with these demands, particularly during peak hours. Many large electric companies in cities of the Northeast, notably New York City, have experienced brownouts, while the appeals of these companies to customers to reduce consumption during peak hours are becoming commonplace. The occurrence of brownouts and blackouts poses a serious threat to the health, safety, and well-being of the entire Nation. Glenn T. Seaborg, Chairman of the United States Atomic Energy Commission, has speculated on the possible outcries of angry citizens "who find that power failures due to lack of sufficient generating capacity to meet peak loads have plunged them into prolonged blackouts—not mere minutes of inconvenience, but hours, perhaps days, when their health and well-being, and that of their families, may be seriously endangered. The environment of a city whose life's energy has been cut—whose transportation and communications are dead, in which medical and police help cannot be had, and where food spoils and people stifle or shiver while imprisoned in stalled subways or darkened skyscrapers—all this also represents a dangerous environment that we must anticipate and work to avoid." (6)

One might ask how the present situation has come about. The answer is that a combination of unanticipated circumstances has handcuffed the electric power industry to the point where it is difficult for them to take the necessary steps to alleviate the pressures placed on them by increasing demands. The two major stumbling blocks encountered by the utility industry have been (1) long delays in construction scheduling, and (2) difficulties in securing approval of site selections for new generating facilities.

Delays in construction scheduling

A major problem facing the power industry is the continual slippage in construction schedules and exhalation of site labor costs. This is usually associated with the specialized nature of the work involved in the traditional practice of constructing power stations as one-of-a-kind entities. For each new facility, a different set of laborers must be recruited, trained, and organized to carry out the specialized construction peculiar to that particular plant and geographic site. This problem is particularly acute in the construction of nuclear power stations

which must be designed to meet stringent radiation containment standards, even in the event of severe seismic disturbances. Although factory-type construction techniques have been utilized in other types of large-scale construction, power stations are still built using traditional methods. As a result, we are witnessing inordinate delays in construction schedules: Nuclear plants now take from 5 to 7 years for completion. (7) These setbacks in construction scheduling are extremely costly and could wipe out any cost advantage that one particular type of plant might have over another. Also, power companies may be forced to anticipate delays by increasing construction leadtimes, running the risk of premature retirement of existing facilities if the construction schedules are met.

Also, if nuclear power is to be increasingly relied upon in the future, the installation of nuclear stations must proceed even faster than net power demand. The doubling time for nuclear plant capacity would then be on the order of 7 years, since new demands must be satisfied while old fossil plants are phased out. Hence, the combination of short doubling time and long construction time could be a major obstacle in the way of increased reliance on nuclear power.

Difficulties in securing approval of site selections

The most severe problems facing the utilities of late have arisen from difficulties associated with the selection of sites for new generating facilities. The situation is accurately described as follows:

Everyone agrees that electric power supply is vital to the Nation and that we must find sites for the powerplants needed to meet the Nation's rapidly expanding use of electricity. Nevertheless, "Don't Put It Here" is increasingly becoming the public's reaction to particular sites selected by the utilities. Furthermore, the electric utilities are facing increasing competition for sites because our land resources are limited, and the ingredients of a prime site for electric generation also make it attractive to many other expanding industries.(8)

This statement points out the two major difficulties related to site selection and approval: Competition from a wide range of prospective users, and the multiple pressures of public opinion.

Competition for prime sites is not restricted to industrial development. The site that is ideal for electric power generation is often very well suited for various forms of residential development, the location of transportation corridors, commercial development, or recreation. This competition becomes especially intense as the utility companies move to acquire coastal locations to assure adequate supplies of cooling water. Yet many of these areas, as Senator Jackson pointed out in his introduction of the National Land Use Policy Act, "with the benefit of planning and foresight, should have been reserved for other uses,"(9) such as recreation, parks, or wildlife preservation. Strong arguments of this kind have been made (see reference 35) as to the need for preserving coastal resources in recognition of their extremely high intrinsic value for recreation, conservation, and wildlife preservation. The present trends toward locating powerplants at coastal and estuarine sites is in direct and irreversible conflict with considerations of this sort. The State of California has already located 85 percent of its power stations on tidal waters. Of large nuclear units now planned, built, or operated in the United States, 18 percent use ocean or bay water as condenser cooling water, and another 12 percent are sited on estuaries.(10) If this trend is allowed to continue for the next 20 to 30 years, 80 percent of the cooling water for States border-

ing on the Pacific coast and 50 percent on the Atlantic coast will be saline. Even if the ecological and esthetic effects of these plants on the fragile marine environment can be demonstrated as negligible, the use of large blocks of coastal acreage for powerplant siting constitutes an irretrievable loss which cannot be regained for use by future generations. Careful consideration of this issue is of crucial importance in the formulation of long-range planning for land use management.

In addition to market factors, the utilities are likely to encounter increasingly stringent constraints on site selection imposed by public agencies, such as the conservative site standards set by the Atomic Energy Commission with regard to areas of potential earthquake hazards. All these factors are further compounded by the fact that the greatest percentage of future sites are likely to be required in the regions of heaviest concentration of population and existing plantsites, especially in the northeast corridor. It is here that land is the scarcest, especially at the seacoast.

The problem of public acceptance is primarily one of an overriding concern for the quality of the environment. The areas of most concern are: (1) the air pollution caused by fossil-fired plants; (2) the thermal pollution caused by nuclear plants; (3) potential radiation hazards related to nuclear plant accidents; and (4) the visual intrusion of generating facilities on the beauty of the natural landscape and other esthetic considerations. Presently, political action has led to the situation whereby 20 percent of new plants are delayed by actual litigation, while 40 percent are delayed by general conservation and environmental considerations. (11) It is reasonable to expect that problems of this general nature will occur more and more frequently, causing delays of increasing consequence when considered together with the delays in construction scheduling.

A most recent manifestation of these multiple problems associated with powerplant siting can be found in a report entitled "The Turkey Point Case, Power Development in South Florida—a Study in Frustration." (19) In this article, Harris B. Stewart, Jr., Director of the National Oceanic and Atmospheric Administration's Atlantic Oceanographic and Meteorological Laboratory in Miami, documents an extraordinary chronology of events (covering a 7 year time span) concerning the location of a new nuclear powerplant to satisfy the increasing demands for power of the residents of Dade County, Florida. Turkey Point was about the last remaining section of waterfront in Dade County available for the needed expansion, a site which was relatively remote from population (25 miles south of Miami and 5 miles from the nearest dwelling), was accessible to cooling water (Card Sound to Biscayne Bay) and the transportation necessary to supply fuel for the units. Yet for the last 7 years the Florida Power and Light Company, despite clear evidence of good faith on environmental issues, has been frustrated at every turn in its attempts to secure approval of its expansionary plans, with the most intense pressures coming from conservationists who feared that the thermal effects of discharged cooling water might be detrimental to the ecological systems of the area. The issue has risen to national prominence, while at present construction is at a standstill while the fight goes on in the Federal courts. In concluding his examination of the conflict, Stewart reflected on the dilemma:

My personal feeling * * * is that the real endangered species in the overall ecosystem is man himself. Those who now scream that Biscayne Bay is being ruined by the warm water will be the first to rail against the power company when a power brownout or blackout occurs. The problem then is one of the conflicting uses of a resource held in common—in this case the estuaries of our coastal zone. At the very heart of the problem of coastal zone management lies conflict between those who would use the waters for the cooling of electrical power generating plants and those who would keep our estuaries in their pristine, pre-man, condition. Some mutually agreeable meeting ground must be reached. It must not be considered as a case of power or estuaries, but rather a case of how to develop the power we require and still have estuaries that are needed for the development of fish and for the many uses to which our growing coastal population wishes to put them. (12)

Certainly this constitutes an accurate expression of the central issue at stake; yet more and more we are finding, to our dismay, that the multiple uses that we would like to see supported by our natural environmental systems are so incompatible that use for one purpose often must necessarily preclude use for many others. When we are confronted with basic dilemmas of this sort, we can only make decisions based on the relative weights of perceived value judgments of society as a whole.

We can now summarize the primary land use issue regarding the siting of electric powerplants in the following way: we are running out of usable inland fresh water cooling capacity; we are running out of coastal and estuarine land resources for recreation and conservation (let alone for powerplant siting); and we are running out of patience with regard to the harmful side effects that power generation imposes upon our environment. Perhaps it is with the words "we are running out" that we can begin every discussion of the allocation of all our precious environmental resources.

So, having examined these difficulties facing the power industry, it is small wonder that we are now facing the prospect of serious power shortages. The most immediate issue we face today is not one of reducing high power costs or of choosing between particular methods of generation (although this is certainly of great importance from a resource-consumption standpoint and other long-term considerations of national concern), but "the vital one of persuading the American people that a crisis exists right now" (13) in satisfying the *present* needs of our highly power-dependent society. Sometime in the near future drastic new approaches must be taken to alleviate the "saturation" problem (of which power production is an integral part) before we exhaust our technological capabilities to hold back disaster, before we exceed the ability of our environmental resources to disperse waste, or before we run out of usable land for recreation or powerplant siting. It is inevitable that we face in the long-run some of the serious tradeoffs (such as that between undisturbed estuaries and power generating plants as described by Mr. Stewart) given that we continue with our present patterns of exponential growth in so many areas.

Perhaps we must eventually try to cut back on consumption by buying fewer air conditioners, televisions, and cars, although this would seem socially unacceptable in our present democracy. The only really effective long-run solution to all congestion-related problems is to attack the source of congestion—continued population growth. Yet solutions are also needed in the short run; the vanguard of crisis is here and now. We must find measures to avert dangerous power

shortages with an eye to the future consequences of our actions on man's total environment. Perhaps we are not adequately equipped at present with the institutional mechanisms (social, economic, political) to completely resolve issues brought on by the preponderance of man's presence on this earth. Until we become so equipped, we can turn to technology to provide the short-run solutions to pressing problems such as the one here described—realizing at all times that we are just buying time and that the consequences of failure at some later time may be all the more severe.

It is in this context that I present a concept that strikes at the heart of the power production issue, providing relief for pressing problems and holding great promise for the future. This concept has the relatively unique feature that it holds the potential for simultaneous solution of the two major difficulties faced by the power industry—construction delays and site selection and approval—without placing additional stress on the financing aspects of the overall situation, while removing a serious area of contention and conflict from the already overburdened shoulders of land-use planners. The general features of this concept are described in the remainder of this article.

II. THE OFFSHORE CONCEPT

In recent years the concept of locating large electric generating stations at offshore sites has gained increasing attention. There are a number of extremely attractive aspects to this concept. One is the potential elimination of many of the difficulties associated with the selection and approval of sites. Questions of land cost and availability are no longer relevant; competition with industrial and other development interests would be nonexistent; use of the ocean's capacity for cooling seems to be the only answer to the environmental problems of thermal pollution; and siting of plants offshore allows new flexibility in locating close to the load, especially as our population concentration shifts to the coastal perimeters of the Nation, where land is already at a premium. Hence, nearly all the problems of land-use management associated with the siting of power generating facilities can be effectively obviated.

The second major advantage of great importance is the amenability of many offshore designs to shipyard construction. While U.S. shipyards are presently operating with a backlog of orders, their utilization is subject to large variations depending on the construction plans of the U.S. Navy. This is because the U.S. yards are generally not competitive on the world market; the costs of a given shipyard product are approximately 20 percent less in Europe and 35 percent less in Japan, where shipyards are larger. Diversion of American shipyards to the mass construction of powerplants might constitute a more efficient use of this well-developed resource while having beneficial side effects on regional economies. Shipyards are geared to hold tight construction schedules. For example, it is estimated (14) that large (43,000 ton displacement) nuclear-powered containerships could be produced in as short a time as 18 months, at a shipyard price of \$40 million. Compared to these ships, a powerplant is a very high value product: A 1,000 megawatt nuclear plant now costs a utility over \$200 million. Furthermore, like ships, powerplants could become an important regional export industry. The market for the eastern and gulf coasts of

the United States alone is estimated to average 10 plants per year (15), worth a total of more than \$2 billion, for the next several decades.

Another benefit, perhaps the most important, is that the construction of a powerplant at a shipyard has the potential for significant savings in construction time. A shipyard maintains the permanent base of shops, equipment, and skilled labor that is lacking in the traditional methods of powerplant construction. This provides for (1) increased stability of the skilled labor force, (2) increases in the efficiency of the skilled labor force by allowing a learning curve to develop as additional stations are built, and (3) elimination of duplicative areas of management, management support, engineering, construction support, and quality control presently necessitated by separate construction locations. Shipyards are also frequently hubs of transportation networks that can use the most efficient combinations of land, sea, and air facilities to reduce transportation costs over onsite construction of land-based plants. The possibility of shortened construction times to help the power industry stay ahead of rapidly increasing consumer demands, together with a potentially large savings in capital outlays by utility companies for new plants, are most encouraging prospects in these times when substantial delays in construction are both costly and commonplace.

Several designs for offshore power stations have been proposed in the literature. (See app. A for a "Selected Bibliography of Reports on the Offshore Concept.") These designs usually fall into two broad categories: the basic choice is between floating platforms or enclosures (indirectly coupled to the ocean floor by a mooring system) and fixed structures that are solidly attached to the bottom.

Fixed structures

Fixed structures can be of several forms: (1) Man-made islands; (2) fixed-pile platforms; (3) jackup platforms; (4) grounded barge.

(1) *Manmade islands*.—The technology of this scheme does not differ in any appreciable way from that of land-based plants, except in the added complexities (and cost) of site preparation and transportation of men and equipment across a water gap. Studies investigating the feasibility of this concept have been undertaken on both the East (16) and West (17) coasts.

(2) *Fixed-pile structures*.—In this scheme, piles are floated or barged to a given location and erected permanently. A platform is then erected on these piles, similar to a Texas-tower configuration. Japanese engineers (18) have proposed construction of an offshore power station based on this design. Like the manmade island concept, this design entails conventional land-based construction techniques, again with the added complexities of offshore onsite construction.

(3) *Jackup platform*.—The power station is constructed in a shipyard atop a platform equipped with extendable legs, floated to the chosen site, then jacked up on the legs (grounded to the seabed), out of the water, and into a position similar to that of the fixed-pile structure. The jackup system is generally thought to be useful in depths up to 250 feet, while 300 feet is accepted as the practical limit.

(4) *Grounded barge*.—This scheme involves the permanent grounding of a floating bargelike platform to the ocean floor (in shallow water) or on a prepared site. The barge and power station are again constructed in a shipyard, towed into position, and then ballasted until the grounding is complete.

Floating structures

A number of designs have also been suggested for floating structures. These include: (1) Submersible stations; (2) ship hulls; (3) barges.

(1) *Submersible stations*.—This concept is presently under investigation by the Quincy Division of General Dynamics under the auspices of the Department of the Interior(19). As described in a proposal by R. W. Marble(20), this scheme consists of a grouping of cylindrical containers enclosing the reactor, steam, and electrical systems, positioned at sea and tethered to the bottom by a multipoint mooring. The position of the station with respect to the ocean surface would be controlled by ballasting in much the same way as on a present-day submarine. The best position for the station with respect to the surface must be ascertained—at least 100 feet over the main hull section probably would be desirable. In shallow water this might demand bottom siting. A personnel transfer system would be provided by a long access trunk and elevator to a light heliport structure above sea level.

(2) *Ship hulls*.—The U.S. Army presently operates the Sturgis craft(21), a floating nuclear power station utilizing a small pressurized water reactor (PWR) in a conventional ship hull. For the much larger plant sizes necessary for commercial power generation, this shape would not be suitable because of excessive stability problems and the difficulties in designing suitable mooring, although the good towing characteristics would provide excellent mobility for smaller size plants. Experience with such reactors aboard a number of naval vessels, including the NS *Savannah*(22) and the *Otto Hahn*(23), have indicated that "there are no inherent reasons why reactors should not be installed on floating platforms—at least not for pressurized-water reactors. Some concern has been expressed in the past about the performance of boiling water reactors on ships * * * under conditions of roll, pitch, and heave. Several studies, plus the performance of the *Otto Hahn*, suggest that this is not a serious problem(24)."

Fig. 1. Floating nuclear-power plant.

(Taken from Reference 26)

(3) *Barge Mounted Power Stations (BMPS)*.—This concept involves the location of a powerplant on a floating barge, built in shipyards and towed to, and moored at, appropriate offshore locations. One possible configuration that was the design selected in a recent study(25) is shown in figure 1. The barge supports the reactor and its containment dome in the center, surrounded by the personnel and generator housings. The latter contains the turbines, generators, condenser and condensate systems, and transformers for high voltage transmission. The switch gear and other auxiliary equipment are located on shore. The generator part of the plant would not differ in any substantial way from modern steamplants now used in conjunction with fossil-fueled stations. The personnel area contains the reactor and steamplant control stations, administrative offices, and auxiliary

equipment compartments. Access for operating and maintenance personnel would be provided by a causeway, while docking facilities could be constructed if boat transportation is more economically attractive.

To protect the plant against extreme environmental effects, such as 30-foot storm waves, 7-foot tidal waves, and 200-mile-per-hour winds, a rock breakwater can be constructed in depths less than 50 feet. This breakwater can also serve as the basis for the mooring system and as a collision shield for the barge. Protection from seismic disturbances is provided by the fact that the barge is floating, while "air springs" can be designed which will shield the barge from vertical shocks. All these issues are more widely discussed in a study by Harold M. Busey at the Donald W. Douglas Laboratories(26).

It should be noted at this point that determinations of the technological feasibility of the offshore concept should not be restricted to consideration of nuclear plants alone. In many respects, the issues are independent of the type of powerplant that is located offshore. It may be that locating fossil plants offshore might be desirable if the atmospheric dispersion conditions are favorable enough to avoid air pollution in nearby cities. This report has based the analysis on nuclear technology since the literature related to the offshore concept has been developed primarily in this area.

The literature describing variations of the offshore concept has focused on primarily three designs: manmade island, submersible stations, and floating barge-mounted facilities. The general consensus is that all of these concepts are technologically feasible, (27) the ultimate determinant being that of cost. Of the three, the manmade island concept appears to be the least desirable due to reasons cited previously, while the floating and submersible designs each have singularly attractive features. For example, both designs appear to provide near absolute protection from seismic disturbances. (28), (29) In addition, it is thought (30), (31) that underwater containment of nuclear reactors would provide much better postaccident fission-product retention than is now possible in land-based plants. Also, floating stations offer a relatively limitless choice of locations since they would be unaffected by ocean depth or bottom contour. The possibility of moving stations at some future time in response to changes in population or consumption patterns might be a factor in favor of floating stations.

It seems at this point that the offshore concept contains a number of extremely attractive features that go a long way toward eliminating the twofold problems faced by the power industry—construction delays and site selection and approval. While it is not the purpose of this paper to go into the details of the technological and economic aspects that require careful examination, it would be useful to set forth the major tradeoff variable (economic, technological, political, and legal) that must be considered in any comprehensive analysis of this concept. If the technology and the economics of this proposal do not provide new obstacles of comparable complexity with today's problems, the realization of the offshore concept could be hailed as one of the most significant advances in the history of electric power production.

III. ISSUES IN THE CONSIDERATION OF THE OFFSHORE CONCEPT

Two recent studies conducted at the Massachusetts Institute of Technology have provided a preliminary analysis (32) and an in-depth followup investigation (33) of the major technological, economic, political, and legal trade-off variables that must be considered in an analysis of the offshore concept. The results of these studies are in general agreement with previous investigations in the conclusion that a number of offshore designs are well within the limits of present technological capabilities.

These reports examine some of the general considerations that would go into the design of offshore power installations, including fixed and floating structures, as well as some areas in need of special attention due to the differences between a land and a water environment in connection with a large-scale power facility. The treatment has led to the identification of a number of major trade-off issues that must be assessed in the choice among alternative schemes and their effect on costs. These include:

- (1) The degree of seismic protection required.
- (2) The suitability of various mooring schemes and their ability to withstand the forces of maximum storm conditions for a large number of years.
- (3) The minimization of ecological stress on local sea life and on coastal ecosystems to within allowable margins (a function of oceanographic conditions and constraints imposed by the institutional environment).
- (4) The protection against collision with air and sea vehicles.
- (5) The effect of tidal movement and tsunami (tidal wave triggered by a remote earthquake).
- (6) The establishment of a thermocline to prevent mixing cold influent with hot effluent—constraint on depth of water.
- (7) The limitations on draft of floating structures imposed by the depth of harbors providing shipyard access.
- (8) The suitability for use with undersea or tower transmission lines (cost is the major variable).
- (9) Ease of access for personnel and suitability for heavy maintenance.
- (10) Radiation containment, and radionuclide waste dispersal during normal and accident conditions must conform to AEC standards.
- (11) The adaptability of various offshore structures to shipyard construction without incurring prohibitive costs.
- (12) The susceptibility of the plant to sinking and loss of access, and how this might interact with design features such as use of soluble poison control.
- (13) Effect of winter icing on plant operations.
- (14) Coupling to onshore transmission facilities and suitability for clustering to reduce costs: that is, how far apart should multiple plants be?
- (15) Refueling and maintenance schemes adopted: need for barge or truck access and so forth . . .
- (16) Legal and political considerations, such as the 3-mile limit, jurisdiction of Federal, State, and local governments, applicability of recent environmental legislation, national security, and so forth.

In the comparison of a number of alternative offshore schemes to a land-based plant, the major differential cost components were identified as follows:

- (1) Costs of alleviating thermal pollution.
- (2) Interest costs and savings due to shipyard construction.
- (3) Cost of real estate for plantsite.
- (4) Cost of transmission to shore.
- (5) Shipyard construction costs.
- (6) Cost of site preparation.
- (7) Transportation costs.
- (8) Insurance costs.
- (9) Cost of operations.
- (10) Additional labor costs.

The results of this analysis have indicated that at least one offshore design can be shown to be economically competitive with a land-based facility, while the realization of offshore siting would meet no severe legal obstacles and could be regulated within the present institutional framework. This is an encouraging result since the analysis was deliberately conservative in nature. There seems little doubt that as land prices continue to spiral upward, this component alone will make the offshore station the most economical choice for the utilities. Other factors which were not included are potential savings due to closer location to load centers and savings associated with the development of a learning curve in the mass production of large-scale installations. Both of these considerations could make sizable contributions to savings over land-based plants in the near future.

IV. CONCLUSIONS

What now are the implications of this analysis of the offshore concept? It is clear that this concept provides a viable alternative to land-based power stations and can eliminate some of the most serious problems faced by the power industry today in meeting our Nation's increasing demands for electric power. All indications are that the concept is feasible from a wide range of technological, political, legal, and economic standpoints. What then can be done to set the machinery in motion to give the feasibility of this concept a long hard look?

To answer this we must first decide what machinery we are talking about. In our country today, there is no centralized governmental body at the Federal level that is charged with the formulation of national goals and priorities and the long-range planning that is necessary if we are to meet our future needs for electric energy. Yet, it would be difficult to imagine a more pervasive issue in relation to the maintenance of our society as it exists today. The aspirations of every American citizen for a greater level of well-being are based in part upon the confidence that this Nation can maintain the capability to provide adequate supplies of electric power on a continuing basis. Yet, today, we live under the recurring threat of brownouts and blackouts in our major cities each summer, while evidence of any substantive effort at the Federal level to attack the root causes of these problems remains conspicuously lacking. This is not to say that there is a lack of concern—certainly the Atomic Energy Commission has been instrumental in developing the technology that we need to meet

increasing demands. But a number of the problems of power production, as we have seen (plant siting), are not technological in nature; rather, they are social problems generated by an awakened sense on the part of our society of the value of the environment and of the mistakes we have made for so long in pursuing a course of unbridled growth. Yet there is no existing mechanism to direct our course and help resolve conflicts in a manner consistent with a carefully considered set of national objectives and policies in the area of electric energy production. Hence the path of power generation continues to wander helter-skelter in whatever direction that is randomly dictated by the activities of the private marketplace and local political decisionmaking.

Is it wise to entrust such a crucial issue as electric power production to anyone other than the highest level of government where the true national interest can be fully determined and appreciated? I think not. It must be emphasized that this is not a matter to be resolved at the State or local level—the problems of air and thermal pollution and land use (especially of coastal resources) in relation to power production are regional and national in scope. Nor can it be the responsibility of the electric utility industry unless present forms of regulation are modified to allow for the generation of the large amounts of capital that would be required to fund a large-scale research and development effort. The responsibility lies clearly at the Federal level where the power-production issues related to land-use management and a host of other areas of national concern can only be resolved as part of coordinated effort in the formulation of a national energy policy.

The implication is clear—we are in need of a comprehensive, long-range, coordinated effort at the Federal level that will bring together all those areas of concern that are affected by the lack of a national energy policy. Certainly one such area is the formulation of policies for effective land use management. One might make the general statement that the first principle of effective land use management is to factor out and avoid as many conflicts as possible before trying to manage the multiple use of a common resource. Undeniably, the implementation of the offshore concept would virtually eliminate one of the most troublesome issues of land use management—powerplant siting. Hence, careful consideration of this proposal is particularly germane to the formulation of a national land use policy at the Federal level. The issues of environmental quality and land use that are inherent in the problems of powerplant siting are directly related to the questions being addressed by the proposed national land use policy program. Any political mechanism that is established at the Federal level to coordinate a national land use program must provide for the investigation of the interrelationship between electric energy production and land use management.

I find in reviewing the most recent report ³⁴ on the National Land Use Policy Act that such provision has been made in a substantive way by the participation of the Chairman of the Federal Power Commission in the proposed Land and Water Resources Council. I feel that this Council, under the mandate set forth in section 106 concerning the establishment of a Federal planning information center, can foster effective land use management in the area of powerplant siting (especially in the coastal zone), *by sponsoring a coordinated, indepth study of the offshore concept as a viable alternative to land based installations*, bringing together Federal agencies including

the Office of Science and Technology, the Atomic Energy Commission, the Department of the Interior, and any public or private organization with a vested interest in land use, environmental quality, and other issues related to powerplant siting. Such an effort could be instrumental in eliminating a troublesome source of controversy from land use management and is certainly relevant to the concept of intergovernmental coordination that is fostered in the land use policy program. At the same time, this could be the all-important first step that would draw attention to the increasing need for the establishment of a formal governmental mechanism that can effectively deal with the formulation of a long-range, national energy policy.

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APPENDIX A

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