DRAFT

a natural resources planning program handbook

u.s.d.a., soil conservation service, amherst, ma. 1977

FOREWORD

"A few very broad generalizations can serve as a theoretical basis for discussing the effects of the environment on human life. Ideally, all aspects of the environment should form an integrated ecological system in which the welfare of any part of the system is dependent upon the welfare of all the others. In the light of ecological theory, man is part of the total environment and therefore cannot achieve and maintain physical and mental health if conditions are not suitable for environmental health. For this reason, it is ecologically and indeed logically impossible to define an optimum environment if one has only man in mind." - Rene Dubos in So Human an Animal

PREFACE

Although there has now emerged a widespread ecological consciousness and a public ethic towards land and water use, there is presently little information available to communities to guide them in integrating information about their natural resources into their planning efforts. There existed, in fact, a crucial need for a procedure to carry out natural resources planning. It is intended that the Natural Resources Planning Program meet this pressing need. Although all references and guidelines in this handbook are for Massachusetts, the methodology may be adapted for use elsewhere by adjusting the guidelines to local conditions and needs.

The Natural Resources Planning Program is based on the understanding that citizens must be directly involved in both collection and use of natural resource information and in land use planning and decision-making. Only through an informed and concerned public will sound natural resource management be truly integrated into everyday land-use decisions. To quote R. M. Davis, Administrator of the Soil Conservation Service:

"Yet, because natural resources are finite--and because some genuine interests or concerns in their use and management are not as readily seen or heard as others--an even broader base of public participation is needed in natural resource allocation. That's what we're going after. It's not going to be easy. But it's a challenge we're going to meet.

"The wise use of America's natural resources cannot be guaranteed by any agency. It can be assured through what we encourage: full public involvement in determining how resources will be used."

The Natural Resources Planning Program is a dynamic and ever changing program. As more experience is gained, refinements will be made in the program. This handbook presents the "state-of-the-art" at this point in time.

If any reader has suggestions for changes or comments to make on any aspect of the program, they should be sent to:

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Amherst, Massachusetts 01002

THE PURPOSE OF THE MNRPP HANDBOOK

This handbook provides a detailed explanation of the Massachusetts Natural Resources Planning Program's procedure and methodology. It provides guidance and direction to Natural Resource Technical Team members, Conservation District officials, other agency personnel and community leaders in carrying out the program in communities throughout the state.

Contained in this handbook are the detailed procedures and instructions necessary for community leaders and volunteers to undertake a MNRPP in their community. Additional forms, specific inventory instructions, evaluation sheets, and other necessary data are available through the local Soil Conservation Service office.

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CHAPTER 1: INTRODUCTION AND OVERVIEW

THE NEED FOR NATURAL RESOURCES PLANNING

Growth and land use policies are crucial issues that presently confront Americans at all levels of government. In Massachusetts, as in other states, problems associated with growth and land use are intensified at the local level where the greatest responsibility for land use regulation has rested. Many local governments find it difficult to deal effectively with these problems. They usually have neither the information, nor the methodology required to confront complex issues regarding their natural resources. The Massachusetts Natural Resources Planning Program (MNRPP) offers the methodology and the technical assistance for communities to systematically collect, evaluate and utilize information concerning their natural resources. This program presents a framework for an ecologically responsible approach to natural resources planning and to the making of wise land use decisions.

About one million individuals were added to the "Massachusetts population between the years 1950 and 1970. At the same time, there has been a shift in population as residents have left the larger cities for the suburbs in search of woodlands and fields, clean air and water, and the other natural amenities of the countryside. Changes in land use have paralleled decentralization and population growth. In Massachusetts, the most significant changes are represented by the decline of agricultural land and the increase in urban uses. Between 1951 and 1971, the amount of agricultural land diminished by over one-third while the amount of urbanized land nearly doubled.

To accommodate increased development, Massachusetts communities have had to provide areas for housing development as well as additional facilities such as schools, recreational areas, sewage treatment plants, water impoundments, and areas for solid waste disposal to meet the needs of an ever increasing population. Until recently, little attention has been paid to changes in the natural resources base brought about by rapid growth and development. Decisions have seldom been based upon how much urban development the land was capable of supporting; rather, they have been framed in the limited context of the growth expected and desired from social, economic and political points of view. Seldom, if ever, does the community have the expertise available to study the consequences of urban oriented decisions on its natural resoucres (life systems) base.

The costs that urban development has exacted from the natural resources, and from the quality of the environment, are often extensive and enduring in their effects. Increased hazards such as air and water pollution, flooding, and siltation threaten the health and safety of community residents and often jeopardize the integrity of the ecosystem. Visual amenities have often been sacrificed and opportunities for outdoor recreation have been impaired. Valuable nonrenewable resources such as sand and gravel have been carelessly used or made inaccessible through urbanization. Such costs need to be measured in terms of the quantity of land use changes, the quality of the resultant environment, and the distribution of land uses which often prove to be incompatible with one another.

The Natural Resources Planning Program is intended to help communities establish natural resource considerations as of equal importance with social, economic, political, and physical concerns in the planning process. The program described here is a systematic procedure for community involvement in natural resources planning.

Briefly stated, the purposes of the Natural Resources Planning Program are:

1. To stimulate local interest, discussion, and action for sound natural resource management, protection, and use.

2. To provide local citizens and decision-makers with an appreciation and understanding of their community's natural resources; what the natural resources are, where they are located, what their condition is, their value, and their potential for benefit to the community.

3. To provide communities with the methodology and technical assistance to enable local citizens to inventory, evaluate, and analyze their natural resources and to use this information to make environmentally sound land-use decisions.

4. To assist communities to identify:

   A. Environmentally sensitive areas requiring protection and/or special management.

   B. Areas where resources are being overused and, thereby, degraded.

   C. Opportunities for development of natural resources for community use.

   D. Areas with potential for more intensive use or development.

   E. Alternative solutions to present or projected problems related to natural resource use.

   F. Probable impacts of proposed land-use changes on the natural resources system.

5. To enable the community to better utilize the technical assistance available from state and federal natural resource agencies.

6. To encourage continuing local monitoring and evaluation of the natural resources for use in community decision-making.

NATURAL RESOURCES PLANNING PROGRAM PHILOSOPHY

Four major assumptions form the basic philosophy of the MNRPP: (1) Citizens should be involved in land use decisions that affect their community, (2) A community must consider the opportunities and limitations of its natural resources in formulating land use policies,

(3) Natural resources differ between major MNRPP areas of the state, and (4) Land use planning is a continuing process. These assumptions are discussed below.

1. Citizens Should Be Involved In Land Use Decisions That Affect Their Community

"Participatory planning" provides for a partnership between citizens, their local governmental leaders, and others assisting in the planning process. The MNRPP provides an opportunity for a community's citizens to become directly involved in the actual planning process. It also serves as a valuable educational vehicle, creating a broad base of informed, environmentally responsible citizenry.

2. A Community Must Consider the Opportunities and Limitations of Its Natural Resources in Formulating Land Use Policies

Within any given community, there exists a combination of natural resource features (its natural resources system) specific to that community. These resources provide a range of opportunities for specific uses and have limitations for other uses. Land use decisions that ignore the opportunities and limitations of the natural resources systems will result in degradation of those resources over time, in decreased quality of the community's overall environment, and in unnecessary additional expense to private landowners and the public.

Ecological systems, physically and funtionally, do not usually conform to political boundaries. Also, the degree of flexibility that one community may have in planning its natural environment may not be shared by a neighbor with fewer resources and more acute social and economic problems. Thus, the planning that takes place should consider regional as well as local needs.

3. Natural Resources Differ Between Major MNRPP Areas of the State

As a guideline for evaluation of their natural resources and as an aid for development of a plan for optimum Natural Resource use, the Natural Resources Planning Program provides communities with suggested guidelines for Natural Resource use. To be useful, these guidelines must reflect the resource characteristics specific to particular areas of this diverse state. It would be meaningless for the guidelines used by a community in the Berkshires to include consideration of surf fishing. Similarly, a community in suburban Boston does not have the same agricultural opportunities as does one in the Connecticut Valley. For this reason, the Resource Evaluation Sheets, used in the MNRPP evaluation process, contain guidelines developed specifically for each major MNRPP resource area.

4. Land Use Planning Is a Continuing Process

It is a common misconception that once a community decides upon a course of action and records this course in a plan, it need do little further planning for the "life" of the plan. Thus, a plan with a time frame extending to 1990 should not be considered to take care of all planning needs to that year. New problems, new needs, and new opportunities arise on an ongoing basis. To be effective, a community should have an overall framework or strategy to deal with new situations as they emerge.

WHO IS INVOLVED IN THE NATURAL RESOURCES PLANNING PROGRAM

The MNRPP relies on local residents working together with a natural resources technical team - NRTT. A successful program requires a concerted effort by the community, the conservation district, and the natural resources technical team. The roles of each of these participants are:

Community

"Community" refers to the local government participating in the MNRPP: a town, a city, a county, or other political subdivision.

The community provides the leadership and the personpower to carry out the program. The responsibility for making decisions that affect land use and growth rests entirely with the community. The process requires a steering committee, a coordinator, and inventory and evaluation committees composed of local citizens. If the community has a planning staff and/or a consultant, they should be involved in MNRPP activities.

Conservation District

Conservation districts in Massachusetts are legally constituted units of state government created to administer natural resources conservation work within their boundaries. They set priorities for agency assistance to communities wishing to participate in the MNRPP. Each of the fifteen conservation districts is directed by an elected board of supervisors who decide upon a district-wide program and plan of action that includes MNRPP activities along with other forms of conservation assistance.

Natural Resources Technical Teams (NRTT)

A natural resources technical team assists each conservation district, based on a memorandum of understanding. Through working agreements with each district, the NRTT helps communities to carry out their MNRPP. The function of the NRTT is to provide technical assistance to the community. The NRTT offers guidance--it does not make decisions concerning the community's resources, nor does it perform the work involved in collecting natural resource information.

Personnel from the following federal, state and regional agencies participate as team members:

Soil Conservation Service, U.S. Department of Agriculture

Cooperative Extension Service, U.S. Department of Agriculture

Division of Forests and Parks, Massachusetts Department of Environmental Management

Division of Fisheries and Wildlife, Massachusetts Department of Fisheries, Wildlife and Recreational Vehicles

Regional Planning Commissions

Personnel from the following agencies and institutions participate as needed, via the memorandum of understanding executed with the community:

Division of Coastal Zone Management, Massachusetts Executive Office of Environmental Affairs

Division of Conservation Services, Massachusetts Executive Office of Environmental Affairs

Division of Water Resources, Massachusetts Department of Environmental Management

Division of Parks, Metropolitan District Commission

Division of Marine Fisheries, Massachusetts Department of Fisheries, Wildlife, and Recreational Vehicles

Massachusetts Department of Food and Agriculture

Fish and Wildlife Services, U.S. Department of the Interior

Geological Survey, U.S. Department of the Interior

Environmental Protection Agency

Personnel from the Soil Conservation Service work closely with each community to provide the primary guidance throughout the program.

HOW NATURAL RESOURCES PLANNING WORKS

The program is divided into four phases:

1. Organization
2. Inventory
3. Evaluation and Analysis
4. Planning and Implementation

A brief discussion of each of these phases follows:

Phase One: Organization

Organizing for action is a critical phase of the MNRPP. During this phase, participants (representatives of the community and the NRTT) must decide upon an organizational framework for the community's involvement in the program. First, the NRTT provides information to the community, detailing how the program works, its uses and benefits, and who might be involved. Then the community and the NRTT establish a common understanding of what will be done and by whom, and develop a schedule for completion of each task. In addition, the community organizes a steering committee and designates a coordinator. The community and the NRTT then present their proposed organizational framework to the conservation district which reviews and sets priorities on the applications received.

A Memorandum of Understanding is then signed by the community, the conservation district and participating members of the NRTT. This agreement specifies the inputs and commitments of each party.

Prior to beginning the next phase of the NRPP, the steering committee locates volunteers that will be needed to make the inventories. The NRTT provides data sources and training to the volunteers who will make the inventories. They are especially concerned with giving the volunteers an understanding of the ecological importance of the resources and problems that result when the resources are abused.

Phase Two: Inventory

This phase involves the collection of information and the preparation of the various maps and inventories that will provide the community with a natural resources data base. This activity requires the greatest volunteer time commitment for field work. With support from the NRTT, volunteers compile and field check detailed information on the quantity, quality and distribution of the community's land uses and natural resources. MNRPP guidelines are provided for inventorying each resource.

The coordinator provides leadership and coordinates the activities of the volunteers with the NRTT.

Phase Three: Evaluation and Analysis

During the Evaluation and Analysis Phase of the MNRPP, committees evaluate the inventory results to identify the community's natural resource assets, needs, and problems. The MNRPP provides Natural Resource Evaluation Sheets and guidelines to aid in this process.

In addition, the NRTT assists in the analysis of the inventory results and other technical natural resources information. This analysis identifies opportunities for action to enhance, develop, or protect the community's natural resource base.

Through the evaluation and analysis process, the community will recognize that its natural resources have a limited capacity for absorbing ever-increasing urban development. The community identifies and maps those environmentally sensitive areas and resources that are most susceptible to degradation. It identifies those natural resource features that serve a vital function in the community's ecological systems. The community also locates those areas most suitable for more intensive use or development to meet community needs. It learns that the limitations on use of certain resources can be overcome by special management measures, but that such measures may carry long-term costs.

Based on its own particular mix of natural resource potentials and limitations and on its own goals and objectives, the community can then plan for optimum use of those resources.

The steering committee plays an important role in evaluating the overall significance of the inventory committee findings. It pulls together and analyzes these findings, community responses, and other information within the broad perspective of community needs, attitudes, and objectives. The committee's major task is to provide the community with an "Analysis Report", a statement of the present situation of its natural resources and recommendations of alternatives for future action. Then it is up to the community to utilize this knowledge concerning its natural resources in its decisions and actions.

In this phase and the next, the function of the NRTT is primarily informational and educational. Members of the team instruct the community in evaluating and utilizing data and maps. They also

can assist the community in determining the consequences of proposed actions on its natural resources.

Phase Four: Planning and Implementation:

Although the community may develop specific plans, take action on proposals, or make natural resource use decisions at any time during the program, it is in this phase that the community's attention is directed to charting its future course of action.

Natural resource opportunities and constraints are now weighed by the community with social, economic, and political factors. Citizens can then make informed decisions in structuring the future of their community. Based on the "Analysis Report" and recommendation of the steering committee, specific plans are prepared and actions are taken by the appropriate local governmental bodies. MNRPP information may be used in ongoing or future planning efforts, such as Comprehensive Planning, Conservation/Recreation Planning, Sewer Facilities Planning and others.

In addition, the community may establish a permanent natural resources advisory committee and a natural resources monitoring procedure. The NRTT can be called upon to provide technical assistance in the development and management of the community's natural resources.

HISTORY OF MNRPP

On April 15, 1970, Dr. Benjamin Isgur, State Conservationist, Soil Conservation Service, USDA, Amherst, Massachusetts, appointed members of his staff to a Massachusetts Natural Resources Work Group. The work group's task was to develop a methodology and procedure for a planning program to determine the "carrying capacity" of an area's natural resource base, the effects of increases in population upon this base, and thereby the quality level of the natural resources. The methodology would contain provisions for active local citizen participation in all phases of a program that could be carried out by communities in Massachusetts.

The work group served as a "core" or central committee to guide and coordinate the development of the Natural Resources Planning Program. Technical specialists from state and other federal natural resource agencies, together with the work group and personnel from the Soil Conservation Service Northeast Technical Service Center made up the total committee. Those members were selected to insure an interagency and interdisciplinary approach.

In carrying out its task, the committee first determined that: (1) the program would have to closely involve local citizens in all phases; (2) the program would have to be simple and easily usable by lay people; (3) guidelines would have to be developed for use by the community to guide evaluation and use of their natural resources; (4) any guidelines developed would have to be acceptable to other natural resource agencies, the academic community, and private citizens; (5) local citizens would have to provide the maximum amount of manpower, with technical assistance and guidance from agency personnel, to carry out the program; (6) the program would have to be designed to permit local citizens to make their own decisions and to plan for their own future; and (7) the methodology would have to be adaptable for use in communities elsewhere in the nation.

The committee designed a methodology to meet the above objectives. Many of the guidelines had to be based on the sound judgment and experience since, in some cases, no research or other technical data were available.

An academic field test, conducted by the work group, confirmed the feasibility of the proposed methodology. Draft standards and criteria, to be used as guidelines, were reviewed with other committee members, various natural resource agency personnel, the academic community, and other individuals and groups concerned with the preservation and conservation of natural resources.

Based on experience gained in the academic field testing and reviews with others, the work group refined the draft guidelines and the methodology and then prepared this "how-to-do-it" handbook for use by agency personnel and local citizens. This "Natural Resources Planning Program Handbook" contains the procedure, guidelines, and detailed instructions on how to carry out a Natural Resources Planning Program in a community.

The Natural Resources Planning Program is designed to be "open-ended," providing for continuous monitoring of the community's natural resources and updating, as needed, to keep the community's plans current and reflect changing technology.

Since this program requires detailed inventories to be made of all land and water used within a community, this information is usable in USDA's inventorying and monitoring program, and in Massachusetts state programs for wetlands protection, agricultural land preservation, open space acquisition, land use planning, water quality planning, and others. Planning Consultants are using this program as a vehicle to provide them with needed information and data for preparing Comprehensive Plans, zoning revisions, and other special-purpose plans.

The Natural Resources Planning Program (formerly known as the Environmental Quality Planning Program) was tried as a theoretical pilot study in the town of Foxborough in 1969, and later as operational pilot projects in the towns of Lincoln, Granby, Lee, Acton, Chelmsford and Nantucket; and the three towns (Attleboro, North Attleborough, and Seekonk) in the Ten Mile River Basin in southeastern Massachusetts. The MNRPP, now fully operational, continues to serve many of these original areas and has expanded to include towns throughout Massachusetts.

USE OF THE NATURAL RESOURCES PLANNING PROGRAM IN OTHER STATES:

Although the MNRPP guidelines for land and natural resource evaluation and use have been developed as nearly as practicable for the major land resource areas of Massachusetts, the approach and procedure are applicable elsewhere across the country. The keystone of citizen participation is both feasible and necessary anywhere. The organization can be adapted for use with different governmental units, and the detail of information collected can be made appropriate to the geographic scale of use.

Guidelines for land and natural resource use can be developed for other major land resource areas, or simplified guidelines can be developed based on average figures for a state, or other geographic area. The analysis tools and techniques used in the program can also be applied elsewhere with minor modifications. Use of the Natural Resources Planning Program in other states can help to more effectively bring the technical expertise of the Soil Conservation Service to bear in support of sound community decisions in natural resource use.

The MNRPP establishes a procedure by which natural resource information can be utilized in resource planning. The program does not attempt to offer a "cookbook" approach to land and water use planning. It standardizes what information is collected and provides set guidelines for evaluating the condition of natural resources. Yet, it offers a community the opportunity to gear the program to its own particular situation and constraints.

CHAPTER 2: ORGANIZATION

INTRODUCTION

Organization is a critical step in the Natural Resources Planning Program. It is important that a community understand all aspects of the program from the outset. A thorough understanding of what is involved will allow the community to take full advantage of the program and tailor it to meet community needs and objectives. It will also allow the community to utilize fully the diverse services offered by the Technical Team. A good organizational framework is vital for a successful program.

THE ROLE OF EACH PARTY

The Community's Role in NRPP:

1. Boards and Commissions (e.g., Selectmen, Planning, Conservation, Recreation, Historic, Finance, Public Works)
   a. Apply for NRPP assistance.
   b. Provide representatives to form the NRPP steering committee
   c. Develop community objectives
   d. Determine course of action
   e. Sign Memorandum of Understanding
2. Local Citizens:
   a. Provide person power to conduct inventories, and assist in evaluation and analysis of data
   b. Form a base of support for local government actions
3. Steering committee (composed of members of the various local boards, commissions, and interested citizen groups)
   a. Directs NRPP activities in the community
   b. Organizes public information program and recruits citizen volunteers to conduct inventories
   c. Arranges for necessary working space and materials
   d. Designates a program coordinator

e. With technical support from the NRTT, compiles the overall evaluation and analysis of the community's natural resources, based on inventory data.

f. Recommends alternatives and priorities for use and management of the community's natural resources.

g. Provides for communication among town boards and commissions and other NRPP volunteers.

4. Coordinator (designated by the steering committee)

a. Coordinates the work of other volunteers in the inventory, evaluation, and analysis processes.

b. Is the primary community contact with the NRTT for coordination of its technical support.

SCS role in NRPP:

1. As member of Natural Resources Technical Team (NRTT)

a. Assists the Cooperative Extension Service in general information program to acquaint communities with NRPProgram.

b. Assists conservation districts in establishing priorities for NRPP assistance.

c. Conducts special studies (such as "Inventory of Sites Having Natural Resource Use and Development Potentials") and makes existing data and information available to the community.

d. Assists in an intensive information and education program with a community applying for assistance to carry out NRPProgram.

e. Provides technical assistance and training to inventory committee members in preparing inventories, collecting data, and completing "Inventory Data Sheets," and in evaluating and analyzing inventory results.

2. Continues to provide technical assistance, as requested, on ongoing SCS programs within the community.

3. Provides graduate students to directly assist communities in all phases of the NRPProgram, but primarily in the Inventory Phase and Evaluation and Analysis Phase. Concurrently, affords graduate students an opportunity to gain practical experience and training in working with local citizens, in techniques of evaluating and planning for the protection and enhancement of the natural resource base, and in identifying and inventorying the various components of the natural resource base.

4. Helps to educate local citizens regarding the community's natural resources and to develop an environmental awareness throughout the community.

5. Assists in the evaluation of the suitability, limitations, and potentials of the natural resources for selected possible or alternative uses.
6. Provides soils data, including interpretations, for use in evaluating alternative courses of action.

The roles of other local, regional, state, and federal agencies:

(The services listed may be available as agency workload and other circumstances permit.)

1. Extension Service
   a. Conducts the general information program to acquaint communities with NRPP.
   b. Assists a community interested in carrying out an NRPP to conduct an intensive information program.
   c. Holds informational and progress review meetings among committees, agencies, and town boards to acquaint interested parties with status of the program and provides coordination between the various parties.
   d. Is a member of the NRTT.
2. Conservation District
   a. Receives applications from communities interested in undertaking an NRPProgram.
   b. Assigns priority for assistance from the NRTT.
   c. Coordinates work of local, state, and federal agencies and requests assistance from agencies who are not members of the NRTT.
   d. Assists in preparing the Memorandum of Understanding.
   e. Assists communities in obtaining technical assistance from state and federal agencies to implement resource management plans and decisions.
   f. Encourages and assists communities to monitor land use changes and periodically review and update their natural resource planning proposals.
3. Regional Planning Agency
   a. As appropriate, serves on the NRTT.
   b. Provides a community with regional evaluations of proposed alternatives.
   c. Provides existing data to a community, such as land use, population projections, land use change projections, special transportation studies, etc.

d. Assists communities to publish reports.

e. Assists communities to utilize NRPP information in the preparation of conservation/recreation plans or other similar functional plans.

4. Massachusetts Division of Forests and Parks

a. Serves as member of NRTT.

b. Assists inventory committees to inventory and evaluate land and water uses within its area of expertise, namely, woodland, recreation land, and recreation water.

c. Within its operating policies, provides technical assistance in implementing planned measures, particularly in woodland and recreation land.

d. Provides existing information and data, including unpublished studies.

5. Massachusetts Division of Fisheries and Wildlife

a. Serves as member of NRTT.

b. Assists inventory committees to inventory and evaluate land and water uses within its area of expertise, namely, wildlife land and wildlife wetland--assists as requested on others.

c. Within its operating policies, provides technical assistance in implementing planned actions, particularly as related to wildlife.

d. Provides existing information and data, including unpublished studies.

6. Massachusetts Division of Marine Fisheries

a. Serves as member of NRTT.

b. Assists inventory committees to inventory and evaluate land and water uses within its area of expertise, namely, coastal wetlands and estuaries--assists as requested on others.

c. Within its operating policies, provides technical assistance in implementing planned actions, particularly as related to marine fisheries and shellfish.

d. Provides existing information and data, including unpublished studies.

7. Other state and federal agencies may be asked to assist a community. (Such assistance will be determined by the needs of the community and the ability of the agency to furnish, such as:)

a. U.S. Geological Survey (USGS) ground water data; water yield; aquifer locations; topographic map data; bedrock geology.

b. Mass. Division of Water Pollution Control - Stream water quality classifications, test data, and pollution loads; pollution problem areas.

c. Mass. Division of Water Resources - Water use data.

DEVELOPING AN ORGANIZATIONAL FRAMEWORK

Before entering into a Memorandum of Understanding to initiate the subsequent phases of the program, it is essential for participants to arrive at a common understanding of what will be done, by whom, and when. The Organization Phase Flow Chart (Figure 2-1) and the step-by-step procedure detailed below, describe the steps to be followed in establishing an organizational framework.

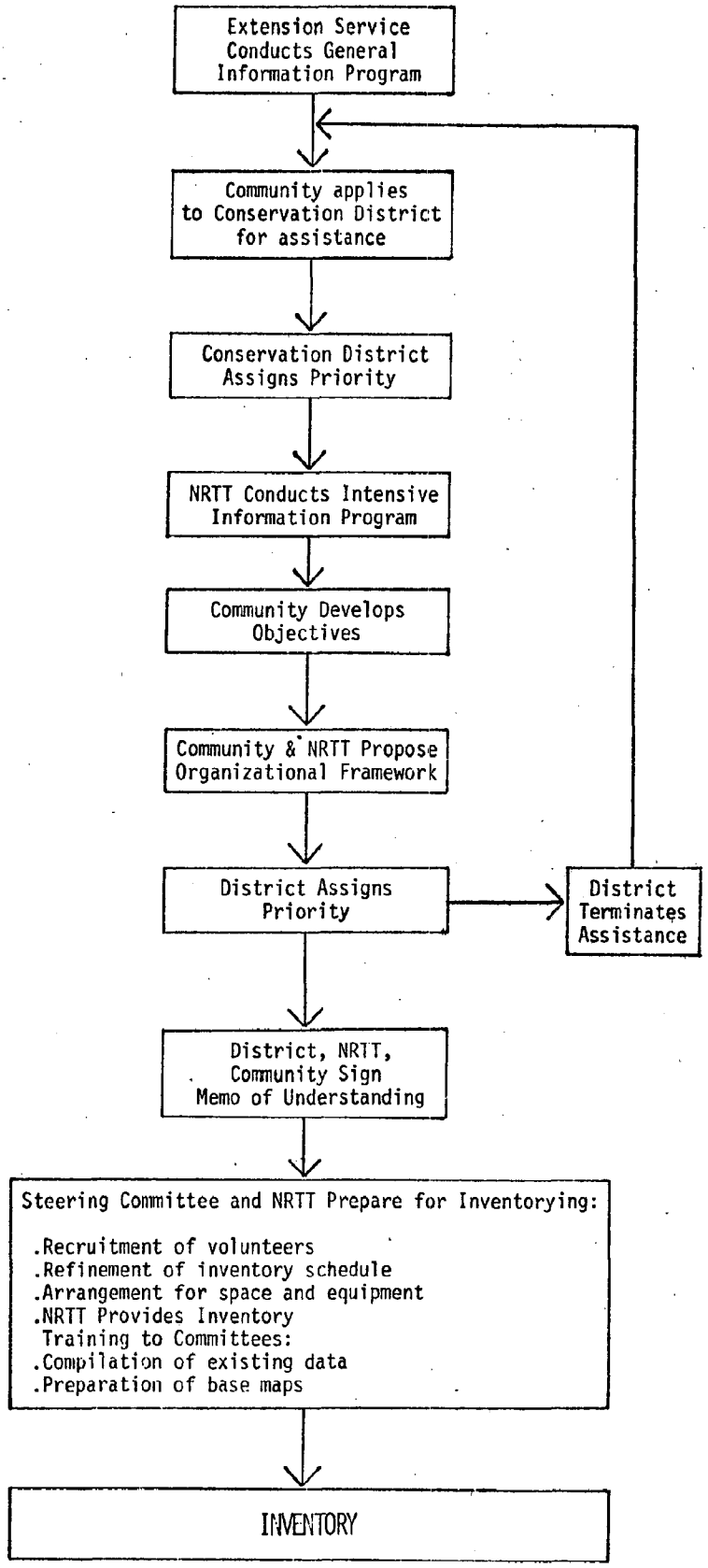
The Cooperative Extension Service Conducts General Information Program

The Cooperative Extension Service conducts the general information program to acquaint communities with the NRPP. Meetings are held to explain the program to community boards and commissions, private interest groups, interested individuals, and members of other agencies. Topics of discussion include: NRPP objectives; how the program works; what is required to carry it out; who is involved; expenses that may be incurred; and possible benefits. Individuals from communities already participating in the program could be invited to explain how their communities are conducting and using the program. Media such as newspapers, radio, slide presentations and informational brochures should be used to publicize the program.

Community Applies to Local Conservation District for Assistance

Interested communities then apply to the local conservation district for assistance. The request for district help may come from any town board or commission, although the selectmen, planning board, or conservation commission are usually the initiators.

FIGURE 2-1 ORGANIZATION PHASE



Conservation District Assigns Priority

The conservation district will consider all applications and determine priority for those towns wishing to participate in the "Organization Phase." In establishing priority the conservation district may use such criteria as the following:

1. The availability of a soil survey. (This is a required survey, to be available before undertaking the NRPProgram).
2. The intensity of growth pressures within the region and community.
3. Community participation and commitment in past conservation district activities.
4. Other studies or planning efforts being carried out in the community or region.
5. Community support for the program.

If the conservation district assigns a high priority to the community's request for assistance, it will request members of the NRTT to work with the community in proposing an organizational framework.

NRTT Conducts An Intensive Information Program

The NRTT will meet with members of the community to explain thoroughly what needs to be done to carry out the program. It will discuss which inventories are required and which are optional; what evaluation and analysis tools are available; what is expected of the community; and what studies and services are available from the NRTT.

A variety of interests and skills is critical at this stage. Although a particular board or commission may have requested the assistance, it is in the community's best interests to involve other town boards and interested citizen groups from the outset. An involved, well-informed cadre of townspeople will lead to better communications and will increase the use of the natural resources information in community decisionmaking.

Community Develops Objectives

When the community understands the NRPP, it is ready to develop the objectives it desires from the program. In examining its needs and expectations for the program and in developing its objectives, the community should address the following questions:

- What are the community's goals with respect to its natural resources?
- What current natural resource issues may require the collecting of more information so they can be dealt with effectively?
- How is the community going to use the information generated by the program?
- Is the community moving towards a comprehensive planning effort or is its aim more specific, such as a conservation/recreation plan? (or both?)
- Is additional information needed to gain sources of funding for special projects?
- Are there on-going projects related to natural resources (such as woodland management?) in which the NRTT could be of assistance?
- What groups should be included?
- How can residents be encouraged to participate?

Some objectives may be broad while others may be quite narrow in their intent. They will vary from community to community. The example in Figure 2-2 demonstrates how a community may wish to use the program.

FIGURE 2-2 DEFINING COMMUNITY NEEDS AND OBJECTIVES: AN EXAMPLE

Community A: The Planning Board held several discussion meetings with other boards, interest groups and townspeople to determine community opinion concerning needs and objectives. The items below were proposed.

The Selectmen would like:

- To increase inter-board communications.
- To have more information concerning townspeoples' views on community character, growth, and land use.
- To utilize the NRPP to gather information to formulate community growth and development policies.

The Planning Board would like:

- To incorporate information concerning the town's natural resources into an on-going comprehensive planning effort which is being directed by the board and its consultant.
- To revise zoning by-laws.
- To secure overlay maps of town's natural resources for use by developers and by the board in making decisions concerning subdivision approvals.

The Conservation and Recreation Commissions are concerned about the effects upon the natural resources of a haphazard growth pattern. They would like to:

- Update their joint conservation/recreation plan.

The community, in general, would like:

- To protect its ground water supply and other natural resources.
- To preserve its "rural" character.
- To alleviate circulation problems at town recreation areas.

One objective which many communities may share is to fulfill the planning requirements for participation in the State Self-Help and BOR Land and Water Conservation Fund programs. In order to be eligible for these funding reimbursement programs, the community must have a conservation and/or recreation plan on file with the State Division of Conservation Services. Once a community has such a plan, then it can submit project plans for funding assistance which are evaluated on a priority basis. Communities that wish to use the NRPP as a means to receive such funding should discuss the possibility with the NRTT in order to learn the specific requirements. The community's NRPP activities then can be directed towards this objective.

Community and NRTT Propose an Organizational Framework

When the program is well understood and the community has outlined its objectives, the community and the NRTT can begin to propose what will be done, by whom, and when.

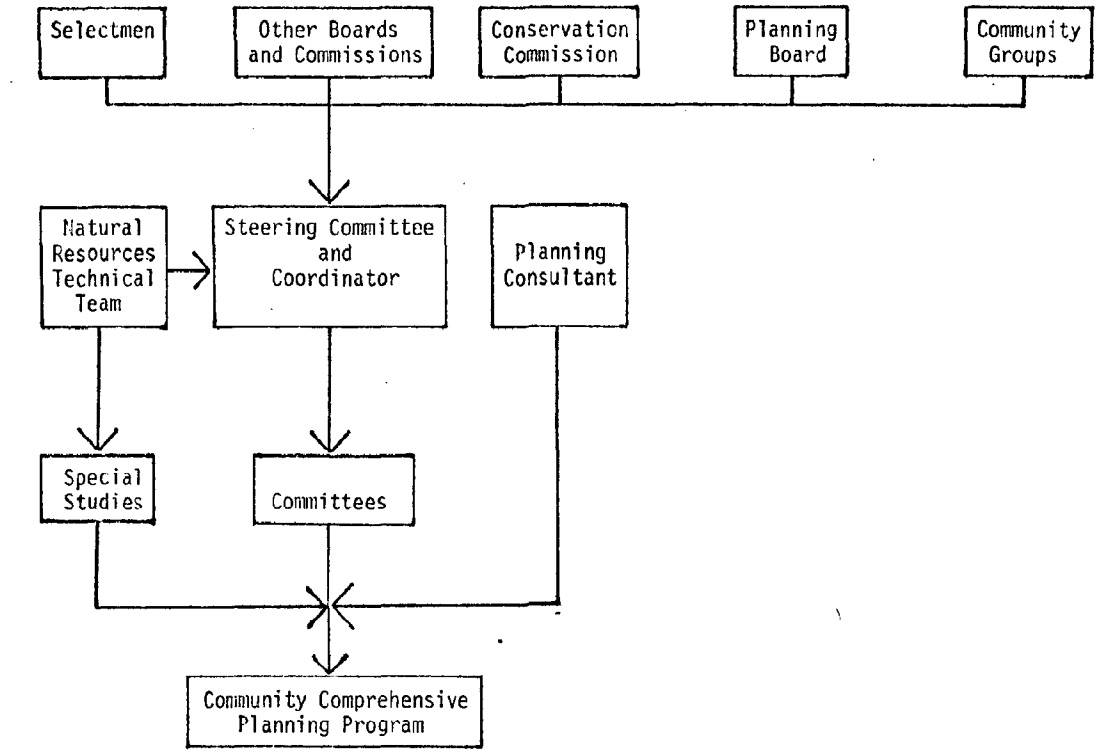
1. The first step is to review the flow charts of the subsequent phases, (Chapters 3, 4, and 5), the inventories and studies to be made, and the proposed use of information to meet community objectives.

2. Next, the roles and working relationships among participants should be clearly spelled out. The community should decide how the steering committee will be formed, to whom it will be responsible, how a coordinator will be selected and how any subcommittees will be formed. The tasks and responsibilities of each town committee or individual should be defined as well as those of the technical team. Figure 2-3 gives an example of how these working relationships may be organized. In this particular instance, the community has opted to include the NRPP as a part of a broader planning effort.

3. The steering committee and the NRTT should then agree upon a tentative time framework for accomplishing the specific tasks of the program. Tentative target dates should be established for the completion of each activity planned.

4. Lastly, the steering committee should develop an informational program to keep townspeople informed and involved. Newspaper, radio, slide presentations, and public meetings are all possibilities. An individual or committee may be assigned the task of writing articles and keeping the press informed of activities and progress.

FIGURE 2-3 SAMPLE ORGANIZATIONAL FRAMEWORK



District Assigns Priority

When the organizational framework has been thoroughly worked out and agreed upon, the community is ready to apply for a commitment from the conservation district to undertake the program. The conservation district will determine priority by evaluating the proposed organizational framework, and, very importantly, community support for and commitment to the program. If the town cannot generate enough support, the district will probably elect to terminate further assistance. The community will then have to reorganize and reapply to the district.

District, NRTT and Community Sign Memorandum of Understanding

Upon approval of the conservation district, a Memorandum of Understanding is prepared. The Memorandum of Understanding is a statement of intent; it is not a legally binding document. It is signed by the community, the conservation district, regional planning agency (if appropriate), members of the NRTT, and other agencies who will assist the town with the program. The document is tailored to the specific organizational framework agreed upon by the community and the NRTT. It outlines the inputs and commitments of each party. (See Appendix C).

Community Prepares to Make Inventories

Two elements are critical to the success of the Inventory Phase. First, the steering committee must enlist the help of dedicated volunteers. A high degree of involvement is necessary on the part of these volunteers. Their task is not only to inventory natural resources; they are also expected to bring their acquired knowledge into the Evaluation and Analysis Phase of the program. Secondly, there must be a strong coordinator, a leader with skill in organizing and gaining support from the volunteers and in directing NRPP activities.

Volunteers working on the inventories and exploring the backroads of the community will find the experience rewarding and enlightening. They will also have the opportunity to work with their local government. What, however, does the community stand to gain? To begin with, those citizens who have participated in the inventorying will bring their knowledge and enthusiasm to the process of self-government which allows towns to control their futures. At the same time, a well-organized public information campaign through such media as local newspapers and open meetings can bring about public awareness of the issues confronting the community.

Besides creating a well-informed citizenry, the community will have a meaningful way to bring together natural resources data. The inventories should be the beginning of a data library which the community can compile in a continuing process allowing them to keep abreast of changes.

Perhaps the most important benefit received through the inventory process, however, is a common frame of reference concerning a community's natural resources. It is critical that the people involved in policy formulation and implementation be able to discuss issues using the same language. Using the NRPP data as a basis for discussion, different interest groups, individuals and boards can coordinate their ideas, and discuss and resolve conflicts regarding the community's resources.

Recruitment of Volunteers: The steering committee is responsible for recruiting volunteers to serve on inventory committees. These volunteers need not be experts; the NRTT will provide the necessary training that is needed. The number of volunteers required depends on the number of inventories to be prepared by the community. Usually two or three individuals are needed for each inventory committee. Most towns participating in the NRPP have found that a total of fifteen to thirty volunteers is sufficient.

There is a variety of ways to enlist the help of volunteers. Communities may wish to use previously established committees whose function is related to gathering or evaluating information for planning purposes. Members of the steering committee may know of townspeople with an interest in natural resources who may wish to serve on a committee matching their interests. Groups such as the League of Women Voters, recreation clubs, and high school students also should be asked to participate. Community boards or commissions could be given the job for completing certain inventories (or recruiting help for their completion). Help usually can be generated through newspaper

articles. In one community, where assistance was requested through the newspaper, at least eighty individuals responded. Such a large number is, of course, unwieldy, but serves to demonstrate the kind of community interest that often goes unnoticed. A good public information campaign is the key to reaching the town's most valuable resource, its people.

A committee is formed for each inventory or set of related inventories to be made. Assignments may reflect particular interests or expertise of the volunteers and should consider the differing amount of work involved for different inventories. The NRTT provides guidance as to the skills and personpower required for each inventory.

Prospective volunteers want to know what they are being asked to do, how much time is required, and what the program is all about before they commit themselves. The steering committee, with the aid of the NRTT, should be ready to provide answers to these questions.

Refinement of Inventory Schedule: The steering committee and the NRTT review the steps remaining in the Organization Phase and the steps in the Inventory Phase, designating a completion data for each step to meet the target date set for this phase of the program. The town may be divided into three or four sections, and a target date established for the completion of each successive section. Dates are set for progress reviews.

Arrangements for Space, Equipment, and Funds: The community provides the space and the supplies necessary to carry out the program. There are several activities for which space will be required. A large room should be designated for training and progress review meetings. There should be an office or room where the NRTT and the Coordinator can be available during certain hours to committee members who need help. Arrangements for permanent space are made for storing reports, maps and

other information. In other words, a data library is established. A working area equipped with a light table also is provided for map making and drafting. The community also allocates funds for expenses such as maps, "Mylar," light table, and reports. Such items as colored pencils, felt-tip markers, dot grids (for measuring acreage), and a roll of "Mylar" (clear plastic) material must be acquired. The total funds required will range from $400 to $1,000, depending on the size of the town, map scale used, number of maps prepared, and quality of graphics and printing desired.

NRTT Provides Inventory Training: Initially, the committees receive training of a general nature. The coordinator and the NRTT, as appropriate, explain the program, the community's involvement in the program, and why the volunteers have been asked to participate. Committees also need to know what they are going to do, how they are to accomplish their tasks, what assistance is available, what target dates and progress review meetings are scheduled, and what relevant information exists and can be made available to them.

An information packet or folder is prepared in advance for each committee and contains the following:

1. Instructions to Inventory Committees
2. Glossary
3. Appropriate Inventory Description
4. Appropriate Data Sheet
5. Appropriate Natural Resource Evaluation Sheet
6. Work Maps
7. Names, Addresses and Phone Numbers of the Volunteers, Coordinator and NRTT Members
8. Schedule of Progress Review Meetings
9. Office Hours of Coordinator and NRTT

More than one meeting may be required to present all of the above information to the inventory committees. The NRTT also schedules at least one field training session with each committee, including a discussion of the natural processes associated with the resources. Before the committees begin their inventory and evaluation tasks, it is extremely important that they have an understanding of the ecological importance of the resources and the problems encountered when the resources are impaired. Such an understanding helps them to appreciate why the resources are being mapped and evaluated. It enables them to get a good grasp of the importance of the evaluation and analysis process.

Compilation of Existing Data: All existing information that could be included in the community's NRPP is located and brought together in a central location. In most communities, a multitude of reports, studies, maps and other data having a bearing on natural resources, has been accumulating in many places over time. This information is collected, annotated and systematically organized. A list of what is available is compiled and kept up-to-date. The steering committee reviews this material and notes that information which will be helpful to the inventory and evaluation committees.

Data such as that shown in Figure 2-4 are especially relevant to a natural resources planning program and should be secured by the steering committee.

If systematically organized, this information, plus that generated during the NRPP and other future studies, can be made accessible to the community on an on-going basis--making problem identification and evaluation easier.

Figure 2-4 MAPS AND STUDIES WHICH MAY BE AVAILABLE

- Master Plan
- Zoning Maps
- Regional Studies
- Recreation/Conservation Plans
- Water Resource Studies
- Ownership Map or Plat Map
- Wetland Studies
- Infrastructure Maps (sewers, water lines, etc.)
- Results of Opinion Surveys
- Fishing Location Map
- Lake Bottom Contour Map
- Wildlife Studies
- Soil Survey (a prerequisite for the program)
- Town Natural Resource Inventory (NRI)
- Flood Plain Identification Map
- USGS Surficial and Bedrock Geology Maps
- Massachusetts Map Down Land Use and Vegetative Cover Map
- Recent Aerial Photos

Preparation of Base Maps and Other Supportive Maps

Several maps are prepared at the selected NRPP scale as a basis for actual field inventories and evaluations.

One of the aims of the NRPP is to standardize, to the extent possible, the scale of the maps used for planning purposes within a community. A standard scale allows maps of various kinds to be overlayed or

compared. Within any one community, there are often several scales being used for different purposes. This is often unavoidable and may be desirable in many instances. It is up to the steering committee to decide how the maps are to be used and what is an appropriate scale at which to prepare them.

The following three base maps are prepared by the SCS on "mylar," a clear plastic material, from which paper copies can be made.

1. Topographic Base Map: Enlarged from USGS topographic quadrangle maps covering the community, this map will serve as the base for many of the inventory and analysis maps to follow.
2. Massachusetts Map Down Project, 1971 Land Use and Vegetative Cover Map 1/: This map will be the basis for a preliminary land use map, to be verified and corrected by the field inventories. It will also be used to develop a generalized cover type map to aid in wildlife habitat evaluation.
3. Detailed Soils Map: This map is the basis for a number of possible interpretive soils maps as explained below.

Land Use Inventory Work Maps are prepared for each inventory committee to guide their field work. As a first step, a Preliminary Present Land Use Map is prepared. Based on the Mass. Map Down Map and other available information, NRPP land use inventory categories are delineated on a reproducible topographic base map. Paper working maps are then printed for each inventory committee. The boundaries and uses shown are then verified and corrected during the Inventory Phase.

1/ These maps are available for both 1951 and 1971. By comparing the vegetative cover and land use maps for both years, the rate of change in land use can be documented. The comparison is often astounding. These maps and accompanying data are distributed by the Cooperative Extension Service, University of Massachusetts, Amherst, Massachusetts.

Interpretive Soils Maps are also used in preparation for the inventories. Based on the characteristics of soils shown on the Detailed Soils Map, the SCS prepares interpretive maps showing the limitations, suitability, or relationship of the soils for various uses. (See figure 3-1 for a listing of possible interpretations.) Selected interpretations are prepared with the Town Operational Soils Report. Any additional interpretations should be discussed with the SCS and may be prepared on a cost-sharing basis. Prior to field work, each inventory committee overlays its preliminary work map on the interpretive soils maps related to its inventory (on a light table). It should note areas where the inventoried land use occurs on soils with severe limitations or low suitability for that particular use. These areas will then be carefully field checked during the inventory to identify problems that may have resulted from this inappropriate land use.
(Note: Interpretive Soils Maps will also be used extensively in the Evaluation and Analysis Phase of the program.)

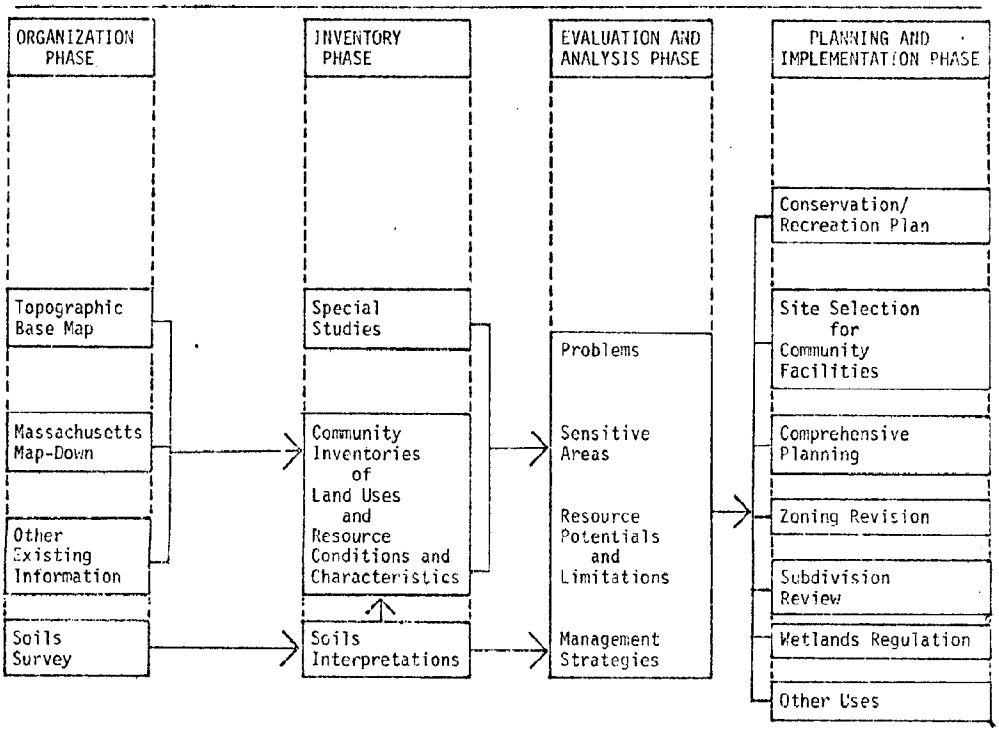
CHAPTER 3: INVENTORY

INTRODUCTION

The Inventory Phase of the Natural Resources Planning Program is a process of public involvement and education. Townspeople with varied backgrounds and interests join together to inventory the natural resources. Although the NRTT may prepare a few of the more technical studies, their primary function during this phase is to train townspeople to make the inventories, to give them support throughout the process, and to provide the volunteers with an understanding of the ecological importance of their natural resources.

The inventory committees must understand how the information that they will gather will be used in the overall program process. The maps and data that the inventories produce are not the end of the process. Instead, this information is the basis for the Evaluation and Analysis Phase, when the committees evaluate the present condition of their community's natural resources, identify alternatives for action, and recommend solutions to problems. Figure 3-1 outlines the collection and use of natural resource information throughout the NRPP.

Figure 3-1 INFORMATION FLOW IN THE NRPP



NRPP INVENTORIES, MAPS, AND STUDIES

Figure 3-2 lists the inventories, maps, and special studies that are compiled during the inventory phase of the NRPP. Other analyses, using combinations of these maps and studies, are conducted during the Evaluation and Analysis Phase of the program.

Land and Water Uses (column 1): Each acre of land and water within the community is classified as being used primarily for one of the eight NRPP land and water uses. The primary land and water use within the community is then displayed on a composite Present Land and Water Use Map (PLUM). The PLUM and the separate detailed inventories are valuable planning tools in themselves, but alone, they do not provide a complete picture of the community's natural resources.

Resource Conditions and Characteristics (column 2): This additional information is needed for the community to effectively evaluate, analyze, and plan for its natural resources. Many of these maps and studies are directly related to a particular land or water use inventory and are best done concurrently, by the same committee. Several are optional, and provide an extra level of detail for evaluation to meet a particular community need. Some, such as the Visual Resources Survey (see Chapter 6), require a separate committee. Others, such as "Problem Areas," are best done with input from all committees. The NRTT helps the community to select the appropriate inventories to meet its particular needs.

Interpretive Soils Maps (column 3): Selected maps, based on a detailed soil survey, are prepared by the Soil Conservation Service on a reimbursable basis with the community. They have a wide range of uses, from preparation for field inventories, through evaluation and analysis, to planning for specific sites and purposes. See pages and for more information.

Figure 3-2

NATURAL RESOURCES PLANNING PROGRAM

INVENTORIES, MAPS, AND SPECIAL STUDIES

To be developed by COMMUNITY INVENTORY COMMITTEES		To be developed by NATURAL RESOURCES TECHNICAL TEAM or OTHERS	
LAND AND WATER USES	RESOURCE CONDITIONS and CHARACTERISTICS	INTERPRETIVE SOILS MAPS (Soil Conservation Service)	SPECIAL STUDIES
Agricultural land use	Prime and Unique Agricultural lands and Agricultural lands of Statewide Importance Agricultural land Preservation	Agricultural Land Use Capability - for: Cropland Hayland Pasture land Suitability for Farming	
Recreation land use		Playgrounds Athletic fields and similarly intensively used recreation areas Golf fairways, lawns, and landscaping Paths and trails Picnic areas Camping areas	Inventory of sites having natural resource development potentials (NRI) by NRTT
Recreation water use	Recreation Facilities		
Municipal water use	Community water service areas		Potential Impoundment sites - by SCS Ground Water Favorability Aquifer Recharge Areas
Woodland use	Woodland Characteristics	Woodland Suitability	Surface Drainage and Watershed Boundaries
Wildlife land use (dedicated or managed)	Wildlife Habitat types (for entire community) Wildlife Habitat evaluation (for selected areas)	Suitability for: Openland wildlife habitat Woodland wildlife habitat Wetland wildlife habitat	Fish and Wildlife Resources - by NRTT Habitat evaluation for selected species
Wildlife wetland use	Wetland Identification (for entire community) Wetland evaluation (for selected wetlands)	Developing sites for Wetland Wildlife Relationship of soils for existing wetlands Depth to seasonal high water table	Natural Flood Storage areas
Urban land use	Zoning Municipal Service Areas Water, Sewer Public transportation Solid Waste Property Boundaries Areas of pending development Subdividable land	Land slope characteristics Septic tank absorption field Sewage lagoons Sanitary landfill (trench) Sanitary landfill (area) Shallow excavations Dwellings without basements Dwellings with basements Small Commercial buildings Local roads and streets Source of: Daily cover for landfill, Sand, Gravel, Roadfill, Topsoil Surface Runoff	Housing needs Storm drainage Sewer feasibility studies Flood Hazard analysis by SCS Flood Insurance Study
PRESENT LAND USE MAP (composite of above)			
	Unique Items or Areas Historic and Archaeologic sites or areas Problem Areas Public and Quasi-Public Ownership Visual Resources	Rough Lands Map (a composite of soils interpretations)	

Special Studies (column 4): Specialized technical studies may be made by the NRTT or private consultants. Which studies are undertaken by the NRTT depends on the needs of the community and the availability of personnel from the agency involved. Such studies also depend on conservation district priorities and commitments as well as the availability of funding. The community may wish to map or inventory other factors for consideration in its overall planning process. If so, the community should consider performing such studies concurrently with the NRPP inventories and mapping information at a compatible base and scale. If the town has a planning staff or consultant, they should be closely involved in the process.

MAKING THE INVENTORIES

Before discussing the steps of making the inventories, many of which may occur simultaneously, it is important to emphasize the role of the coordinator during this period. As in other projects where the efforts of a large number of people are being coordinated, the volunteers making the inventories need much guidance, encouragement and a sense of purpose. In order to create a directive and supportive atmosphere, the coordinator must work closely with both the volunteers and the NRTT. While the inventories are in progress, it is the coordinator's responsibility to provide the leadership at meetings, and to act as a liaison among the committees, the NRTT, and the steering committee. The coordinator also activates any committees which lag behind.

With a strong coordinator, the program moves smoothly through the steps discussed below and shown in Figure 3-3.

NRTT or Consultants May Make Special Studies: Special studies to be integrated in the Natural Resources Planning process are best scheduled for completion at the same time as the inventories conducted by local volunteers, so that all are available for the Evaluation and Analysis Phase. Where applicable, existing special studies should be transferred to the NRPP mapping scale and base to permit use with other inventories. Local professional staff can assist in this process.

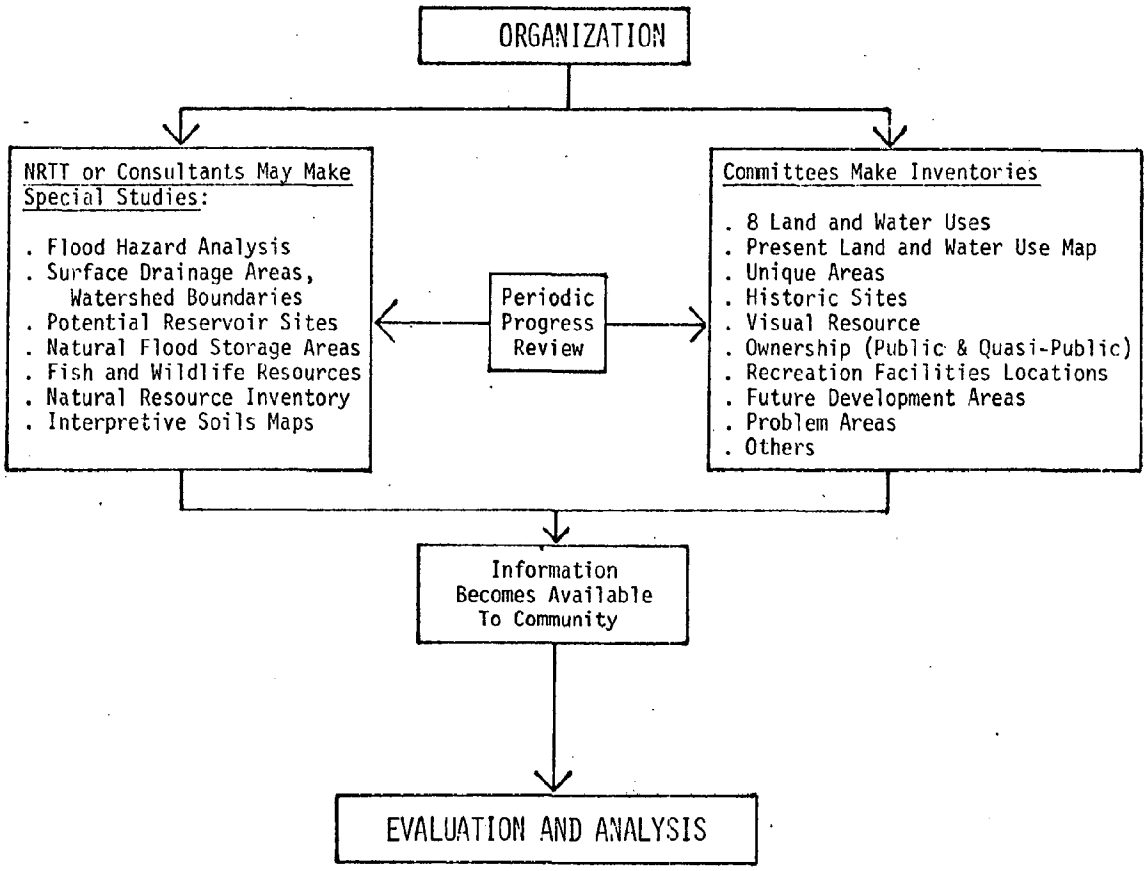
Committees Make Inventories: Using base maps and training provided by the NRTT, the town's volunteer committees conduct field inventories of the land and water uses and conditions listed in Figure 3-2. Each committee is assigned to a specific inventory or set of related inventories. These inventories involve field checking the location, current use, condition, and other features of the land uses and resources assigned, and recording necessary information on a series of data sheets and working maps for future use. Detailed information and instructions for these inventories are found later in this chapter.

Periodic Progress Reviews: Committees should get together with one another and the Technical Team on a regular basis to report their progress and to compile the "Present Land and Water Use Map." Each committee should give an account of its accomplishments to date, any difficulties encountered, and any information they think is appropriate to share with other committees. In this fashion, any misdirection or misunderstanding can be corrected, information can be traded, and shared enthusiasm can keep committees moving ahead. The preparation of the composite PLUM is described in The Instructions to Inventory Committees, page .

Data and Maps Become Available to Community: As the inventories are completed, the NRTT will "spot-check" each map and data sheet for accuracy. Many of the paper maps can then be transferred to "Mylar" material for a permanent reproducible record. Finalized information will then become available to the community for decisionmaking, or for informational and educational purposes.

With the inventories finished, the steering committee and its subcommittees are ready to move on to the next phase--Evaluation and Analysis.

FIGURE 3-3 INVENTORY PHASE



INSTRUCTIONS TO INVENTORY COMMITTEES

The following section provides a more detailed explanation of the responsibilities of the citizen volunteer committees, and of the inventory procedures suggested for their use.

Responsibilities of Inventory Committees

Each committee is responsible for completing several tasks including:

1. Making a map of its assigned inventory or inventories
2. Recording additional information concerning each mapped parcel on data sheets or other appropriate forms
3. Evaluating the condition of the resource, and
4. Preparing an inventory report

The coordinator and the NRTT will provide training and assistance to the committees in carrying out these responsibilities and in overcoming any difficulties which may arise.

Each inventory committee is provided with the following materials:

1. General instructions to inventory committees
2. A Glossary which explains the terms used in the program
3. An Inventory Description of what is to be inventoried and any special suggested procedures
4. Data Sheets which will provide a written record of information that cannot be shown on a map. The Data Sheets are necessary for evaluating the resource and using the inventory for planning and informational purposes.
5. A preliminary Present Land Use Map or other appropriate work maps and interpretive soils maps for making their inventories
6. Guidelines for evaluating the resource. (The committees evaluating the eight present land and water uses will use Resource Evaluation Sheets for this purpose).
7. A listing of committee members and their phone numbers; and a schedule of meetings and completion target dates.

Inventory Procedures

Several steps are suggested for making the inventories:

Step 1:
Preliminary to inventory and mapping, the coordinator (with NRTT assistance) should divide the town into sectors convenient for the organization of workload and access.

This division is best based on identifiable physical features and/or existing road systems. Easy access to each sector should be available. These sectors are not equivalent to "parcels" to be inventoried, but are an arbitrary means of organizing and planning for field work. All inventory committees should attempt to organize their work based on the same sectors to facilitate coordination of the various inventories. It is recommended that all committees first complete one selected sector and then meet to resolve conflicts in classification and responsibility before proceeding with the remaining sectors.

Step 2:
Before beginning the actual inventory, each committee should familiarize itself thoroughly with the materials provided. The Inventory Descriptions explain what is to be included in the inventory, where to find the information, whom to consult for assistance, and coding symbols to be used on the map. The Inventory Descriptions outline what is to be delineated on a map for each resource.

For each mapped parcel, additional information is shown on the Data Sheet for that resource. This includes information useful in evaluating the resource, such as parcel size, ownership, presence of facilities, and presence of pollution. If a committee is unfamiliar with any of the terms used on the Inventory Descriptions or the Data Sheets, members should consult the Glossary of Terms (Appendix B).

Committee members should also familiarize themselves with the maps that have been provided for the inventory. A topographic map with preliminary land use delineations will normally be used as a work map for making the inventory.

The NRTT will explain the use of the topographic map and other materials, answer any questions, and provide field instruction.

Step 3:
If a preliminary Present Land Use Map has not already been prepared, each committee should transfer any existing information concerning its particular resource onto the work map. For instance, an outdated land use map may exist that can provide the basis for beginning a particular inventory. Some committees may find the current Massachusetts "Map-Down" to be a useful source of information; however, if this map is used, it may be necessary to consolidate similar small areas into larger parcels for actual inventory.

Step 4:
Each committee should overlay its preliminary work map on the interpretive soils maps related to its inventory (on a light table). It should note areas where the land use to be inventoried occurs on soils with severe limitations or of low suitability for that particular use. These areas will then be carefully field checked during the inventory to identify problems that have resulted from this inappropriate land use.

Step 5:
Next, each committee should make a field survey of the town. Beginning with one sector at a time, the committee should drive or walk through the area, checking to see that the land and water uses delineated on the preliminary working map are still correct. Changes should be noted on the map and Data Sheet. Boundary delineation in the field, without special equipment and training, is expected to be limited in its accuracy. The NRTT can provide assistance in special situations, but it is generally best to use existing maps or aerial photographs for boundary delineation. The committee's primary attention should be given to identifying the use and condition of the resource being inventoried. Special attention should be given to identification of problems related to use of the

resource. Areas where the use is inappropriate for the soil condition, should be carefully investigated and problems or corrective management measures should be noted.

During the field inventory, due respect should be given to the privacy of landowners. Required information can normally be obtained without actual access to posted areas. Where access seems necessary, a conversation with the landowner and explanation of the program will often gain you a wealth of information as well as access. In any case, good public relations are far more important to the long-term success of the program than a field check of a certain area.

To assure accuracy and efficiency, each map and its Data Sheet should be prepared concurrently during the field work. Each "parcel" (normally a contiguous area of the same land use and not an ownership unit) is given a number on the map and required information is recorded with the identical number on the Data Sheet for later reference.

The acreages of parcels cannot be determined until the inventory boundaries have been finalized following a review by the NRTT. In the case of the present land and water use inventories, the boundaries cannot be finalized until after the Present Land and Water Use Map has been finalized and conflicting boundaries have been resolved.

As each parcel is checked or added to an inventory map, it should be coded to identify its use, code number, type, and ownership as indicated on each Inventory Description. A sample code might be $\frac{\text{"A-1"}}{\text{O-M}}$, indicating "agricultural land, parcel number 1, which is a productive orchard on state-owned lands." For all inventories, the top line of the code will indicate the primary use and parcel number. Each separate parcel should be numbered consecutively down or across the map. The bottom line of the code denotes various uses, locations, or other needed

information. The code letters will vary depending on the inventory map and the specific information to be shown. The last letter in the code will always indicate ownership of the parcel. For codes to be used in each inventory, see the Inventory Description.

Remember to number all of the parcels, even if they are too small to put the entire coding symbol inside the parcel boundary. After coding each parcel, it should be shaded using the appropriate color listed in each Inventory Description.

Step 6:

Present Land and Water Use Map (PLUM) - Each committee working on a primary land and water use inventory will use a preliminary land and water use work map to prepare its assigned inventory. These eight committees will then work together to make a final composite of all eight inventories to serve as a rough draft of the present land and water use map.

As committees complete assigned sections of their work maps, they should transfer the information to a composite map. This map will show all eight primary land and water uses as verified bv field inventory. To prepare this composite map, a clear "Mylar" sheet is overlain on a topographic base map and the town boundaries, major roads, and waterways are carefully traced onto the mylar. Committees then transfer the information from their work maps by overlaying the mylar composite map on a work map, lining up the roads, and tracing the parcel boundaries directly onto the composite map using the appropriate colored pencil for each land use boundary and parcel code. In this manner every acre of land and water in the area is assigned a specific primary use.

Care must be taken in transferring the information from paper work maps to the composite map. Heat and humidity cause the paper work maps to contract or expand. If this happens, the paper copy will vary in size from the mylar map. Thus, when overlaying the two maps, each map must be carefully aligned and checked frequently. As each parcel is traced onto the composite map, it should be noted if the boundary lines overlap or if there are areas that are not accounted for. Inconsistencies may occur when two or more committees assign a different land use to the same area. As these inconsistencies arise, the committees involved should compare and check the individual inventory maps to determine which classification is correct. The committees may need to field check the area or seek assistance from a member of the NRTT to determine the correct land use and boundary configuration. The incorrect classification and boundaries must be changed on the inventory work maps and the corrections made on the composite map.

Step 7:
When all parcels have been verified, the acreages of each parcel should then be computed and recorded on the Data Sheets. There should be a line entry on the Data Sheet for each parcel shown on an inventory map. The acreage of each separately coded parcel should be measured by using a planimeter or a dot-grid system. The NRTT will explain this procedure.

Each committee should prepare a final version of its inventory map. This map should include a legend, title block, and other appropriate information. A final version of the Present Land Use Map should also be prepared on mylar to permit reproduction. A paper copy can then be colored for display.

INVENTORIES AND SPECIAL STUDIES

in the

NATURAL RESOURCES PLANNING PROGRAM

The following is a summary of the principal inventories and special studies compiled during the Natural Resources Planning Program. Other additional inventories and studies may be conducted by the community or Natural Resources Technical Team to meet special local needs. Detailed "Inventory Descriptions" for the principal inventories are available from the Soil Conservation Service and are distributed to the inventory committees in the Organization Phase of the program.

Agricultural Land - cropped and farmed areas; managed for grass and hay; fruit and berry producing; idle farmland; tree and shrub nurseries, and greenhouses.

Municipal Water - water surfaces used for supplying municipalities, industry, irrigation; fish hatcheries; commercial fishing ponds; well fields.

Recreation Land - areas used primarily for intensive outdoor recreation, with major types of activities available identified.

Recreation Water - areas used primarily for water-associated recreation, with kinds of recreation permitted; includes streams and rivers.

Urban Land - "built-up" areas used for residence, commerce, industry, transportation, institutions--identified specifically as to purpose.

Wildlife Land - areas used primarily for production or preservation of openland wildlife and woodland wildlife.

Wildlife Wetland - wet and shallow water areas; fresh and salt marshes; and shrub swamps; used primarily for wetland wildlife and aquatic animals other than fish.

Woodland - forested areas with at least 30% tree-crown cover, and used primarily for tree production; relationships to stream corridors, watershed protection, and wood production; types of tree stands classified.

All of the information described for each of the foregoing 8 maps is then combined into one map, as a composite, showing, in total...

Present Land and Water Use - the location and boundaries of each block of land and water--exactly what the town has as a basis for evaluation and analysis.

In addition, community volunteers collect further information and compile other maps to complete the picture of their natural resource base. Some of these maps are:

Problem Areas - plotting of locations affected by air, sight, sound and material pollution from various sources including road salt, industrial and household wastes, construction sediment, dumps, junk-yards; high-level noises from traffic, manufacturing; flood-prone areas, etc.

Dedicated Land - areas whose use is not likely to change soon, such as preserves held in trust, historic sites and the like.

Recreation Facilities Location - map is an overall locational view of public and private recreation facilities presently available in the town.

Rough Land - a delineation of steep, ledgy or extremely stony land, and extremely drouthy soils.

Future Development Areas - boundaries of locations already definitely committed to some type of urban (construction) development, such as homes, factories, roads, and so on; identified as to type of development.

Historic Sites - old mill dams; blacksmith shops, one-room schoolhouses; battle grounds; early survey markers; significant homes; and so on.

Unique Items or Areas - "one of a kind" landmarks of all sorts, such as geologic formations, waterfalls, unusual views, ancient trees, buildings of exotic structure, glacial or other physiographic features.

Major Watersheds and Stream Pattern - featuring local drainage patterns and watershed boundaries, indicating stream classifications in respect to water qualities for various uses.

Wetlands - areas of wet soils, identified in the Town Operational Soils Report as poorly drained and very poorly drained soils. Includes swamps and other areas not identified as wildlife wetlands.

Prime and Unique Agricultural Lands - areas with soils of high productive potential whether or not currently in agricultural use; unique areas such as cranberry bogs or orchards.

Visual Resources - based on a survey of the preferences of local residents for carefully selected photographs of local scenes, visual assets and problems are identified and mapped.

Specialized technical studies may be made by the NRTT or private consultants, such as:

Inventory of Sites Having Natural Resource Development Potentials - (Natural Resources Inventory or NRI) - report emphasizing the outdoor recreation or conservation potential of sites or areas in a community.

Soil Interpretations - prepared as part of the prerequisite operational Soils Report contracted between a town and SCS. Maps of interpretations on the limitation of soils for such items as construction, farming, woodland, sewage disposal, etc., which form the basis for a wide variety of analyses to meet local needs.

Potential Reservoir Sites - locations for water storage including pool sizes, dam centerlines, design features and estimated costs are pinpointed.

Floodplains - areas subject to flooding, up to 100-year frequency.

Ground Water Favorability - areas favorable for developing wells, including coding as to variable rates of water output in estimated gallons per minute.

Using combinations of these inventories and special studies, a variety of "Analysis Maps" can be developed. Using an "overlay" technique, information is combined to highlight specific problems or potentials, based on the community's needs and objectives.

CHAPTER 4: EVALUATION AND ANALYSIS

INTRODUCTION

Effective use of the NRPP inventory information in the community's planning and decisionmaking processes first requires evaluation and analysis of that information. In this phase the community evaluates the inventory results to identify its natural resource assets, needs, and problems. With the assistance of the Technical Team, the inventory results and other natural resource information, such as the soil survey, are analyzed to identify opportunities for action to enhance, develop, or protect the community's natural resource base.

The primary participants in this phase are the inventory committees and the steering committee, but involvement of town boards and commissions and of the public at large is necessary if all viewpoints are to be considered. Detailed below and depicted in Figure 4-1 are the suggested steps of the Evaluation and Analysis Phase.

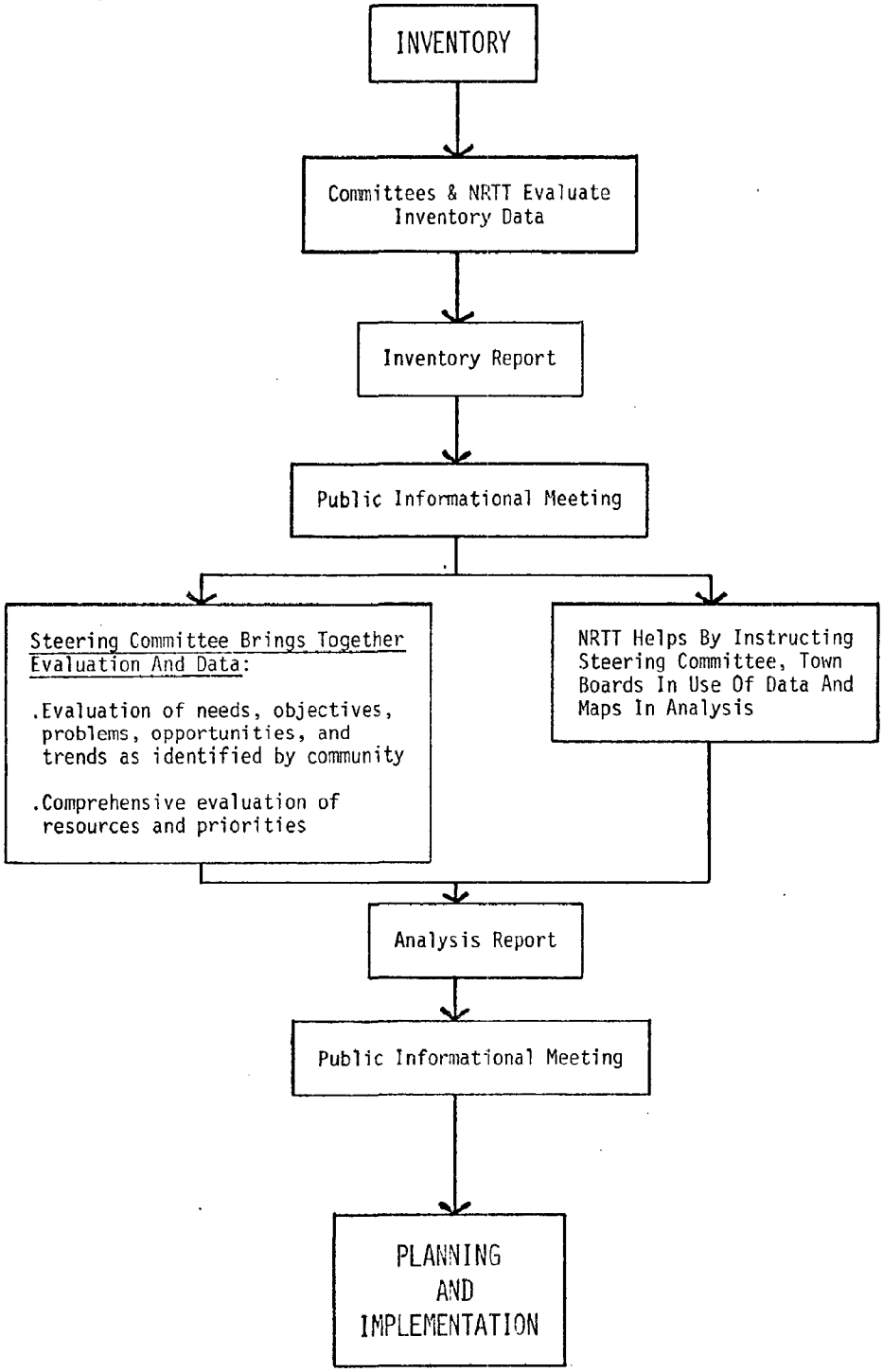
THE EVALUATION AND ANALYSIS PROCEDURE

Committees And NRTT Evaluate Inventory Data

Each inventory committee is responsible for evaluating the status of its assigned natural resource or study area.

The committees make their evaluations in the perspective of community needs and objectives. They determine the significance to the community of the problems and opportunities associated with the natural resources. Trends are delineated. Whenever possible, strategies which may improve the quality of a resource are explored, and situations which threaten its condition are examined. The consequences of no change in the present policy regarding the resource are also explored.

FIGURE 4-1 EVALUATION AND ANALYSIS PHASE



For example, the Historic Committee might concern itself with such questions as: How significant are the historical sites to the community? To the region? To the nation? Is there a preservation and restoration program? If so, is it commensurate with the importance attributed to the sites? Do tours or interpretive programs present any problems to the community or neighborhood in terms of circulation, vandalism, overuse, etc.? Are there opportunities to create a historical trail or to link an existing historical facility with other resource uses such as a recreational activity, bi-walk system, etc.? There exists a myriad of similar issues which committees might explore. The Natural Resources Technical Team will guide the committees through this evaluation process.

Natural Resource Evaluation Sheets:

As an aid to the community in evaluating the information compiled in the inventory phase, committees are provided with Natural Resource Evaluation Sheets for the 8 primary land and water use inventories. These sheets are designed to assist the committees to summarize and analyze the inventory information. They contain a series of questions for the committee to answer that will help to raise issues, and to identify problems, needs, and potentials for action. Much of the required information is collected by field and map work, but some may come from community officials or others and from library reference sources.

The questions on the Resource Evaluation Sheets concern the quantity, quality, and distribution of the land uses or resources inventoried and also suggest consideration of town policies and plans. These sheets also provide the community with the opportunity to compare its land use characteristics with the suggested guidelines. These are discussed below and explained in the "Rationale" attached to the Resource Evaluation Sheets. These guidelines have been developed through the research and experience of professional natural resource managers and can provide valuable guidance for land use decisions.

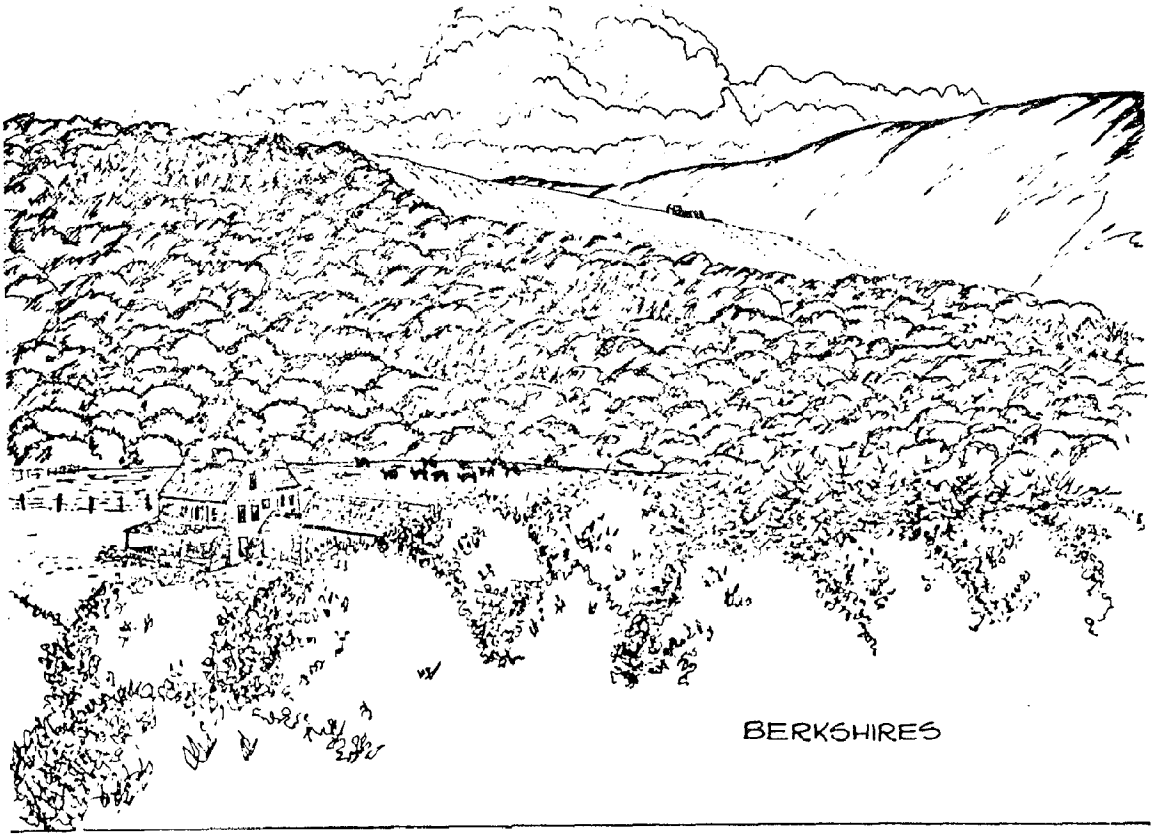
When completed, the Resource Evaluation Sheets provide the basis for an Inventory Report as described on page 4-7. A Sample Resource Evaluation Sheet for Agricultural Land and the associated Rationale for Guidelines are found in Appendices D and E. Resource Evaluation Sheets for the other seven primary land and water use inventories can be obtained from the Soil Conservation Service.

NRPP Guidelines:

To assist a community in evaluation of its natural resources and in development of plans for sound natural resource use, the Natural Resources Planning Program provides suggested guidelines for natural resource use. To be useful, these guidelines must reflect the resource characteristics specific to particular areas of this diverse state. It would be meaningless for the guidelines used by a community in the Berkshires to include consideration of surf fishing. Similarly, a community in suburban Boston does not have the same agricultural opportunities as does one in the Connecticut Valley. For this reason, the Resource Evaluation Sheets, used in the NRPP evaluation process, contain guidelines specifically developed for each major NRPP resource area.

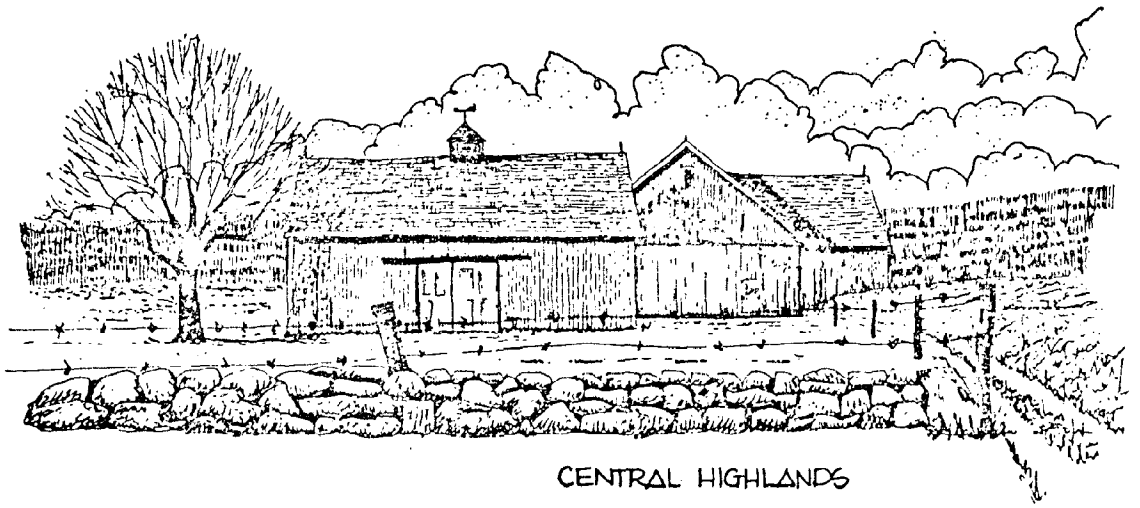
In Massachusetts the four following NRPP resource areas (see Figure 4-2) are defined by particular patterns of soil, topography, climate, water resources, land use, and type of farming:

The Berkshire Area comprises the Berkshire Mountains in the western part of the state. The area is characterized by rounded mountains with strongly rolling to steep slopes and many glaciated, broadened valleys containing numerous ponds and wetlands. About 85 percent of the area is forested. Farming activities occupy about 9 percent of the area.



BERKSHIRES

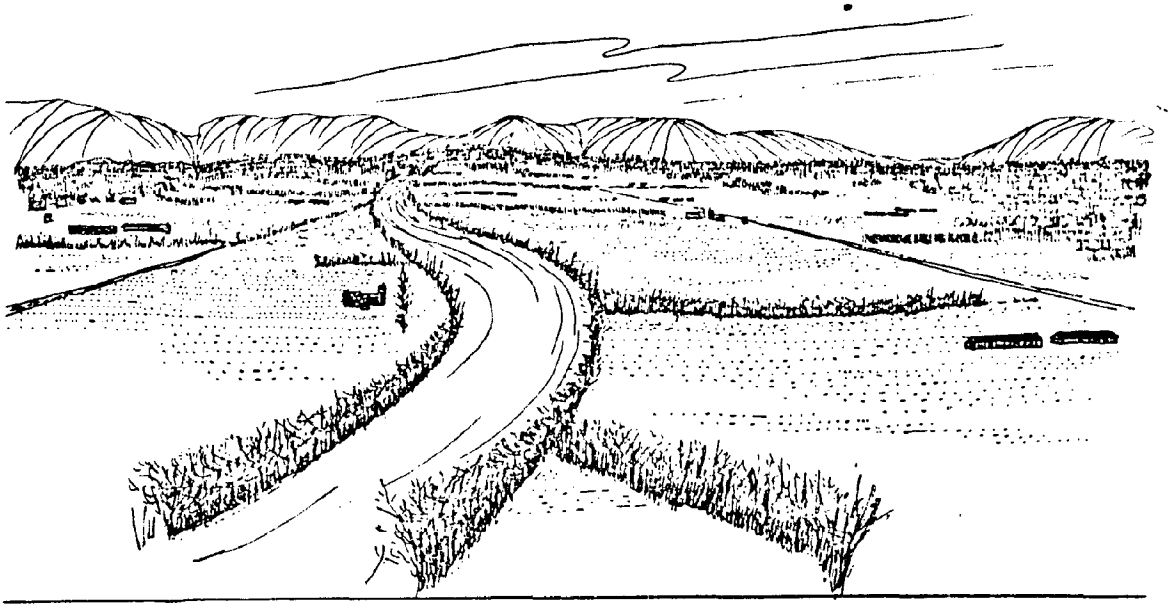
The Central Highlands Area includes the largest portion of the state. The topography varies from rolling land to hilly uplands broken by many level or gently sloping valleys that terminate in coastal lowlands. About 65 percent of the area is forested; mainly small private woodlots, but some is state forests or other large holdings. Thirteen percent of the area is in agricultural use. Many of the farmsteads are used as rural residences with 16 percent of the entire area being urbanized.



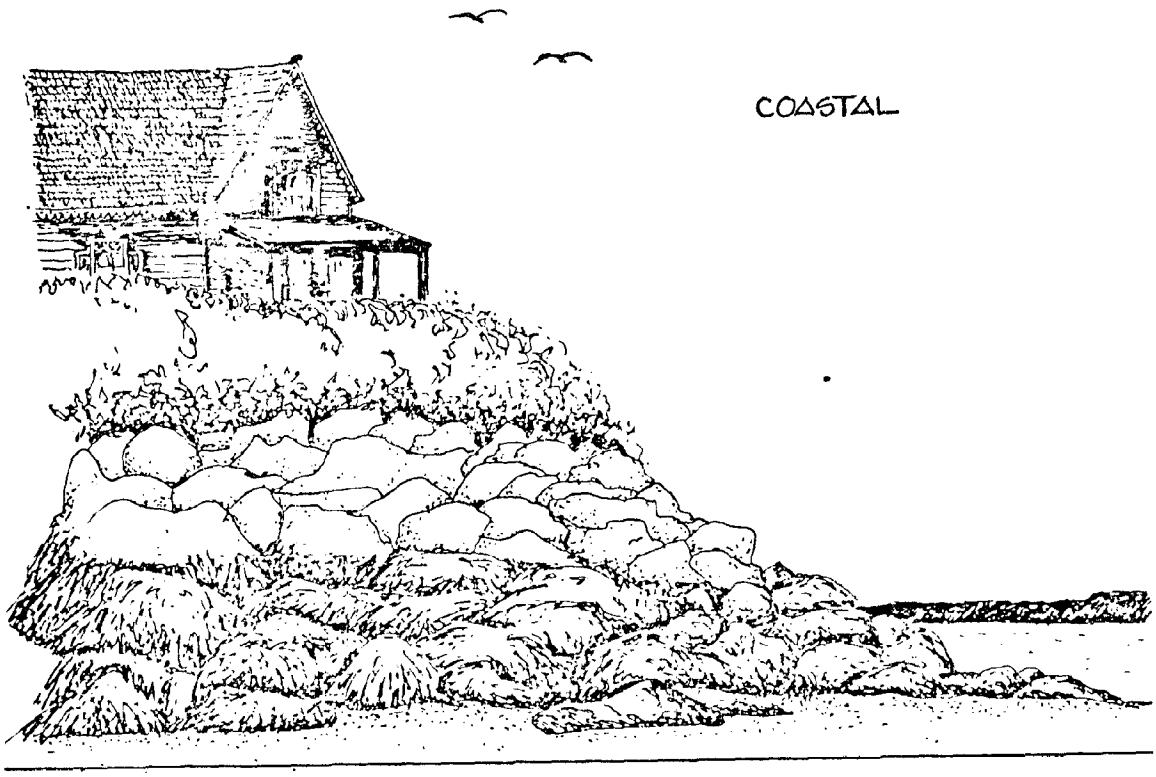
CENTRAL HIGHLANDS

The Connecticut Valley Area is located in the western part of the state. The landscape is nearly level to sloping lowlands bordered by north-south trending trap-rock ridges that have hilly and steep slopes. The area is about 50 percent forested, mostly farm woodlots. Farming activities, primarily crops in rotation, occupy about 25 percent of the area.

CONNECTICUT VALLEY



The Coastal Area includes towns along the coast, Cape Cod and the off-shore islands. Fifty percent of the area is forested. Agricultural lands occupy about 11 percent, urban lands 25 percent, and wetlands about 13 percent of the area. Much of the area is characterized by intensive development for recreation and resorts. The area has little relief, being largely an undulating to rolling coastal plain.



The Inventory Report

The final activity of the inventory committees, and one of the most important, is the writing of reports. These are invaluable as summaries of the findings from the inventories and Resource Evaluation Sheets. Each report serves as an overall evaluation of the conditions, problems, and assets associated with the town's resources. They should be written in a form that can be easily understood. A report is prepared by each committee according to a format which the Steering Committee and the inventory committees determine.

The following outline is a sample of one approach:

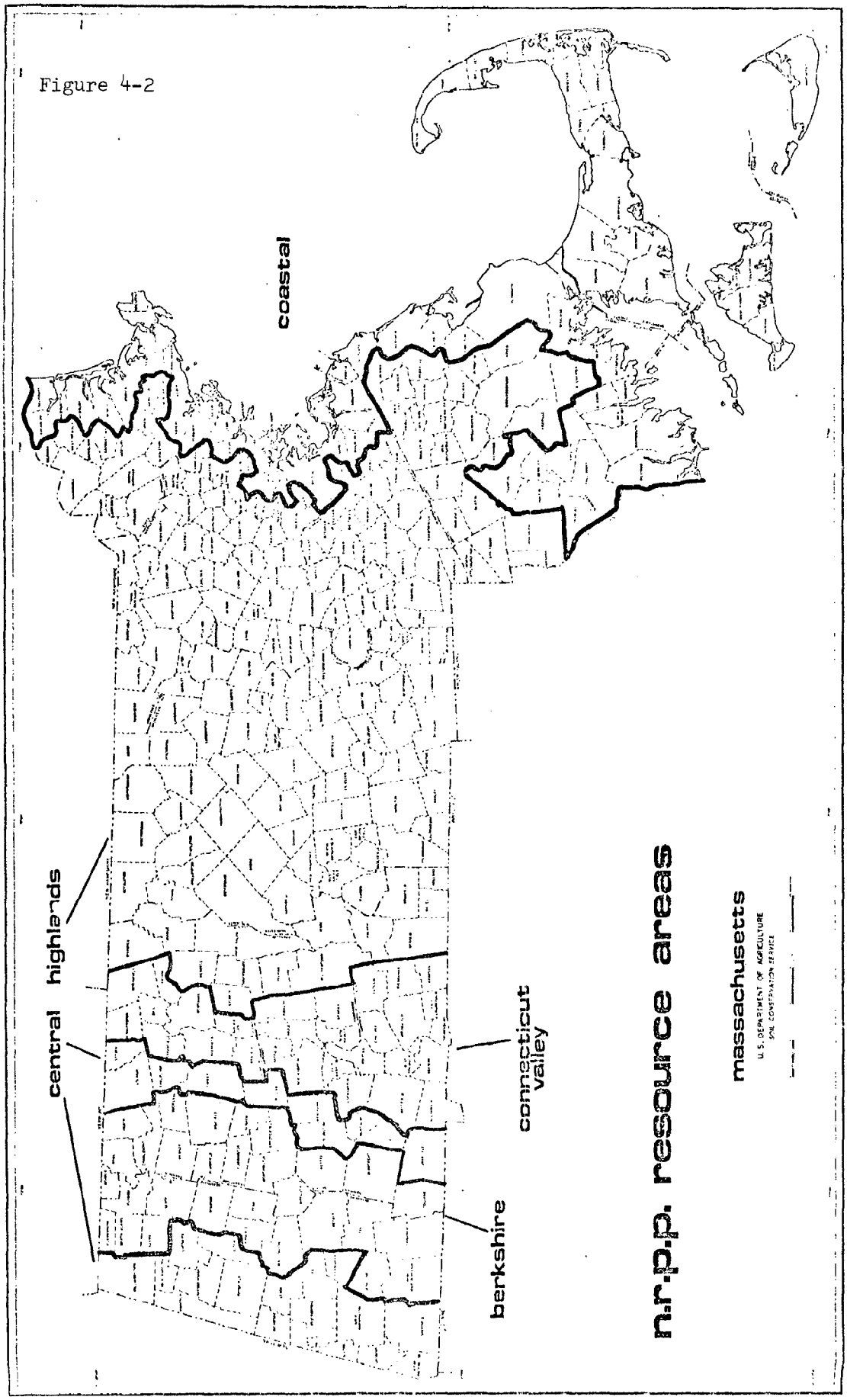
1. General discussion--Sections of a general nature to include:

    a. An explanation of the community's involvement in the program.

    b. An explanation of the inventory and evaluation objectives, and the potential utility of the report to the community.

    c. A discussion of who was involved.

Figure 4-2


coastal
central highlands
connecticut valley
berkshire
n.r.p.p. resource areas
massachusetts
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

d. A general description of what the inventories are and how they were prepared.

e. A summary of the major committee findings and recommendations; this could assume the format shown in Figure 4-3.

2. Specific findings--A section written by each committee to include:

a. An overview of the kinds of things which were inventories, and an explanation of the importance of the resource or land use inventoried.

b. A description of some of the more interesting or significant items inventoried.

c. An evaluation of the condition of the resource, including Resource Evaluation Sheet information.

d. An identification of further studies which may be helpful in determining future policy.

e. Recommendations concerning future management and maintenance of each resource.

If the community wishes to use the report as a portion of a Conservation/ Recreation Plan, meeting state requirements, the NRTT can assist in developing an appropriate format.

The report should include significant information about the resource inventoried, whether or not it was part of a Resource Evaluation Sheet or Data Sheet. The Data Sheets and the Resource Evaluation Sheets should be used as a guide, but anything else that is important to the community should be included in the report. The report is an opportunity to personalize the evaluation to the community. The important points to stress are those that are of interest and relevance to the community and that have implications for future community actions. The more thorough and objective the evaluations are, the more useful they will be. These reports will be the bases for discussions within the community and for further analysis by the steering committee.

FIGURE 4-3 SAMPLE SUMMARY OF COMMITTEE FINDINGS AND RECOMMENDATIONS

Land Use	Opportunity Or Asset	Constraint Or Problem	Recommendation
Recreational Land	a. Areas we have are well used	Lacking in certain types of facilities	Addition of small playgrounds
	b. Good playfields		
	c. Out-of-town golf courses close by	Lack of golf courses	
	d. Shooting club with potential for expansion		
	e. Good potential for nature areas		Implement Rec. Comm. proposals from the 1972 plan
	f. Local availability of ski areas		
	g. Spring Hill trail	Limited development	Extension of trail
		Picnic areas too small	Additional picnic facilities
		Poor distribution of play areas	Add small programs
		Off-street parking lacking	
		Lack of traffic controls on access roads	
		Neighborhood parks lack water & restroom facilities	
		Neighborhood parks lack emergency aid facilities	
		No community parks	Encourage private development
		Lack of facilities near trails end	Add facilities
			Volunteer help for developing
			Sledding/tobogganing facilities
			Area for snowmobiling
			More conservation sites utilized for nature programs

Public Informational Meeting

There are two reasons why a public informational meeting is important at this point. First, such a meeting will focus attention on the results of the labors of the committees. Through a formal presentation by local citizens, the community will be made aware of the data and evaluations which have been completed and are available for use as a result of the NRPP activity thus far. Second, the forum can be used to raise issued to give boards, interest groups and other citizens the opportunity to respond to or to take action based on committee findings. One procedure would be to hold several meetings at which boards are asked to formally comment upon the committee findings in terms of their own areas of responsibility. In this manner the steering committee can learn how other boards perceived the condition of community resources and what ought to be done about them. Through these meetings the boards may discover that they are working towards many of the same goals. The next step is to explore ways in which they can combine their efforts to strengthen their activities.

Steering Committee Brings Together Data and Evaluations

Before the evaluation information can become truly useful, it must be more systematically organized. The inventory report was the first step toward this objective. Now the steering committee pulls together and analyzes the committee findings, community responses, and information from other sources in terms of a broader perspective of community needs, attitudes and objectives. The steering committee explores such issues as: What kind of a community does the town want to become? What crucial environmental problems will demand community attention? Where do priorities lie? Will current trends in land use continue? Which natural resources require special or immediate action to insure that community desires for the future are fulfilled?

These questions are not easy ones to answer; yet each must be addressed. The Massachusetts Growth and Development Policy Act 1/ has institutionalized the need to do so. In fact the Local Growth Policy Committee may have already provided some answers to these questions. Even so, there is more to be done to thoroughly evaluate community resources, and analyze the opportunities for action.

The steering committee may choose to work collectively during this period or it may opt to form study committees. Some volunteers from the inventory committees should be included for continuity. The NRTT is available to assist the steering committee in this activity. The task may take several months to accomplish; it is probably unrealistic to expect members to attend meetings more than once or twice every two weeks. The committee will find the going slow. This is especially true as it becomes oriented. Careful guidance is essential to keep the group from losing sight of its mission and becoming bogged down in details.

Before commencing to synthesize the data and make further analyses, an an outline should be prepared showing what is to be done and by whom. The steering committee may choose to separate the topics for futher analysis into special study areas for committees. Among those items which should be explored are:

Identification of Needs, Trends, Opportunities and Constraints: It is important to have a clear image of where the community is headed and what it wishes to become. To gain this understanding, if this has not already been done, the steering committee should comprehensively evaluate any needs, trends, opportunities and constraints which have been identified by the inventory and evaluation committees, the boards, town reports, census data, opinion survey, newspapers, and other sources,both within and outside of the community.

1/ Massachusetts General Laws, Chapter 807 of the Acts of 1975.

It may be desirable to collect additional information concerning people's attitudes. This can be done through opinion surveys or public meetings. Many communities hold neighborhood meetings on a regular basis to keep government bodies informed and responsive to citizens.

Comprehensive Assessment of Resources and Priorities: Earlier in the Evaluation and Analysis Phase, the inventory committees evaluated each resource independently. The steering committee should now examine the relationships among the natural resources and land uses. The steering committee should explore such issues as:

- Natural resources problems or hazards that are severe or need immediate action. Examples might include excessive storm runoff or septic tank failure.

- Special value resources which require protection or preservation such as wetlands, scenic vistas, historic sites, or prime agricultural lands.

- Areas of conflict or consensus involving growth, land use, and resource utilization. These could either be conceptual things such as a desired growth rate or the special realities of a specific site.

- Potential trade-offs or opportunity costs. For instance, if all prime agricultural land was converted to urban use, the opportunity to turn it to food production would be lost, as would the visual amenity that farmland provides.

- The impact upon the community's resources of maintaining current growth and development policies. For example: continued shoreland development of a lake may impair water quality and destroy opportunities for recreation and water supply.

- The consequences of alternative policies affecting natural resources including the impact of different kinds and magnitudes of growth on the natural resources. For example: if a certain zoning technique is implemented, what effects will this action have upon such factors as community water supply, availability of open space and outdoor recreation, or storm runoff--what will the community's natural resources look like twenty years from now?

- Regional natural resources or growth and development pressures or opportunities that might significantly influence the community. For instance: a regional recreation center may increase local traffic congestion and safety problems. A new regional recreation area outside of the community would also provide increased opportunities for local residents.

- A model of natural resource use for the community, based on the capabilities and limitations of its land and water resources, and the goals, objectives, needs, and priorities of the community.

In order to broaden its perspective, the steering committee may wish to invite individuals with special expertise to discuss the community's natural resources. A forester, a fish or wildlife biologist, an environmental lawyer, the town engineer, a hydrologist or the town's water supply consultant--all could be helpful in answering the steering committee questions.

Another way to approach an analysis of the issues described above, is to ask each of the appropriate community boards to evaluate them in light of its special interest. Then, the responses could be compared to reveal conflicts of basic assumptions, objectives, policies, etc. This could be a meaningful way to evoke discussion and better understanding.

NRTT Helps by Instructing Steering Committee and Community Boards in the Use of Data and Maps in Analysis

Boards and commissions involved with land and water use changes need to have a working knowledge of what information is available and how it can be utilized. They need to be familiar with the process of selecting relevant information to use in decisionmaking. They should also be able to identify some of the consequences proposed actions may have on the community's natural resources, and residents. The NRTT can work with the steering committee and town boards in exploring the interpretation and use of the maps and data generated through the program. They can be particularly helpful in the preparation and use of analysis maps.

Analysis maps are an advantageous way to further utilize the information collected during the Inventory Phase of the program. Each inventory map, of course, is useful in itself. The real potential of the maps, however, exists in combining the information. Depending upon the nature of the problem being tackled--be it site selection or an open space plan--the relevant information from several maps can be combined to show relationships. The purpose of the analysis can be varied. It may show such relationships as spatial patterns, as in an open space system; or areas that are suitable for a given purpose such as areas with potential for a sanitary landfill for recreational development, or for multi-family housing.

Several types and uses of analysis maps are described below:

Interpretive Soil Maps:

NRPP communities have available an Operational Soils Report consisting of a narrative explanation, a detailed soil map, and a number of interpretive maps. The narrative contains brief descriptions of the individual soils and a table of interpretations.

The soil map indicates the location and extent of the various kinds of soils in the community. Each kind of soil has definite characteristics and qualities. The soils are classified and mapped on the basis of such properties as texture, drainage, stone content, depth to bedrock, slope, permeability, etc.

Based on the characteristics of the soils on the map, interpretive maps are prepared, showing the limitations, suitability, or relationship of the soils for various uses.

The SCS, as a part of the NRTT, can provide guidance in the use of these interpretive maps. A partial listing of the interpretations available is found below:

Soil limitations for:

- Septic tank absorption field
- Sewage lagoons
- Sanitary landfill (trench method)
- Sanitary landfill (area method)
- Shallow excavations
- Dwellings without basements
- Dwellings with basements
- Small commercial buildings
- Local roads and streets
- Lawns, landscaping and golf fairways
- Playgrounds
- Camp areas
- Picnic areas
- Paths and trails

Soil suitability for:

- Farming
- Openland wildlife habitat
- Woodland wildlife habitat
- Wetland wildlife habitat

Soil relationship to:

- High water table
- Surface runoff

Soil suitability as source of:

- Daily cover for landfill
- Roadfill
- Sand
- Gravel
- Topsoil

In addition to analysis for community-wide planning, soil maps can also be used by the SCS to develop detailed plans for improved resource management on individual parcels of public or private land.

Sensitive Areas Maps:

Many communities find a Sensitive Areas Map to be useful in the analysis of their natural resources and prospective land uses. "Sensitive Areas" are land or water areas which are serving an important productive or protective function for the community in their present natural state, and whose function would be lost if the natural condition was changed. Areas selected for inclusion on a Sensitive Areas Map will reflect the community's particular needs, but might include the following:

Critical wildlife habitat
Inland wetlands
Coastal wetlands
Beaches and dunes
Aquifers and recharge areas
Water supply watersheds and well fields
Floodplains
Ponds, streams, and creeks with their banks and shores
Hillsides and steep slopes
Scenic and unique areas
Others, as appropriate

Inappropriate use of such areas can lead to loss of an irreplacable resource, to public and private costs to correct the negative impacts, or to both. In planning for conservation of sensitive areas, a community must consider the indirect effects of land use change near these areas as well as the direct effect of development on the areas themselves. The nature and importance of these areas, and a variety of protective measures, are summarized on the "Sensitive Areas Charts," found in Appendix F.

If overriding community needs require alteration of a sensitive area, a community should be prepared to use appropriate management measures to minimize the negative impacts of the alteration. The NRTT can provide technical assistance in planning such measures.

Special Purpose Analysis Maps:

Interpretive soils maps, Sensitive Areas Maps, inventory maps, and other mapped information can be further combined to create analysis maps with a wide range of uses. These uses might include site selection for a public facility, evaluation of alternative potential land use patterns, or identification of areas most appropriate for development, improved management, or protection. Such analysis maps combine consideration of soils limitations and ecological sensitivity with consideration of spatial patterns and potential conflicts of present or proposed land uses. Possible uses of analysis maps will depend on the community's particular needs and should be discussed with the NRTT during the Organization Phase to insure that the required information is gathered and ready for use. Figure 4-4 shows one format that a community might use to plan for analysis maps to meet its needs.

The information to be compiled on an analysis map depends upon its intended purpose. In preparing an analysis map, the problem or objectives should first be clearly defined. Then criteria can be established to select the relevant information.

FIGURE 4-4: SELECTING MAPS FOR ANALYSIS
SAMPLE FORMAT

Analysis Purpose / Source Maps	Recreation, Conservation and Open Space Planning	Potential Elementary School Site
Interpretive Soils Maps	Playgrounds, camp areas, trails, and wildlife	Suitability for commercial building, playgrounds
Wetlands	Areas to be protected/ regulated	Avoid
Floodplains (HUD)	Areas to be protected/ regulated	Avoid
Present Land Use Map	Relationship to existing land uses	Relationship to existing land uses
Sensitive Areas	Areas for protection or buffer areas	Avoid
Prime Agricultural Land	Locate areas for purchase of Development Rights	Avoid
Dedicated Land	Identify current public/ quasi-public land	Identify current public ownership
Historic Sites	Possible protection or link with trails	Possible educational value
Visual Resources	Areas for acquisition of scenic easements, trail location	Assess visual impact
Special Studies	N.R.I. Potential Impoundment Sites	Recreation need analysis Housing studies
Municipal Service Areas	Service to recreational facilities	Sewer and water service availability
Others as needed	?	?

It is imperative that the community establish priorities early to avoid costly mistakes. An understanding of the physical requirements dictated by each criteria will allow the determination of hydrological, ecological, soils or cultural information to be shown on the analysis map. For a technical problem, the community should enlist the advice of a consultant or a member of the Technical Team in deciding which information to include. Whenever using soils information for such purposes, assistance can be requested from a soil scientist of the Soil Conservation Service.

Figures 4-5 and 4-6 provide examples of the analysis process. A similar approach can be applied to a wide range of community purposes. Once the community understands the process, it can develop analysis maps for additional purposes as the need arises.

Analysis Report

This report is one of the most important products of the NRPP. It will serve as the basis for continuing discussions among community boards and commissions and the public and will be a major input to the community's overall planning processes. The report summarizes the findings of the inventory committees and goes beyond these to present the combined analyses described above. In this report the steering committee assigns priorities to the community's natural resource-related needs and problems and identifies selected alternatives for action and implementation.

The community may wish to publish this report in a form suitable for wide distribution within the town to further stimulate discussion and public comment. The format and content should be selected by the steering committee with the intended uses of the report in mind. An appropriately structured report may serve directly as a portion of a Conservation/Recreation Plan meeting state requirements for

FIGURE 4-5 NRPP ANALYSIS MAPS FOR OPEN SPACE, CONSERVATION, AND OUTDOOR RECREATION PLANNING

Scenario: The Conservation Commission and Recreation Commission wish to develop a joint Conservation/Recreation Plan which will qualify for eligibility for Self-Help and BOR matching funds.

In the Organization Phase of the NRPP, they establish the following Goals and Objectives:

Goals	Objectives
1. protection of water resources	a. protect the town's water supply watershed b. identify and protect wetlands c. identify and protect potential ground water supplies d. control non-point pollution
2. integration of recreation and conservation activities	a. develop trails to link conservation areas with intensive outdoor recreation areas b. identify multiple-use possibilities on conservation and watershed lands.
3. provision of a balanced recreation program	a. meet BOR standards where appropriate to the town b. develop a summer recreation program for the elderly c. identify areas to meet future recreational needs
4. preservation of agriculture	a. maintain present agricultural land in agricultural use b. protect prime agricultural land, not now in agricultural use, for future agricultural needs
5. direction of the community's growth to maintain environmental quality	a. identify areas with hazards or limitations for development b. identify areas with potential for desired development c. identify areas for open space buffers between incompatible land uses d. distribute open space and recreation opportunities to match population distribution e. identify and protect the town's visual and scenic resources and unique areas

In the Inventory Phase, maps and other data are compiled and field-checked.

In the Evaluation and Analysis Phase, present conditions and supply are compared with the community's objectives to determine needs. Alternatives and potentials to meet those needs are identified. Using the inventory maps and other data, the following maps can be compiled and used in the analysis:

1. Sensitive Areas Map showing:
   - a. wetlands
   - b. floodplain or flood hazard areas
   - c. streams, lakes, and ponds with protective corridors
   - d. aquifers and recharge areas
   - e. critical wildlife habitat areas
   - f. municipal water supply watersheds and well fields
   - g. "rough lands" (steep, shallow bedrock, droughty)
2. Special Open Space Features Map showing:
   - a. unique features
   - b. historic sites
   - c. areas of high visual quality and sensitivity
3. Present Open Space and Outdoor Recreation Supply Map showing:
   - a. recreation land, water, and facilities
   - b. public and quasi-public lands
   - c. trails
4. Agricultural Resource Map showing:
   - a. present agricultural land use
   - b. lands under Chapter 61A
   - c. lands classified as prime, unique, or of statewide importance
5. Potential Open Space and Outdoor Recreation Supply Map showing:
   - a. areas with slight soils limitations for needed recreational uses
   - b. potential impoundment sites

These maps can then be used as overlays with the Present Land Use Map to determine the needs for conservation and the potentials for an open space and outdoor recreation system.

In the Planning and Implementation Phase, the community develops an action plan based on this analysis. It proposes a program to protect, control, acquire, or develop the sites or areas identified above.

FIGURE 4-6 ANALYSIS MAPS FOR SITE SELECTION: SCHOOL SITE

Scenario: The community recognizes the future need for an elementary school to serve a growing suburban area. It hopes to use NRPP information to select potential sites.

In the Organization Phase of the NRPP, selection of alternative school sites is identified as one of the community's objectives for the program.

Criteria for site selection are determined, including:

1. Minimize site preparation and construction costs, but -
2. Avoid destruction of prime agricultural land (another community goal).
3. Include outdoor recreational facilities.
4. Include an Environmental Education area.
5. Avoid environmentally senstive areas.
6. Preserve the scenic character of the community.
7. Serve the area of recent and projected residential growth.

In the Inventory Phase, maps and other data are compiled and field checked.

In the Evaluation and Analysis Phase, the following maps are compiled and used to identify alternative sites for the proposed school:

1. Sensitive Areas Map (see Figure 4-5 and page page 4-16).

2. Development trends map showing:
   a. present land use
   b. existing and proposed water and sewer service
   c. current zoning
   d. subdivided (but undeveloped) and subdividable land

3. Visual Resources Map showing:
   a. areas of high visual quality
   b. viewsheds
   c. town visual character

4. Interpretive soils maps for:
   a. small commercial building (Soils requirements equivalent)
   b. playgrounds
   c. athletic fields
   d. wetland wildlife habitat (for adjacent environmental education area)

5. Agricultural Resources Map (see Figure 4-5)

6. Public Ownership Map

In the Planning and Implementation Phase, the community hired a consultant for detailed investigation of the best identified alternative sites and selected one for acquisition and construction of the school.

eligibility for the Self-Helf or Land and Water Conservation Fund matching grant programs. The NRTT can provide a suitable outline if this use is intended. Through discussions with its planner or consultant, the steering committee may adapt the report to fit with comprehensive planning efforts as well.

An effective report will require time and effort from the steering committee and continuing support from the NRTT, but will be worth the price. It will normally be the community's most widely disseminated detailed statement of NRPP findings and will be the core of natural resources input to the planning process. It will not be a static plan to sit on the shelf, but a working document for reference and discussion.

Public Informational Meeting

Informational meetings are essential to promote a discussion of "where do we go from here" by the community and boards. They are a forum for making public the findings and recommendations of the steering committee. Hopefully, a policy or set of policies regarding the community's natural resources would result from public discussion of this issue.

CHAPTER 5: PLANNING AND IMPLEMENTATION

INTRODUCTION

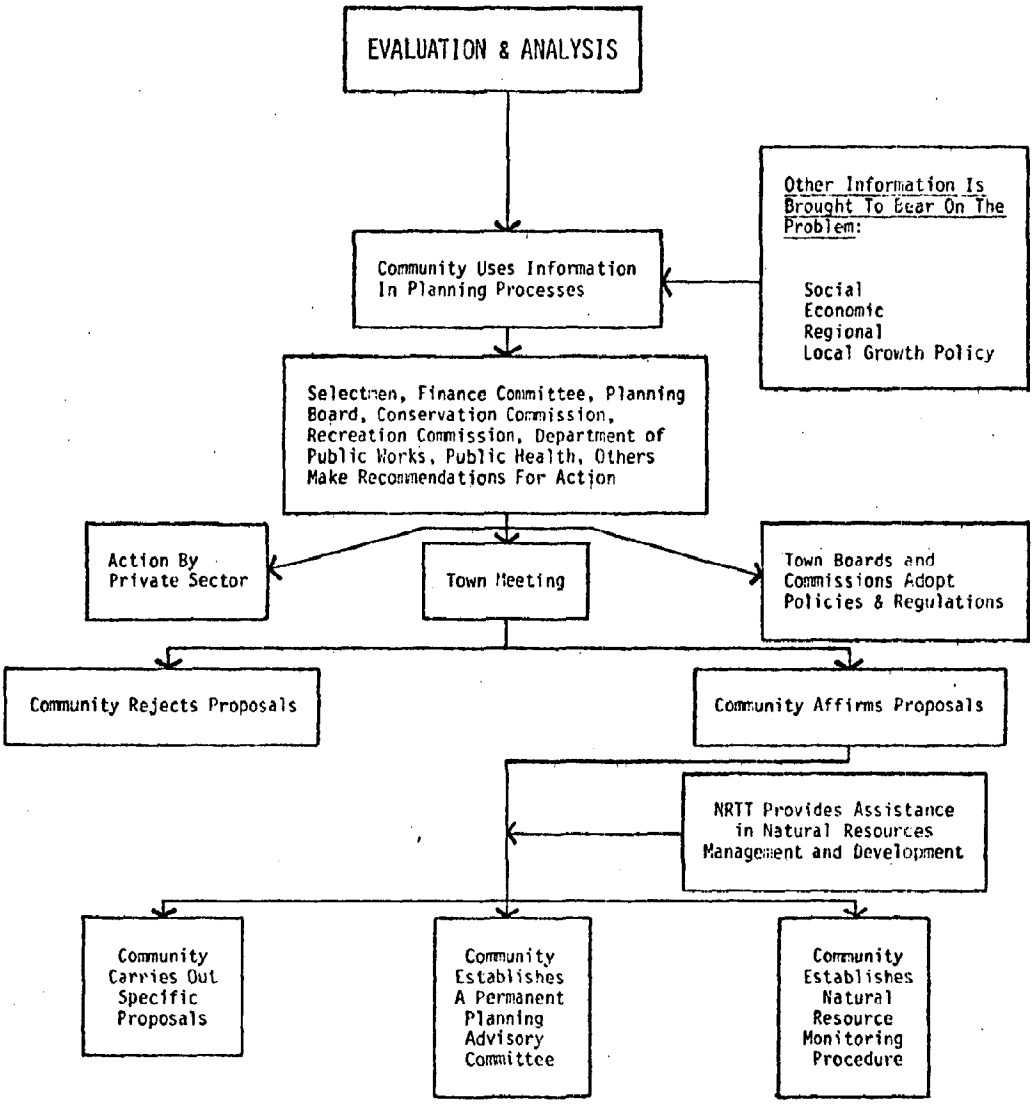
At this point it is essential to reassert one of the major assumptions underlying the philosophy of the Natural Resources Planning Program. Planning is a process; it is a repetitive activity that occurs continuously. Although an open space plan or a comprehensive plan may well be some of the results, the intent of this program is not necessarily to encourage communities to produce The Plan. The major thrust, instead, is directed toward helping a community to collect, evaluate and integrate natural resources information into the planning processes occurring within the community, and to stimulate action for sound natural resource use.

In the Evaluation and Analysis Phase, the steering committee and its subcommittees evaluated the condition of the resources and pinpointed opportunities, problems, and "use" constraints. Then, the steering committee melded this information with the needs and objectives which had been identified by the community; identified areas of conflict and consensus; set tentative priorities; and determined the consequences of potential trade offs, thus articulating the hard choices which face the community regarding the use and management of its natural resources. Now it is up to the community--its boards and citizens--to agree on basic land use policies and to chart a course of action.

The Natural Resources Technical Team does not make policy or planning decisions for the community. However, it can help to assess the probable impact of proposed policies and plans on the natural resources. Continuing technical assistance in implementation measures is also available from the NRTT. The expertise of the NRTT agencies can be requested by the community as the need arises.

Detailed below and depicted in Figure 5-1 are the suggested steps of the Planning and Implementation Phase.

FIGURE 5-1 THE PLANNING AND IMPLEMENTATION PHASE



PLANNING

There is no one single planning effort in a community. Planning is carried on by diverse groups and at various levels, often independently and for different purposes. The selectmen, planning board, conservation commission, town engineer, and other boards and officials; private developers; and citizens all make decisions affecting land and water use. An understanding of the opportunities and constraints of a community's natural resources not only complements the social, economic and political concerns, but also lends a broader dimension to the decisionmaking process. Natural resources opportunities and constraints should be an integral part of any planning process where land and water use is involved, such as the siting of a new fire station, the development of a community park, a zoning change, a subdivision approval, the construction of a trail system, or the formulation of an open space plan. With sound leadership and coordination, a community can develop a set of land-use policies to guide these many planning processes towards the desired result.

Community Uses Information In Its Planning Processes

There are many uses to which the community can put the inventory data, evaluations, and analyses prepared by the steering and inventory committees. This information is of use to such diverse interests as town boards, private developers, environmental educators, and community consultants. It can be incorporated into routine decisionmaking processes such as subdivision review, or used to develop new forms of decisionmaking. It can provide a valuable input to single-purpose or functional planning processes such as the selection of sites for municipal buildings, roadways, recreation facilities or parks; and the preparation of recreation and conservation plans. NRPP information is equally useful in comprehensive planning processes including future land use plans, zoning, and other regulatory measures.

While planning purposes vary from community to community, one of the primary objectives of the NRPP is to encourage communities to protect their valuable natural resources. A community may wish to develop a policy statement and action program with regards to its natural resources. The following excerpt from Performance Controls For Sensitive Lands: A Practical Guide For Local Administrators (Thurow, C. et al, 1975) is a helpful guide to follow in developing regulatory measures. Although the resource being considered is wetlands, the advice applies to other resources:

> "There is a logical series of steps a community should follow in developing a regulatory program for its wetlands:
>
> (1) A community must recognize the range of use values that wetlands offer. Then it must
>
> (2) act on a policy level. First, are those values important to us so that we want to insure that they continue? And then, if yes, what are the specific values we are most interested in? Defining these policy goals will make a difference in
>
> (3) choosing the style of regulation. If the policy is to guarantee that the community's residents will not suddenly find their home sitting in a foot of water, there will be one set of regulatory procedures. If the goal is to maintain wetlands as wild areas, so that the community has the red-wing blackbirds it enjoys now or that it will continue to see the wild swans pass through in the spring, then it must develop a different wetland program.

Whatever common resource values the community decides that it wants to maintain, it is first necessary to understand how the wetlands function so that the regulatory program can achieve those goals. The more closely the regulatory program reflects the ecological nature of the wetlands, the more effective it will be."

The opportunities to integrate natural resource considerations into the community's planning processes are infinite. It is up to the community to decide how this will be done and to take action as the need

and the opportunities arise. Appendix G, Implementation Techniques and Assistance--has been prepared as a guide for those who are developing planning proposals within the community. The NRTT can help familiarize the community with implementation techniques. Regardless of what form the planning assumes, those who are involved should bear in mind several important planning guidelines, including an estimation of:

- .The impact of the proposal on the natural resources and social systems. Who or what stands to gain or lose as a result is an excellent query.
- .Public and political support for the proposal and the means of giving direction, force and continuity to the plan.
- .The need for new institutions to implement the proposal.
- .Staging or timing requirements.
- .Budgeting and funding.

Based on the information and analyses of the NRPP, the NRTT can also help the community to predict the possible consequences of proposed actions on the natural resources. It can assist in determining what management measures will minimize the environmental impacts of the proposed actions.

Selectmen, Finance Committee, Planning Board, Conservation Commission, And Others Make Recommendations For Action

As the community's various boards and commissions consider the information and analyses from the NRPP, they develop recommendations for action. Some proposals may be within the responsibility of a single board, while others may require coordinated action. It is wise for the community to agree on a coordinated set of land-use policies so that separate proposals will complement each other rather than conflicting.

Those who are accustomed to preparing planning proposals are well aware of the need for a wide base of public support to assure success in implementing their projects. It is essential that the public be informed and involved so that good recommendations are not defeated by misunderstanding, a lack of interest, or a lack of communication.

IMPLEMENTATION

Implementation is putting planning proposals into action, whether they be constructing a reservoir, establishing a new planning process such as subdivision review, enacting zoning by-laws, or managing a town forest. Although the implementation process of the NRPP is considered last, it is in reality an activity occurring continuously in a community. As the community moves through the program, immediate action may be taken at any time, in direct response to an issue or condition identified by the steering committee, its subcommittees, or other members of the community.

One cannot predict the exact course a community will take in implementing specific planning proposals. However, several general steps are suggested for consideration as an approach to putting planning proposals into action. These steps, shown in Figure 5-1, are briefly described below:

Town Meeting

Most local governments in Massachusetts use the town meeting for deciding the fate of many planning proposals and other community issues. Several small meetings geared to neighborhoods or interest groups are an effective way to create a broad base of support before a proposal is brought before town meeting. Some proposals, however, such as clearing trails, can often be implemented without formal approval, unless large expenditures of public funds and land taking are involved.

Community Affirms or Rejects Proposals

Although certain proposals submitted by local governments must be approved at the state level, for the practical purposes of this discussion the ultimate decision rests with the community. Once a proposal has been approved, efforts can be directed toward its implementation.

Community Carries Out Specific Proposals

The community board or group which initiated a proposal is usually responsible for following through with its implementation. Timing, staging or funding will depend upon the nature of the proposal. Figure 5-2 is a scenario describing the planning and development of water-based recreation facilities.

Town Boards and Commissions Adopt Policies or Regulations:

Many planning proposals do not require formal town meeting approval, but need only action by the appropriate board or commission. Septic system regulation by the Board of Health, subdivision regulation by the Planning Board, and wetlands regulation by the Conservation Commission, and storm water management practices of the Public Works or Highway Department are examples of this approach. It is also important that the town's administrative policies be coordinated in support of the community's chosen goals and objectives. Continued communication among local boards is an important aspect of that coordination.

Private Citizens and Groups Take Action

Discussions of the NRPP inventory findings and resulting planning proposals often stimulate actions by private groups or individuals. Individual landowners may seek NRTT assistance in improved management of their lands, land trust may coordinate its acquisition with town objectives, or a business may improve its landscaping. Taken as a whole, the sum of many such small actions can be a major benefit to the community's environmental quality.

NRTT Provides Assistance In Natural Resource Management and Development

Where matters such as the management of the town's forests, the engineering of a wildlife pond, the preparation of a conservation plan for a "Community Garden," or the technical considerations involved in the stocking of a pond or stream are concerned, the community can draw upon the services of the NRTT. Appendix G, "Implementation Techniques and Assistance" outlines many of the services available from the natural resource agencies.

An overall community policy for natural resource use will enable the NRTT to coordinate its assistance efforts in support of community goals.

Community Establishes a Permanent Planning Advisory Committee

Town boards and commissions are faced with two major problems which may seriously hinder their effectiveness. To begin with, a board is usually swamped with work and may consider itself fortunate, if it is able to accomplish routine duties such as subdivision review or wetlands hearings. Little time is left for the longer-range activities of natural resources planning, especially that time which is required to collect data. Secondly, boards often find it difficult to maintain communications--both in-coming and out-going with other boards and individuals. They frequently regret not being more in touch with the opinions of community residents and other town boards. One way to free board members for other important activities and to enable them to gauge public opinion, is to create a permanent data gathering and evaluating committee.

In creating an advisory committee, a community board could tailor the committee's responsibilities, membership and allegiance to suit the community's particular needs. Such a committee could be charged with the identification and assessment of changes in the natural resources, problems associated with resource use, trends in growth and development, and opportunities for resource use improvements. The committee could serve as a weather vane to monitor public opinion. It

could be responsible for researching special problems or study areas as the need arises.

Community Establishes Natural Resources Monitoring Procedure

It would be advantageous to the community to continually or periodically identify and assess changes occurring in the condition of the community's natural resources. In addition, maps and data should be updated from time to time to keep information current. How this should be carried out, when, and by whom will have to be decided upon by the community. A special committee or planning assistant could perform this task. The NRTT can provide suggestions and assistance in establishing such a monitoring procedure.

A SCENARIO: IMPLEMENTING A WATER-BASED RECREATION PLAN

The Setting

The community of Ritzerton experienced rapid population growth between 1956 and 1973. During that period the population increased about 65%. In order to keep abreast of the natural resource needs of the town, the Conservation Commission, Recreation Commission and Planning Board sponsored the Natural Resources Planning Program. After finishing the evaluation process, it became evident that there was an inadequate amount of open space, especially for water-oriented recreation. A subsequent survey conducted by the Recreation Commission indicated among other things that townspeople generally felt a need for more swimming and fishing opportunities.

In response to the identified need, several potential sites for water-based recreation facilities were identified in the analysis process. These sites had been identified by the Technical Team on the "Potential Reservoir Sites Map" and the "Natural Resource Inventory." The Conservation and Recreation Commissions incorporated three potential sites in their Open Space and Recreation Master Plan. The Open Space and Recreation Master Plan was approved at the Town Meeting.

Putting Proposals Into Action:

To carry out the parts of the master plan that were oriented towards water-oriented recreation, the Planning Board and Recreation and Conservation Commissions agreed upon and followed the course of action below:

The Conservation Commission took charge of purchasing the three sites jointly selected for water recreation development and open space preservation. Working with the Soil Conservation, it evaluated the sites for ease and expense of development; management problems; wildlife and open space value; and the impact of their development on the surrounding areas. Acting on this knowledge the three town boards then decided to eliminate one site from consideration and to develop the other two in stages over the following ten years. In order to acquire the site that was selected for immediate attention, the Conservation Commission applied for Self-Help Funds through the Division of Conservation Services. Information concerning the steps which the commission followed may be obtained from the Regional Supervisor of the Division of Forests and Parks.

When the Conservation Commission's acquisition program was underway, the Recreation Commission secured funds through Town Meeting and hired a landscape architect to plan the site which had been selected for immediate development. The consultant met with all three boards to determine what objectives should be realized through the development of the site. The Recreation Commission also planned for incorporation of the site into its active recreation program. Throughout the process, the Recreation and Conservation Commissions met informally with small groups of townspeople to discuss the project.

The Planning Board played a role that was indirectly related to the project and was oriented toward long-term protection of the community's water bodies for recreation, water supply and other uses. The board and its planning consultant prepared for submittal to the next Town Meeting a Shorelands Zoning By-Law which would establish a 150-foot buffer zone around surface water bodies. Some uses such as dredging and filling would be prohibited from the zone, but other uses would be regulated on a permit basis. The Planning Board then conducted neighborhood meetings to discuss the proposal with townspeople.

CHAPTER 6 VISUAL RESOURCE SURVEY

INTRODUCTION

Overview

Under the Natural Resources Planning Program, local citizens join with technical specialists to inventory their community's natural resources and to analyze alternatives for sound resource use. Many communities find that their visual resources are an important part of their overall environmental quality.

The Visual Resource Survey provides local boards and other decision-makers with information about the visual character of their community which can be used for practical planning purposes. For too long, the visual implications of land use changes have been ignored. The results have been blighted neighborhoods and monotonous or ugly landscapes. Unique and aesthetically pleasing landscapes have been lost. This survey determines the kinds of visual scenes local residents prefer, and also indicates what it is about the landscape scene that adds to or detracts from its scenic quality.

Objectives of the Visual Resource Survey

1. To involve a large number of people in the process and to increase their awareness of the community's visual resources;
2. to determine which local landscapes are preferred by local citizens;
3. to provide communities with information on landscape quality that is useable for practical planning purposes;
4. to find the community's special image of its land, and preserve this image, i.e., to preserve the existing rural character, while providing homesites for new residents;
5. to measure the visual resource of the community and compare it to the measured visual resources of other towns;
6. to stimulate local action to improve the visual resource;
7. to relate the visual resource to the other resources inventoried and analyzed in the NRPP.

MAPPING

Each person in the community knows which part of the community is beautiful to him. Everyone has a special mental picture of their present hometown. But, many people do not know how to work with topographic base maps, and almost no one knows how to show the limits of beautiful scenery on a flat paper map.

This mapping procedure helps people express what they already know about a community's beauty. It allows comparison between very personal views. The end result should be a map which shows the total community opinion about "what is beautiful in our community."

By the end of the mapping stage, the committee has prepared two documents: the town character map and the special features map. They are then prepared to work knowledgeably with the view matrix used to select photograph locations for a visual preference survey.

Orientation

To orient the committee to the landscape as it is represented on maps, members should first identify their homes on the standard base map. This is a problem solving exercise. They are then asked to describe the landscape in the immediate area of their homes. They are asked the direction and length of any prominent views in that area.

This is a good time to introduce classification of visual landscape units. Visual landscape units are definitions. They try to show, in simpler form, all of the combinations of types of buildings and types of landscapes that exist in a community.

For example, single family homes can be old or new, very close together or far apart. They can be near the street or distant. They can be large or small. The community decides which of these types is important. Then single family homes may be mapped according to three or four types instead of one, which

does not show important differences, or twenty, which is too confusing. Some examples of visual landscape units are single family residences on an open flat site (URL Oa) or the town center (UC).

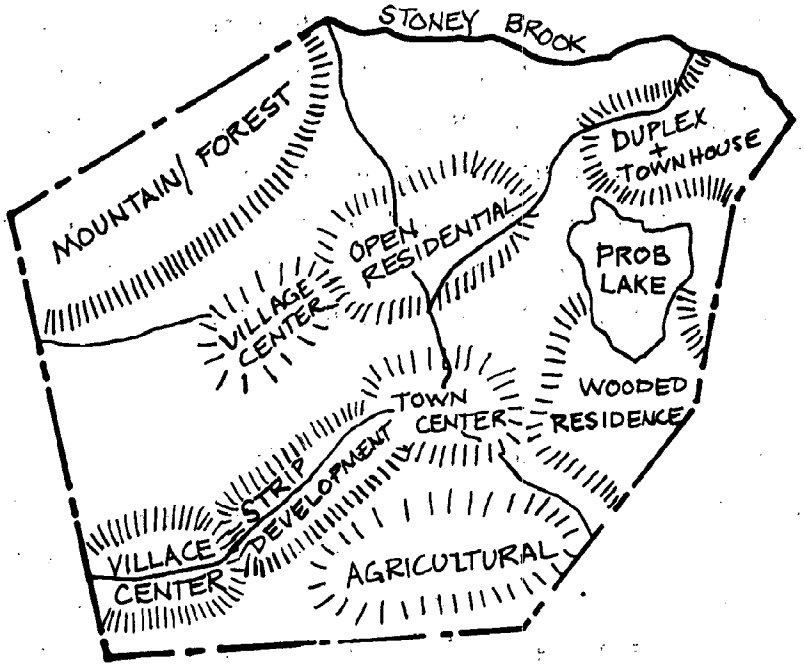
Visual Character Map

Local citizens have an image of what makes up the visual character of their community. Visual character is defined as those factors which most effectively contribute to the "look of the landscape." Vegetation, topography and man-made features are the most significant factors that define the visual character of an area. The human activities which occur on the land contribute to distinct character. For example, a "town center" is an area of distinct visual character because of the combination of natural and man-made features and activity occurring in it.

Based on its judgment and knowledge of the community, the Visual Resource Survey Committee divides their community into several visually distinctive areas. Town centers, village centers, large wooded residential areas, strip development, agricultural districts, recreation resort areas and large multi-family apartment complexes are examples of what might be included. Each town has a different visual character and, therefore, the committee should choose its own words or phases to describe the "image" that is to be represented on the map.

The committee draws generalized boundaries on a paper base map to show the general location of areas of distinct visual character. These areas should be colored differently and labeled as on the sample map shown on Figure 6-1.

FIGURE 6-1



Special Visual Features Map

The Visual Resource Committee makes this map through a field study of the community. The map should show:

1. Panoramas, and major and minor views (, ,)

   A picturesque scene or view is often (but not necessarily) viewed from an elevated point and encompasses a large expanse of land or water. Good vistas are well known to townspeople.

2. Unique and Critical Visual Areas 

These are areas that significantly contribute to the visual character of the community and should be identified and protected when possible. These unique or critical areas might include a historic district, parks or monuments, land/water edges, picturesque mountains or hills, river valleys, and visually appealing approaches to the town center.

3. Eye Sores 

Eye Sores are those features in the community which obviously detract from its visual character. Eye sores can include unscreened landfill areas, littered vacant lots, overly cluttered strip developments, and poorly sited housing developments.

This map is put on mylar and can then be overlain on the Town Character Map.

Roadside Landscape Analysis

The community may wish to do still more study of their roadside landscape. The following technique will allow them to map the visual features of certain roads which were identified in the special visual features map procedure:

A. Are you in open fields or surrounded by buildings?

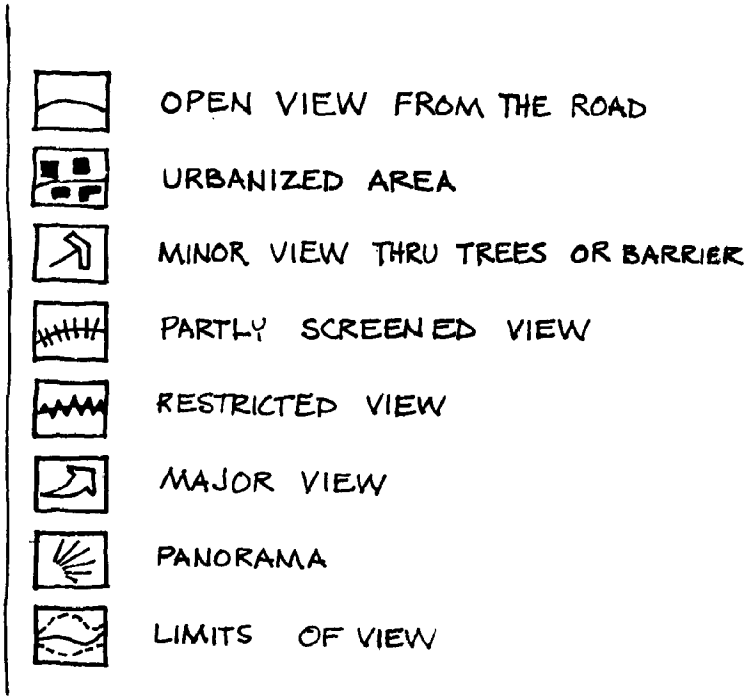
B. What kinds of views do you get?

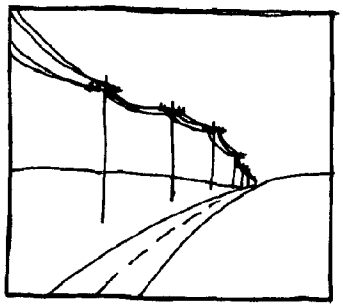
.Views through brief openings?
.Views partly screened by trees?
.No view? You are closed in by trees.
.Major views from higher elevations of large areas?
.Panoramic views from the highest point around?

C. Does the edge of the path, the area you can see, parallel the road, or are there openings on the side?

D. Do the trees grow to the edge of the road? Are there fields or openings in the trees?

Figure 6-2 below will orient the committee to the symbols used for this Roadside Landscape Analysis.



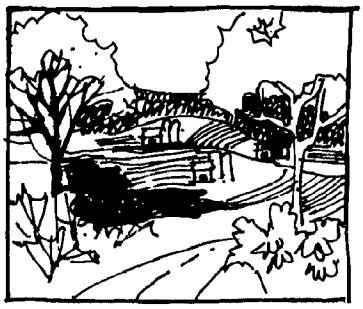

OPEN VIEW

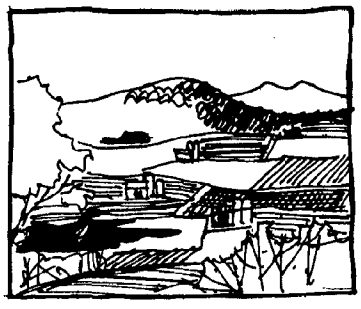
URBANIZED AREA


RESTRICTED VIEW


PARTLY SCREENED VIEW

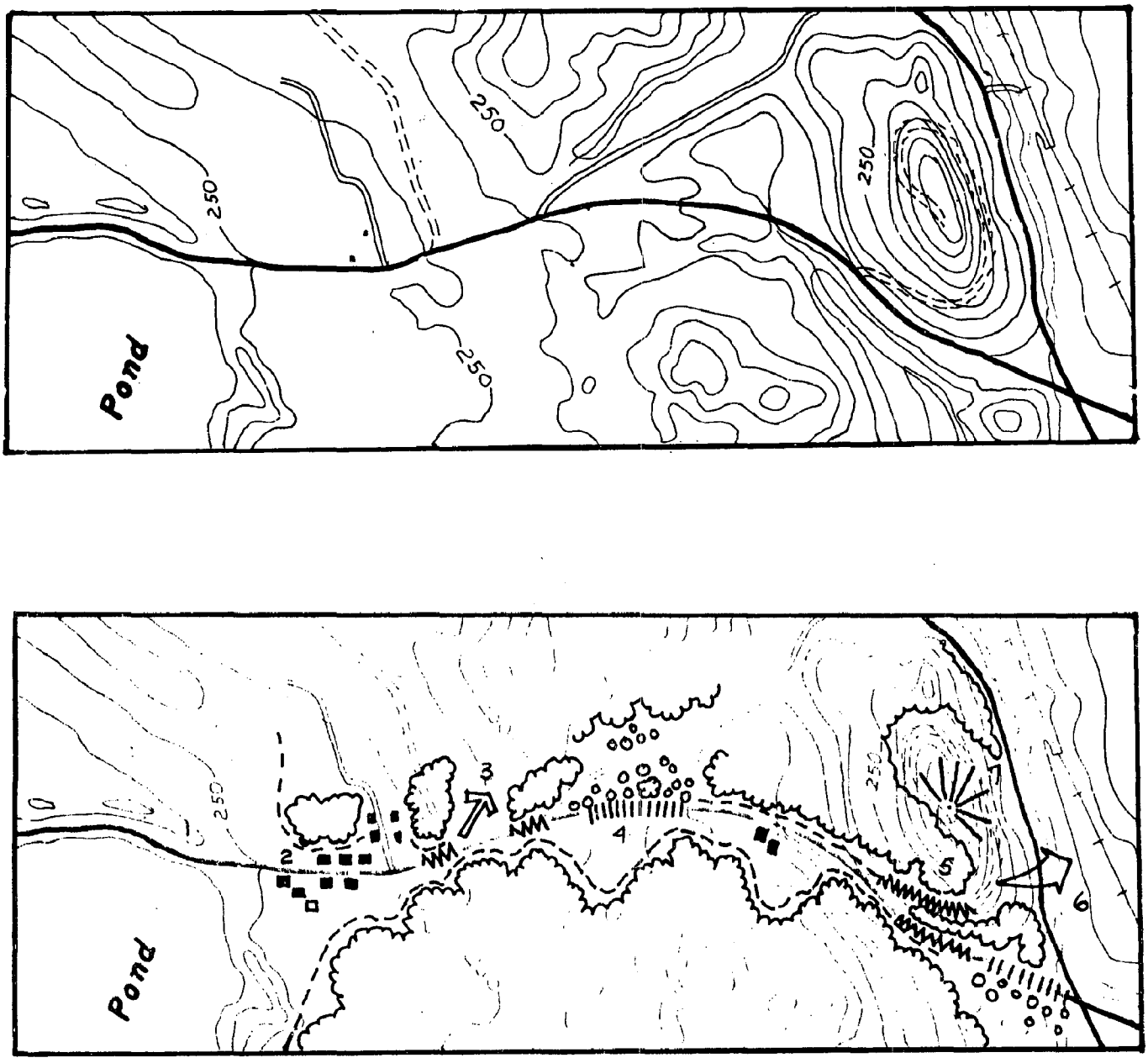

MINOR VIEW


MAJOR VIEW


PANORAMA


LIMITS OF VIEW

Figure 6-3 below shows how the view from a road is translated into visual symbols.



VISUAL PREFERENCE SURVEY

Survey Process

1. General Explanation:

A large number of citizen volunteers are surveyed to determine their landscape preferences. The core of this procedure is an analysis of the people's choice of photographs of typical local landscapes. The whole process is known as the "Q-sort" and it has three subparts:

Part I. Photo selection
Part II. Open-ended questionnaire
Part III. Background information

Part I, the Q-sort photo selection survey uses a set of 56 photographs representing the range of local landscapes. The views are from the road and other common points. Complete instructions for completing the survey are provided to the committee. Generally, the participant is instructed, according to his or her preference, to distribute the photographs among seven ranked groups:

Group 1	Highest scenic quality	3 photos
Group 2	High scenic quality	7 photos
Group 3	Medium high scenic quality	11 photos
Group 4	Medium scenic quality	14 photos
Group 5	Medium low scenic quality	11 photos
Group 6	Low scenic quality	7 photos
Group 7	Lowest scenic quality	3 photos

By totaling participants' rankings, a list of mean values is established which is used to assign a quality score to each scene. For instance, if participants place a scene in the highest quality grouping with relative

consistency, then that information will permit that landscape to be ranked as one which residents consider of highest scenic quality.

Once all photographed scenes have been ranked, the committee and the whole community will know what kinds of landscapes it values most... or dislikes most. The results may not surprise anyone! But for citizens and government to act together to protect what the community values, it is necessary to define what landscapes exist and to reach common agreement on what is most liked.

Part II of the survey asks participants to indicate, in their own words, why they placed a certain scene in the highest, middle or lowest grouping.

The open-ended questionnaire allows the participant to state, in his own words, reasons for choices in the Q-sort. These responses are grouped and duplications eliminated to produce tables similar to the ones which follow in Survey Analysis, part 2.

The background information questions provide additional information to the community. However, the main purpose of this part of the survey is to ensure a fair sample. By checking this part, the committee can see if some groups of ages, of sex, of jobs, or of neighborhoods are not being represented. The committee can then act to encourage these groups to take part so that the whole community is represented.

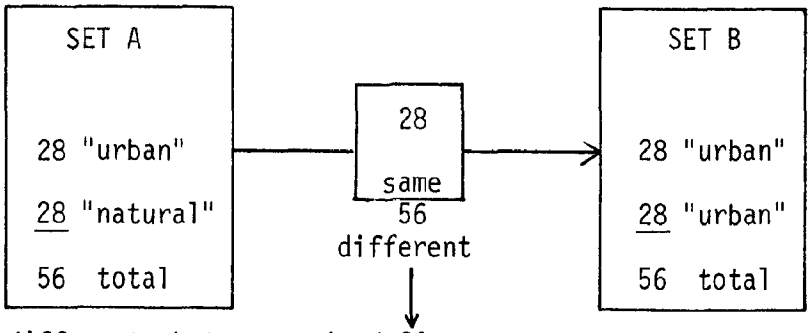
This information may also be used in planning to serve the needs of a particular group or area of the community.

2. View Selection

A. Objectives

Two sets of photographs each containing 56 photos are prepared. Each set (A and B) is different, but there are certain

photos which are identical and common to each set so that data may be correlated and compared. Set A contains photographs representing the full range of Visual Landscape Units found in town (a Visual Landscape Unit is a particular combination of land use, land form and vegetation). Set A includes the more natural scenes, such as wetlands, field and wooded areas, as well as more urban scenes, such as residential areas, strip development and shopping centers. Set B contains photographs representing only the more urban scenes and requires respondents to select among only more intensively developed areas. Twenty-eight photographs of urban scenes are common to each set:



Total different photos required 84.

Six photographs from other localities, which are included in each set are called "marker" photos, and are used to compare and validate information obtained from the survey. It is important that these photographs be ranked relative to or in comparison with the local photographs and not be treated as a "foreign" or odd landscape.

Comparing photographs of local landscapes with photographed scenes from other measured towns is important.

With this information, citizens may be able to show that certain landscapes are of extremely high visual quality. Knowing this, decision-makers could justifiably apply protection to these areas of the town.

B. View Matrix

Selecting the views for photographs that are typical of the town is one of the most difficult parts of the Visual Resource Survey procedure. To effectively consider all of the possible landscape types of the community, they are arranged in a matrix.

On the large matrix, Figure 6-4, land uses are arranged on one axis and vegetation-topography is on the other axis. The small matrix below shows how the vegetation-topography categories were made and shows the general process used on the larger land type matrix.

	Vegetation			
Topography types		Open land (0)	Brush land (1)	Tall Forest "canopy" (2)
Flat land (A)		A0	A1	A2
Steep land (B)		B0	B1	B2

If other types exist, but were not listed, they are added. The committee decides if some land types do not exist in the community. These types are eliminated. Note: Many studies indicate that photography used for the Q-sort does not show minor variations of topography.

Figure 6-4 is a sample land type matrix. The committee should evaluate this closely, adding and subtracting land types to fit their town. The symbols relate to the Massachusetts Map Down system of land use classification, so that the matrix can be mapped almost directly.

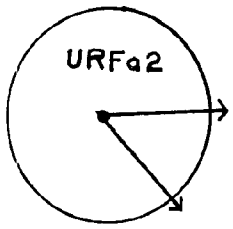
FIGURE 6-4 - LAND TYPE MATRIX

Land Use \ Topographic-Vegetation Elements	Flat Open a0	Flat Brush-land a1	Flat Land - Forest Canopy a2	Steep Open b1	Steep Brush-land b2	Steep Forest Canopy b3	
Typical Topo-Veg. (a0, a1, a2, b0,b1,b2)							
Multi-Family (UA, UT, URH)							
Single Family (URM, URL, URO)							
Commercial Center (UC)							
Industry (UI, UL)							
Institutional (UP)							
Farms (T)							
Wetlands (SS, SM, M, DM, B)							
Recreation Sites (R)							
Gravel Pits (SG, OM)							
Flood Plains (SF)							
Lake, Pond, River (W)							
Highway (HW)							
Town Roads							
Scenic Roads							
Historic Areas							

3. Mapping Photo Site Location

Suggested photo sites are marked by the committee on a base map. The map shows:

1. The matrix name; i.e., single family homes on flat forest (URFa2);
2. The photo view:
   A. location
   B. direction
3. The number of the "shot" on the roll of film is later recorded on both the matrix and this map.



After the 84 photos are chosen, the sites will be renumbered according to their Q-sort identification number (1-28, 29A to 56A, 29B to 56B).

4. Photography

After the views are selected, a member of the Natural Resources Technical Team from the Soil Conservation Service photographs each scene using a 35mm camera with either (but only one) a 28mm or 35mm wide angle lens. Each photo is taken from a standing position. Kodacolor or any comparable film is used, and the photograph processing is controlled for consistency. The photographs are taken on clear days (with few clouds only) between 10 a.m. and 3:00 p.m. and record a typical nonwinter scene.

A typical view is one which best expresses the character of a visual (matrix) unit. All photos should have a consistent level of detail in the foreground.

A typical view:

1. Is not the prettiest view;

2. does not show more than one-third sky;

3. is not dominated by roads or paving, unless the view typically is, i.e., a shopping center;

4. is not specially enhanced by water; it only shows the usual amount from a common view;

5. is not framed by trees or buildings;

6. does not exclude people or cars from usual activities, i.e., shopping center on Sunday;

7. does not shoot photos at an angle of more than 45 degrees to the center of the roadway; this is to stimulate the experience of driving on the road. If scenes are commonly viewed by pedestrians, they should be photographed from a pedestrian's point of view.

Detailed instructions will be given separately to the photographer.

5. Photo Finishing

Great consistency in finished quality is required.

The photographs are:

A. 5" x 7" color prints;

B. matte finish;

C. no cropping;

D. no border;

E. hand delivered and picked-up;

F. mounted on precut 5" x 7" perma mount (by committee or NRTT) or attached, following guidelines, to poster board by spray adhesive and cut along lines, using a steel rule.

6. Photo Selection

After processed photos are obtained, the committee chooses the 56-urban and 28 natural (84 total) photos which best express the range of landscape types in the town.

Survey Participants

Number of Participants Required:

A certain number of persons are needed for the survey to have statistical validity. More importantly, a large sample is needed to give the study validity in the community's eyes. For the first thousand residents in the community, 50 participants are needed. For every additional one thousand residents, five more individuals are needed. Therefore, if the community has a population of 10,000, the study requires a local sample of 50 plus (5 x 9 = 45) = 95 participants.

There are a number of methods to recruit the necessary volunteers. Potential participants can be randomly selected from a listing of street addresses and contacted by mail or phone. Other sources of potential participants include voter registration lists, the phone directory, newspaper ads and articles, or word of mouth and personal acquaintances of people who take the survey in the first days. After this first contact, the committee gives further information, tells where to take the survey, and makes appointments for the volunteers to judge the photographs.

Since group choices are sometimes quite different from the sum of individual choices, there are several possible additional survey participants:

A. Some studies indicate that local government and social leaders reflect the group desires of the community when they act in their official capacity. It may be desirable to take the survey to these leaders in their offices. (This is also important to gain their support for public action on the results.)

B. Official groups, the town planning board or selectmen, acting as a group could complete one Q-sort survey.

It takes 35 to 40 minutes for each participant to complete the three-part Visual Preference Procedure. The groups would take longer.

Instructions to Visual Resource Committee:

In preparation for administering the Visual Preference Survey, the committee members should:

A. Try the survey themselves;

B. Find at least one friend or relative to try the survey;

C. Sign up to administer the survey.

The following is a sample of step by step instructions provided for committee members:

A. From the preceding discussion, you are familiar with the Visual Quality Survey. You need no further instruction in order to try it yourself. You probably will learn something interesting about your community and the way you perceive it.

B. Find at least one friend or relative to do the survey. Although we have placed no age limit on those who are participating, we caution you not to try it out on someone who is too young to understand the procedure. In administering the survey to person(s) you have selected, it is important that you do not explain the directions to him or her in any way. This is to insure that all participants are given the same conditions in which to do the procedure.

   To start a participant off on Part I, place the instructions and the cardboard group markers in order, 1 through 7, on the table in front of him or her. Make sure participant completes Parts II and III.

C. Sign up to administer the procedure during at least two blocks of time, each consisting of two hours.

   Two volunteers are required to administer the tests at all times. The workload has been broken up into two hour shifts, and each of you is asked to sign up for at least two shifts during any of the specified time periods (a total of four hours).

   Your shift: Volunteers should arrive shortly before their shift starts in order to touch bases with the preceding shift. During your shift, you are asked to administer the procedure to participants in the following manner:

   A. Write the participant number in the appropriate space on the instructions. (This will not be traced back to the participant; it is solely to keep tract of how many participants have taken the tests.)

B. Place the instructions and cardboard group markers in front of the participant.

C. Do not give any help in explaining the instructions to the participant. (You may explain afterwards why the information is being collected and how it may be used.)

D. After the participant has completed the procedure, enter the results of Part I and III in the appropriate Scenic Quality Tabulation Sheet (A or B):

PART I

SET A or B

PARTICIPANT # ↓ \ PHOTOGRAPH # →	1	2	3	4	5	6	7	...	56
1	6	5	1	7					
2	7	4	2	5					
3	5	5	1	6					
4	5	4	3	6					
5	7	3	3	5					
6	4	2	2	4					
7	6	3	1	5					

} SCENIC QUALITY NUMBER (1-7) ASSIGNED TO EACH PHOTO

There are two sets of photographs (A and B) so that two participants may do the procedure at the same time. Because the rate of completion will differ between individuals, do not wait to start participants at the same time. The survey takes approximately 30 minutes.

Survey Analysis

Although the Statistical Analysis used for this survey is relatively simple, there is a large volume of data and a computer is used to save time. This analysis uses an SPSS (Statistical Package for the Social Sciences) program and is processed by the Soil Conservation Service state office. To use the computer, all data must be put on punch cards. If no local personnel or facilities are available, card punching can be done by the NRTT from data sheets prepared by the committee. Only numerical data can be punched. The written answers for all of Part II, the Open-ended Questionnaire, must be done manually. Punch card format, instructions, and program listings are found at the end of this chapter.

There are four major results of the computer analysis:

A. Quality score for each photo (mean score from all responses). These quality scores are then used to rank the photos from highest to lowest visual quality;

B. analysis of agreement among individual participants (by standard deviation);

C. comparison of ranking of marker scenes by mean scores;

D. breakdown of Visual Preference results by various subgroups within the participant population.

Analysis of Open-ended Questionnaire

The Open-ended Questionnaire gives participants in the Visual Preference Survey the opportunity to explain their photo preferences. To analyze these results, committee members read through the questionnaires and list, without duplication, the factors which add to scenic quality. Then, list the factors that detract from the scenic quality.

The lists on the following page are an example of the results from one community:

SUMMARY OF FACTORS ADDING TO HIGH VISUAL QUALITY

SENSE OF PEACE

Tranquilty
Peaceful
quiet
sense of peace and quiet
quiet, peaceful
restful
pleasantness
sense of solitude
sense of tranquility

SENSE OF OPENESS

spacious
clean, open space
open
distant prospects
feeling of space
feeling of distance
wide scope of scenic beauty
open space
not crowded in
distance
view
more or less distance

WATER

marsh
view of water
lake
tidal marsh
water
rivers
sea
seascape
salt marsh

OTHER FEATURES

dunes
woods
meadows
beaches
old houses
churches
old mainstreets
country homes
country roads
golf course
boats
wildlife

VEGETATION

use of green
trees
vegetation
nice grass
tall trees

NATURALNESS

hand of man unseen
natural beauty
unspoiled
natural appeal
natural setting
nearest to nature
not too many houses
color of landscape
little disturbance
beautiful, unspoiled
little disturbance

SENSE OF PLACE

look like Cape Cod should
charm of Cape Cod
this is Cape Cod
small towns
sense of history
sense of fit
old Cape scenes
uniqueness
local character
village character
historical character

MAINTENANCE

clean
uncluttered
well-preserved
street and houses well kept
neat and clean
order
well kept

DESIGN

houses tucked into landscape
blend of natural and man-made
houses are different
basic integrity of buildings in landscape

EDGES

blending of natural and artifical
water/vegetation contrast
mixture of scenes
interplay of land/water (color and shapes)
shoreline

ABSTRACT JUDGEMENTS

Change of seasons
just plain beautiful
relates to past experiences
pretty to the eye
lights and shadow

SUMMARY OF FACTORS DETRACTING FROM VISUAL QUALITY

STRUCTURAL

overhead wires
black top/pavement
industrial/building
concrete mixing plant
warehouse
supermarket/shopping plaza
strip development
signs
machinery/car/truck
roads
construction sites
broken asphault
too much blacktop

DESIGN

poor design
lack of design
poor color combinations
building materials
building height
setback
lack of interrelationship with surrounding environment
stark qualities
mis-use of site
unimaginative construction
poor commercial composition
unimaginative architecture
hodge podge of buildings
not in keeping with Cape Cod architecture
tone down signs
raw or bare soil
dense development
over-crowding
congestion
no planning
lack of planning

NON-NATURAL

lack of natural vegetation
no trees
no landscaping
no vegetation
lack of green
not enough green and color
landscape defaced
no foliage, trees or shrubs

JUDGEMENT

neglect
confusion
unimaginative
cluttered
noise
barren
uniformity
1/2 finished look
affects sensibilities
busy
uninteresting
artificial

From this list of factors, the committee further reduces the number of common factors to 10 to 15, which will be a checklist for the ranked photographs of Part I.

The top 5 or 10 photos are inspected to see if they contain elements which were listed on the checklist as "adding to scenic quality." A similar procedure is used with lowest ranked photos to check correlation with scenic detractor factors.

Research indicates that detracting elements will have a powerful effect on ratings, while positive elements have only a mild influence.

As the next step in the analysis, the committee ranks the landscape matrix elements. This ranking is based on the effects of elements adding to or detracting from scenic quality. The following example illustrates this analysis:

W-2A #1 Lake in flat canopied forest URL-1B #2 Single family site in steep brush land	A
UP-0B #20 Institution (school) on open steep land UH-2A #25 Strip Development on flat forested site	B
UT-0A #80 Multi-family on flat open site	C

A-B-C cut-offs are based on inspection of the interval between ranked mean scores.

2.21

.09

2.3

.01

2.31

← 1.74 — A-B cut-off

4.17

.39

4.56

← 1.23 — B-C cut-off

5.79

6.00 .21

Survey Results

To maintain interest, and out of respect for participants' efforts, Preference Survey results are publicized as soon as possible.

Results can be published in local papers or posted in public buildings, such as the town hall. It may not be feasible to publish all the photos with their rank in a paper. There are other options. The highest 5 and the lowest 5 could be printed. Or working toward a concensus, publish a small number (highest 6, lowest 4) based on cut-off established by highest level of agreement between participants measured by standard deviation.

Another method of informing and involving the public is a public meeting, at which survey results are presented. This can also provide a forum for further discussion of the community's visual resources.

By whatever means, the photo results must be prominently displayed. They can then serve many persuasive functions. Some effects in other towns include:

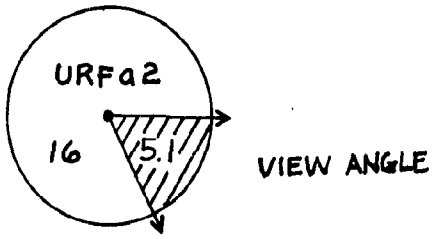
1. Influencing a developer's choice of house style;
2. use by the planning board, as a guide to determine the effects of new development on the visual quality of the community;
3. deterring development in prime scenic areas;
4. raising the general level of awareness in the community;
5. stimulating improved landscaping on a commercial site.

MAPPING THE SURVEY RESULTS

Photo Site Location Map

The final mylar map will show the site of the 84 photographs taken by the NRTT, and can be overlain on the Town Character and Special Visual Features

Map. The NRTT and VR Committee should produce this map together. After photographs have been ranked, the site locations of the photographs can be color coded to show the location of high, medium, and low visual quality areas.



URFa2 = SINGLE FAMILY HOMES ON A FLAT FORESTED SITE.

16 = PHOTO NUMBER

CIRCLE CENTER = PHOTO LOCATION

Interpretation and Extension of Results

Visual Quality Map:

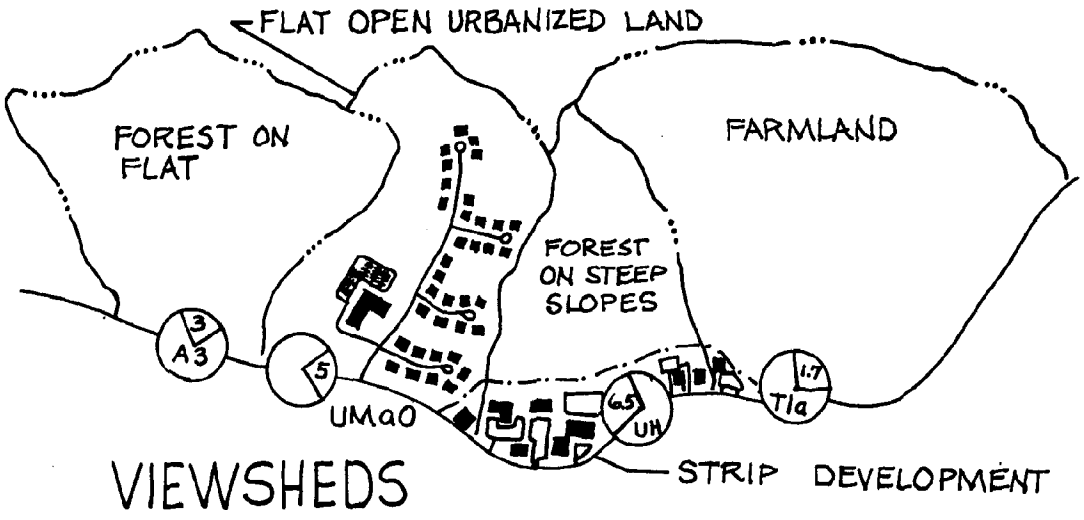
To create a Visual Quality Map for the town, it is necessary to make many generalizations from the data.

It will be especially difficult to know where to draw the dividing line between zones.

Step One--Overlaying the photo site map with the land use map, create a third map, color coded, extending the photo results over general areas of the land use.

Step Two--Overlay this new map with the visual features map. This emphasizes the area that is intensively viewed. Thus, a low ranked scene will have high impact if it forms a narrow corridor and less impact if it allows views to a better liked scene.

Step Three--Mark the general limits of all views by interpreting the topography and showing the viewsheds. Viewsheds are areas bounded by a barrier which prevents a person from seeing beyond, without changing his position. Typical barriers are mountains, ridges, or hills. A viewshed is a good unit for management because any land use change can be seen from many locations within the viewshed, but only rarely from points outside the viewshed boundary. It is desirable to note areas outside the community's government boundary which are frequently viewed.



VIEWSHEDS

Assisted by the NRTT, the committee ranks the viewed areas, considering the following four factors:

1. Original rank of scene (no more than five classes);
2. degree of confinement of road corridor;
3. size (area) of the view type within the town;
4. view quality (size and scene rank and amount of time viewed from road).

Natural scenes are generally preferred to man-made scenes. This foreground rank is raised or lowered (Zube 1970) by background. Visual quality research indicates some trends:

1. A "disliked scene" in narrow corridor is more intensely disliked (Lynch 1961).

2. Screened scenes with some mystery are generally preferred, raising the quality rank of both high and low ranked scenes (Kaplan 1976).

3. If a view type dominates the length of the road, it will be less liked (Denig 1976).

4. Large viewsheds with strong boundaries are highly valued, even if the land uses within the viewshed are less liked (Denig 1976).

    A. This is influenced by the immediate roadside scene.

    B. The greater amount of time the view can be seen, the higher its value will be.

If the community wishes to do further work, the Visual Resource Study can give information that can be used directly to influence the zoning. One method was developed by Harvard GSD, illustrated in a study of The Natural and Visual Resources of Nantucket, 1974. It is possible to establish density and setback limits based on ratings of preference for each visual landscape type. This is done by generalizing the photos used in the Q-sort after a second round citizen surveys into approximately five groups, or by working with the visual character map which shows the visually distinct areas. Each group is rephotographed to show varying density in the same scene. Other photographs show varying building setbacks from the road in each type.

Citizens then take a third survey of these groups of photos. If flat brushland and open field are two of the five types, the results might resemble the following:

A. Density--increases of up to five buildings per acre are accepted on brushland before preference scores dropped significantly. Only one unit per acre was allowed on open land.

B. A setback of only 30 feet was acceptable to most people in the brushland scene. The open land required 500 feet setback to avoid serious drop in the preference ranking.

Additional findings:

By knowing what exists now and how the land use will be changed, it may be possible to determine if the change will improve the visual quality and by how much. This is one of the primary uses of Q-sort information. The committee may want to consider other questions, such as those below:

1. Can photo locations ranking be generalized to all land use?

    A. Are natural scenes preferred over urban scenes?
    B. Are certain types of residential development preferred?
    C. Are farm scenes preferred?

2. Which viewsheds (see page 6-18) are of the highest quality?

    A. Are there large areas which are screened from view by forest or land form?

    B. What would be the effect of changing this?

3. The foreground along the highway may be the most important feature in the town's image. Is it undergoing change?

    A. Does the Q-sort show this new landscape is a type that is preferred?

    B. Note the location of low rated scenes. Can these areas be screened?

    C. Can areas of preferred landscape be opened more to view from the road?

USES OF THE INFORMATION

The mapping and survey projects will have raised the level of citizen concern for their community's visual resources to a new high. Now citizens may wish to include these factors in future community decisions A high level of community agreement as to visual resource preferences will facilitate this process.

Part A below shows examples of policies adopted by a community. Part B shows examples of issues raised by the Visual Resource Survey in several communities.

A. Policies related to findings (Example):

As a result of conclusions of the Visual Resource Study, the town meeting or other community government body may adopt policies such as the following as guide to action by town departments.

1. To buffer new development with natural open space along roadsides;

2. to encourage residential development plans that provide for screening;

3. to preserve farmland in visually important areas;

4. to develop zoning lines that conform to viewsheds as well as to natural limitations and political boundaries;

5. to establish landscaping requirements and sign controls for commercial enterprises;

6. to increase public access to selected views.

B. Issues

The following are issues which have arisen in communities which have used the Visual Resource Procedure. Communities may wish to develop further policies and programs which will deal with these subjects and others.

1. Road alignment--use long curves and short tangents. Reduced cutting and filling, in general, respecting the present landscape.

2. Visual absorption--encourage development in areas where it will be absorbed by hills or forestland.

3. Color and scale; lack of naturalness or clash with present twon character--for example, prevent construction of very large bright metal signs in residential area.

4. Improving vistas--remove trees to open views or construction of roadside parking areas or foot paths.

5. Erosion scars--revegetate new construction sites, gravel pits, or powerline clearings.

6. Roadside woodland management--improve scenic beauty of the road, by removing brush or encouraging mature tree canopy over the road.

7. Enhancing views of water--screening unsightly industrial storage or waste disposal or by tree removal to open scenic views.

8. Retain old town appearance--encourage characteristic light fixtures, paving, signing and other features identified by the community.

C. Legal tools for improving and protecting visual resources.

The following is a list of possible legal tools which can help a community to protect its visual resources. Some use the local regulatory powers and require no direct costs. Others require substantial investment. These tools must be adapted to the specific community.

1. Architectural or Aesthetic Review Board;

2. sign ordinance;

3. encouragement of purchase and transfer of development rights (especially for farmland);

4. acquisition and protection of scenic land (BOR and Massachusetts Self-Help);

5. historic districts (state and national laws);

6. zoning (density, setbacks, cluster and PUD provisions;

7. scenic roads, rivers, and mountain designation (state and national);

8. soil or gravel removal ordinance;

9. subdivision regulation:

    A. Required underground wiring;

    B. reduced street widths and flexible street layout.

10. landscaping ordinance--clearing and paving limits (as percent of site).

Use with the NRPP Programs:

In the final analysis, the greatest benefit the Visual Quality project can have is to change people's perception of their town. All of the legal issues have been mentioned before, but widespread citizen commitment is the only way that major change will occur in existing patterns of land use in the community's viewed lands.

Therefore, public involvement and policy issues, rather than not mapping, are the most important parts of the Visual Resource process.

However, the maps may be used in the Analysis and Planning portions of the overall NRPP process. Visual resources are thereby considered along with the community's other natural resources. For example:

The Special Visual Features Map is used for:

- scenic roads
- zoning review

The Visual Resource Map is used for siting:

- parks
- schools
- sanitary landfills
- open space (Massachusetts Self-Help Funds)
- zoning boundaries

The following pages contain samples of detailed information for use by the visual resource committee in conducting the survey and analysis.

Participant No. _____

Date _____

LANDSCAPE EVALUATION STUDY

Anytown, Massachusetts
and the
USDA, Soil Conservation Service

GENERAL INSTRUCTIONS TO PARTICIPANTS:

Please read this page before starting.

This study is concerned with the evaluation of landscapes as scenic resources. The scenic value of the environment may be an important reason why one chooses to live where one does. The identification and qualification of scenic resources have often been left to the realm of professional judgement or, more frequently, ignored.

The study is divided into 3 parts, each containing a questionnaire that you will complete. A deck of 56 photographs representing a variety of landscapes will be given to you. While viewing these photographs, you will be asked to complete the questions in Part I and Part II. When you are completing these questions, please try to base your decisions on the quality of the landscape in the photograph and not on the quality of the photograph itself. After completing Part I and Part II, you will be asked to answer some general background questions in Part III.

It is important that you complete all parts of every questionnaire.

Thank you for participating.

GO ON TO NEXT PAGE.

Participant No. _____

Date _____

LANDSCAPE EVALUATION: PART I

Instruction Sheet: Part I

Please sort the 56 photographs into 7 piles, according to the scenic quality of the landscape in the photos.

In pile #1, place the 3 landscapes that you think have the highest scenic quality.

In pile #7, place the 3 landscapes that you think have the lowest scenic quality.

From the remaining 50 landscapes, place the 7 with the highest scenic quality in pile #2, and the 7 with the lowest scenic quality in pile #6.

From the remaining 36 landscapes, place the 11 with the highest scenic quality in pile #3, and the 11 with lowest scenic quality in pile #5.

Place the remaining 14 landscapes in pile #4.

The number of photographs to be placed in each pile also appears on the pile identification cards on the table in front of you.

You may rearrange the photographs until you are satisfied with their placement, but please make sure you place the specified number of photographs in each pile.

When you are finished sorting, turn the piles over. Using the form provided on the next page, record the photograph number in the pile you selected for it.

GO ON TO NEXT PAGE

LANDSCAPE EVALUATION: PART II

Instructions:

The purpose of this questionnaire is to measure the relationship of different factors to the scenic quality of the landscape.

We ask you to identify the factors which add to the scenic quality of Pile #1. Considering the three landscapes as a group, describe in either a few words or phrases those factors which add the most to the scenic quality of Pile #1. Record your responses for Pile #1 below.

Next identify the factors that detract from the scenic quality of Pile #7. Considering the three landscapes as a group, describe in either a few words or phrases those factors which detract the most from the scenic quality of Pile #7. Record your response for Pile #7 below.

Pile #1

Description: _____

_____

_____

_____

Pile #7

Description: _____

_____

_____

_____

SAMPLE - To be adapted to fit community.

Participant No. _____

Date _____

LANDSCAPE EVALUATION: PART III

QUESTIONNAIRE

Please answer all of the following questions. Circle the number beside the appropriate response for each question.

1. Sex: A. Male B. Female

2. What is your approximate age? (Circle one)

   A. 18 or less
   B. 19 to 25
   C. 26 to 35
   D. 36 to 45
   E. 46 to 55
   F. 56 to 65
   G. 65 plus

3. What is your occupation or profession? (Circle one)

   A. Clerical/Secretarial
   B. Craftsperson/Mechanic
   C. Equipment/Machine Operator
   D. Farmer/Farm Laborer
   E. Houseperson
   F. Laborer (Nonfarm)
   G. Manager/Administrator
   H. Professional/Technical
   I. Sales Worker
   J. Service Worker
   K. Student
   L. Volunteer (Part-time)
   M. Unemployed
   N. Retired

4. In what section of town do you live?

   A. Town center
   B. Eastern
   C. Southern
   D. Western
   E. Northern

5. How many years have you lived in this community?

   A. 2 or less
   B. 3 to 5
   C. 6 to 10
   D. 11 to 25
   E. 26 plus

6. Type of home:

   A. Rented apartment

   B. Own home

VISUAL RESOURCE INVENTORY

What is it? This inventory is an opportunity to map and evaluate the visual resources of the community by determining how townspeople perceive the visual character of their environment. It is an excellent and interesting way to involve many people in the NRPP.

What are the end products?	What needs to be done?	Who does what?	When?
I. Town Character Map	1. On a map, show general areas which are similar in visual character (i.e., town centers, wooded residential, strip development, wetlands, etc.) This is a conceptual map.	Visual Resource (VR) Committee working with Natural Resources Technical Team (NRTT) in the Office.	
II. Special Visual Features Map	1. On a map, show: vistas, unique and critical visual areas, and eyesores.	VR Committee makes this map through a field reconnaissance of the community.	
III. An Analysis of the Scenic Quality of the Community Through the Use of Photographs:	1. Select 84 sites for photographing.	NRTT and VR Committee	
	2. Photograph sites.	NRTT	
	3. Process photos	NRTT	
Photo Site Location Map	4. Townspeople rank photos according to quality of landscape scenes.	At least 150 townspeople should evaluate the photos. Members of the VR Committee (or others) will administer the evaluations and tabulate data.	
	5. Computerize the results.	NRTT	
	6. Analyze the results.	NRTT and VR Committee	
IV. Evaluation of the Visual Resource	1. Analyze other factors with photo rank to make final mapping.	VR Committee	
V. Maps, Photos & Evaluations Become Useful Planning Tools	1. Write a visual resource report.	VR Committee	
	2. Use information in decision-making.	Any town boards, commissions, interest groups, residents, developers, etc.	

What materials are necessary? 1. 3 rolls, 36 exposures each, 35 mm kodachrome film.
2. hard board for mounting (Permamount)

What are the costs? Expenses will range between $150 to $175: $10 film/ $110 processing/ $30 Permamount (estimated).

Other costs might include Mylar for maps and postage, if a mail sample is used to solicit volunteers.

TIME ALLOCATION FOR VISUAL RESOURCE PROCEDURE

Day 1- 7
Meet with Visual Resource Committee (we recommend five individuals). Introduction. Make rough "Town Character" and "Special Visual Features" Maps.

ONGOING
Refine and draft two maps.

Day 1- 7
Test, procedural and instructional handouts adjusted (obtained from state office) to suit town and corresponding Resource Area. Title pages are changed. Copies made up.

Day 8-12
Selection of sites to photo.
Tech. Team and Visual Resource Committee.

Day 13-20
Tech. Team take photos.

Day 13-20
Visual Resource Committee obtains random sample and requests participants and test administrators.

Day 21-28
Tech. Team processes photos and eliminates photos not used.

Day 21-28
Visual Resource Committee schedules appointments.*

Day 29
Photos mounted.

Day 30
Train administrators to test (we recommend 15-20 volunteers on shifts).

Day 31-38
Administer test.

Day 39-60
Analyze data and interpret results. (Some professional expertise and town input.)

Day 60
Planning and Implementation.

---

* Test takes 35-40 minutes.

MASSACHUSETTS

PLANNING BOARD

January 22, 1976

Dear Acton Family,

Finally, the rest of the world is coming to appreciate something you have known about for a long time - that much of what makes a town nice to live in is the way it looks. Many times we at the Planning Board have been told about the appealing semi-rural look of Acton. Or you have told us of houses and commercial areas you think are attractive. Equally, you have told us of visual eyesores you wish we could get rid of.

The Planning Board has not had a good means of finding out specifically what you found most appealing - was it the stone walls along narrow roads, the close-growing woods, the open fields, the rolling lawns? On the other hand, exactly what bugged you about a bad scene?

As we said, finally the rest of the world is coming around to appreciating the fact that the visual quality of our country is important and worth working to preserve and improve. The University of Massachusetts and the United States Soil Conservation Service have been working with Acton to develop a good survey technique to register citizens' preferences. They have developed a series of photographs, taken under carefully controlled conditions, which are representative of the many scenes of our Town.

Now we need to have your help. The Planning Board has done a controlled random sampling of all the homes in the town to develop the list of interview participants. With the help of volunteers who will be working at the Department of Public Works Facility over a four day period we will be able to schedule all the interviews. Would you look at the enclosed postcard, decide which 45 minute period would be most convenient, and sign up. We would appreciate it very much if you would mail the card back to us right away. Any person, ten years of age or older, may participate for your family.

This is a unique opportunity for your family to register its likes and dislikes which could well impact the future look of Acton. The survey is fun, takes only 45 minutes and the results will be used!

The Department of Public Works Facility is at 14 Forest Road (behind the sanitary land fill). If you have any questions please call the Planning Board Office (263-4448).

Sincerely,

William B. Becklean

William B. Becklean, chairman

TOWN OF DENNIS
South Dennis, Mass. 02660

May 3, 1976

Dear Citizen:

The Dennis Conservation Commission and the Dennis Planning Board are undertaking a visual preference study to aid in inventorying and evaluating the town's valuable visual resources. Your name has been randomly selected from the voter registration list as a potential participant in this survey.

The questionnaire involves sorting photographs and filling out a brief analysis sheet on your choices. It will take 20 to 30 minutes to complete. The questionnaire will be given by our volunteers at the Planning Board office at Town Hall Thursday, May 18, through Thursday, May 20, from 10:00 A.M. to 4:00 P.M. and 7:00 P.M. to 9:00 P.M.

If you or a relative are interested in participating in this study, please return the enclosed postcard immediately, so that we may contact you to confirm an appointment time.

Your cooperation in this effort will be very much appreciated.

Very truly yours,

Mary Hazel Haglund

Curt A. Livingston, Chairman
Dennis Conservation Commission

Constance A. Rachael, Chairman
Dennis Planning Board

Name: Kenneth M. Snyder

Telephone: 394-4575

☒ Yes, I am interested in participating.

Preferred date & time Thurs May 20 10-2-4 PM

☐ No, I do not wish to participate.

VISUAL PREFERENCE SURVEY

SAMPLE Q-SORT SPSS PROGRAM

```
 RUN NAME        SPSS ANALYSIS OF Q SORT FOR NPPP VISUAL RESOURCES SURVEY
 FILE NAME       NANDOVER     NORTH ANDOVER VISUAL QUALITY SURVEY     SET B
81COMMENT        CHANGE FILE NAME TO FIT TOWN , USE NO MORE THAN 8 CHARACTERS
 COMMENT         CHANGE FILE LABEL (AFTER FILE NAME) TO FIT TOWN AND SET
 VARIABLE LIST   PARTICIP,PHOTO01 TO PHOTO56, SEX, AGE, OCCUP, PRECINCT, YRSRES,
71               HOME
 INPUT FORMAT    FIXED (F3.0,56F1.0,1X,4F1.0,F2.0,3F1.0)
 COMMENT         VARIABLE LIST AND INPUT FORMAT MUST REFLECT DATA CARD FORMAT
91N OF CASES     79
 COMMENT         CHANGE N OF CASES TO FIT ACTUAL NUMBER IN SET
 INPUT MEDIUM    CARD
51VALUE LABELS   PHOTO#1 TO PHOTO56 (1)HIGH VISUAL QUALITY (7)LOW VISUAL QUALITY/
                 SEX (1)MALE (2)FEMALE/
                 AGE (1)UNDER 16 (2)16 TO 25 (3)26 TO 35 (4)36 TO 45 (5)46 TO 55
41               (6)56 TO 65 (7)OVER 65/
                 OCCUP (1)CLERICAL-SECRETARIAL
                 (2)PROFESSIONAL
31               (3)TECHNICAL
                 (4)ARMED SERVICES
                 (5)CONSTRUCTION-OPERATIVE (6)FOREMAN-NON-FARM
21               (7)FOREMAN-FARM
                 (8)FARM MANAGER-OWNER (9)LABORER NON-FARM
                 (10)LABORER FARM
11               (11)HOUSEPERSON
                 (12)SERVICE INCLUDING PERSONAL AND HOUSEHOLD
                 (13)SALES WORKER
01               (14)MANAGER-ADMINISTRATOR
                 (15)STUDENT FULLTIME
                 (16)UNEMPLOYED
6                (17)RETIRED
                 (18)OTHER/
                 PRECINCT (1)ONE (2)TWO (3)THREE (4)FOUR (5)FIVE/
8                YRSRES (1)2 OR LESS (2)3 TO 5 (3)6 TO 10 (4)11 TO 25 (5)OVER 25/
                 HOME (1)CITY (2)SUBURB-METRO (3)SUBURB-NONMETRO (4)TOWN (5)RURAL
 VAR LABELS      OCCUP,OCCUPATION/PRECINCT,NUMBER/
2                YRSRES,YEARS OF RESIDENCE IN TOWN/
                 HOME,HOME  UP TO 18TH BIRTHDAY
 COMMENT         IF PARTICIPANT QUESTIONAIRE IS CHANGED, LABELS SHOULD BE CHANGED
9COMMENT         FOLLOWING IS ANALYSIS FOR EACH PHOTO RATED BY ALL PARTICIPANTS
 FREQUENCIES     INTEGER=PHOTO01 TO PHOTO56(1,7)
 OPTIONS         7,8
5STATISTICS      1,3,5
 COMMENT         DATA CARDS ARE INSERTED FOLLOWING (READ INPUT DATA) CARD
 READ INPUT DATA
4COMMENT         FOLLOWING IS ANALYSIS OF PARTICIPANT CHARACTERISTICS
 FREQUENCIES     GENERAL=SEX,AGE,OCCUP,PRECINCT,YRSRES,HOME
 COMMENT         FOLLOWING IS ANALYSIS OF PHOTO RATINGS BY PARTICIPANT SUBGROUPS
3CROSSTABS       VARIABLES=PHOTO01 TO PHOTO56(1,7) SEX(1,2) AGE(1,7)OCCUP(1,18)
                           PRECINCT(1,5) YRSRES(1,5) HOME(1,5)/
                 TABLES=SEX, AGE, PRECINCT, YRSRES BY PHOTO01 TO PHOTO56
2COMMENT         SPECIFICATIONS AFTER VARIABLES SHOULD REFLECT VARIABLES IN INPUT
 COMMENT         SPECIFICATIONS AFTER TABLES  MAY BE CHANGED FOR NEW ANALYSIS
 OPTIONS         4,5
1FINISH
```

APPENDIX A: GLOSSARY

Access--availability of roads or paths to land areas. Public roads and paths constitute formal access, while private rights-of-way are private access. Lands posted or without defined trails or roads are considered nonaccessible.

Agricultural Land Use Map--shows all land areas that are used primarily for the production of some type of agricultural crop, including livestock, and are three acres or greater in size.

Agricultural Land of Statewide Importance--this is land, in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oilseed crops. Criteria for defining and delineating this land are to be determined by the appropriate state agency or agencies.

Analysis Map--a map combining or interpreting information from inventories or special studies for specific planning purposes.

Aquifer--a geologic structure or formation that transmits water in sufficient quantity to supply the needs for water development, such as a well. Highest water yields occur in permeable deposits of sand and gravel, such as glacial outwash plain, ice-contact deposits, and coarse alluvium.

Athletic Field--a specialized type of outdoor recreation intended primarily for highly organized games and requiring standard field dimensions and other facilities. Examples include baseball and football fields.

Base Map--a map upon which other information is placed. It may include topographic features, waterbodies, roads, railroads, buildings, and other cultural features as reference points.

Beach--a tract of land bordering a swimming area (fresh water lakes and streams or salt water) with facilities which may include bathhouses, toilets and parking.

Bog--an area with an acid, peaty soil that is water logged and supports a distinctive plant community which usually includes heath shrubs, cranberries, pitcher plants, and sedges. A mat of sphagnum moss is the most characteristic feature.

Buffer Strip--a strip of vegetation at the interface of two different or incompatible land uses; the strip lends to isolate and screen one from the other. An example would be a band of trees and shrubs between an interstate highway and a residential area.

Bureau of Outdoor Recreation (BOR) Land and Water Conservation Fund--a fund established by Congress in 1965 which provides up to 50 percent reimbursement to states and their political subdivisions for acquisition and development of lands for outdoor recreation.

Camping Area--an area for tents or trailers, usually including some or all of the following facilities: fireplaces, garbage disposal, water supply, bathhouses, and parking. Designed for overnight and long-term visits.

Canopy--uppermost layer which consists of crowns of trees or shrubs in a woodland (see "crown closure").

Cold-water Fishing--fresh water which supports or is stocked with cold-water species. Examples include trout and salmon.

Compatible Use--land uses that can exist together or in close proximity to each other and can still maintain their integral functions in a healthy, harmonious way. An example of a compatible use is recreation land within or near residential land.

Conservation District--a legally constituted unit of state government created to administer soil and water conservation activities within its boundaries.

Conservation Plan (Soil Conservation Service)--a record of land use and treatment decisions made by a landowner with technical assistance from the Soil Conservation Service.

Conservation Plan (Massachusetts Division of Conservation Services)--a plan prepared by a community meeting requirements for eligibility for the Massachusetts Self-Help program.

Conservation Restriction--under the Massachusetts General Laws, Chapter 184, Section 23-33, an easement or other legal agreement in writing between an owner of real property and a governmental agency or private charity, by which the owner agrees to restrict development of his land in certain ways.

Coordinator--a local volunteer responsible for directing the volunteer inventory committees. The coordinator is usually a member of the town's steering committee, capable of informing the committee of the inventory progress.

Crown Closure--the degree to which the lateral branches of one tree interlace adjacent trees to form a cover over (canopy) and close off light from the forest floor. Degree of crown closure is measured as a percentage and is estimated from beneath the canopies.

Culvert--a pipe or similar means for carrying water around or under a man-made construction.

Data Sheet--in the NRPP, a form used for recording information about a resource or land use during the field inventory.

Deep Fresh Water Marsh--wetland with fairly expansive open water areas interspersed with patches of emergent vegetation, such as cattails, bulrushes, and pickerel weed. The water depth ranges from six inches to three feet during the growing season. Vegetation often found in the open water areas include water lilies, duckweed and pondweeds.

Development: (1) Natural Resources--the improvement and maintenance of a particular natural resource to enhance its productivity.

Examples: forest management for timber harvests; creation of reservoirs for outdoor recreation; land management for wildlife habitat improvement.

(2) Urban--construction of buildings, paved areas, and related adjacent land areas.

Easement--a legal right or interest in the land of another which allows the easement holder specified uses or rights without actual ownership of the land.

Ecosystem--a community of plants and animals, together with their environment, forming an interacting system.

Edge--the transitional zone or interface where two different vegetative cover types or land uses meet, usually having characteristics of each.

Edge Effect--the tendency for increased varieties and densities of plant and animal populations at the interface between two diverse natural communities, such as woodland-agricultural land; wetland-open water.

Endangered and Threatened Species--any species of plant or animal which is, or is likely to become, in danger of extinction throughout all or a significant portion of its range.

Examples in Massachusetts:
Peregrine Falcon, Eastern Cougar, Bald Eagle, Ipswich Sparrow, Bog Turtle, Indiana Bat, Shortnose Sturgeon, Bog Rush, Leatherback Sea Turtle, Ridley Sea Turtle.

Erosion--the group of processes (water, wind, ice, and gravity) whereby earthy or rock material is worn away, loosened, or dissolved and removed from any part of the earth's surface. ("Accelerated erosion" is a term used to compare erosion caused by human activities with that occurring at natural rates.)

Eutrophication--a process of aging of lakes, whereby aquatic plants are abundant and waters are deficient in oxygen. The process is usually accelerated by enrichment of waters with runoff containing nitrogen and phosphorous.

Extensive Outdoor Recreation--recreational activities which require little or no landscape preparation and usually occur over large areas of land or water. Examples include jogging, hiking, canoeing, cross-country skiing, fishing.

Evaluation/Analysis Phase--following the NRPP Inventory Phase, when the volunteers evaluate the inventory results to identify the natural resource assets, needs, and problems. In this phase, the NRTT's function is informational and educational. The steering committee's role is evaluating the overall significance of the inventory committees' findings and providing the Analysis Report to the community.

Flood Frequency--a means of expressing the probability of flood occurrences as determined from a statistical analysis of representative stream flow or rainfall and runoff records. The frequency is usually expressed as occurring once in a specified number of years. (For example, a "10-year flood" is a flood having an average frequency of occurrence in the order of once in 10 years. It has a 10 percent chance of being equalled or exceeded in any given year.

Flood Plain--nearly level land situated on either side of a water course or water body which is subject to overflow flooding.

Fresh Meadow--a type of wetland where the soil is water logged through most of the growing season, and surface water is present only for short periods during the spring. Vegetation is predominantly grasses, rushes, and sedges.

Game Animal--an animal sought for its fur, flesh, or sporting value, or one so defined by law.

Game Refuge Area--an area designated for the protection of game animals within which hunting and fishing is either prohibited or strictly controlled.

Ground Cover--any vegetation providing a protective mat on the soil surface.

Habitat--the natural environment of a plant or animal; the locality where the organism may generally be found, and where the requirements for its growth and reproduction are present.

Historic District--an area preserved or restored, due to its significant association with national, state or local history, tradition or cultural heritage.

Huntable Land--any upland area outside safety zones (as defined by state law) that is capable of attracting game species and on which hunting is permitted.

Huntable Wetland--any wetland outside safety zones (as defined by state law) that is capable of attracting game species and on which hunting is permitted.

Impervious Surfaces--surfaces which do not permit infiltration of water. Examples are roads, parking lots, and roofs.

Implementation--the process of carrying out a plan by specific measures or actions.

Interpretative Soils Map--a map showing the limitations, suitability, of relationship of soils for a selected land use. A partial listing of interpretations available is found on page 4-16.

Inventory Committees--teams of local citizen volunteers who conduct the NRPP inventories and evaluate the condition and characteristics of the resources inventoried.

Inventory Description--an explanation (provided for each NRPP inventory) which defines the inventory, lists sources of information, and assistance, specifies the map coding and symbols, and provides any special instructions.

Inventory Phase--in the NRPP, the period of information collection and preparation of the various maps and inventories that will provide the community with a natural resources data base. This phase requires the greatest volunteer time committment and support from the NRTT.

Inventory Report--a short, concise, written description of the character and existing problems of each of the town's natural resources. The report is written, following the volunteers' inventory field work.

Land Trust--a private nonprofit corporation formed to hold land as open space for educational, conservation and/or scientific purposes.

Major Park--an area designated for a variety of recreation uses, often characterized by natural or historical features and used by a number of neighborhoods, towns, or tourists.

Massachusetts Mapdown Maps--a set of maps showing use and vegetative cover type for each USGS quadrangle in Massachusetts. These maps were made using aerial photographs taken in 1951 and again in 1971. They are used for land use, wildlife, woodland, wetland, and other resources planning.

Meadow--an area of vegetation dominated by grasses and grasslike plants.

Memorandum of Understanding--a statement of agreement (not a legally binding document) to cooperate in assisting the town in the NRPP or other SCS programs. In the NRPP, it is signed by the community, the Conservation District, the regional planning agency (if appropriate), the members of the Technical Team, and other interested agencies.

Multiple-use Areas and Facilities--land and structures managed, designed, and/or constructed to meet the space and facility requirements of several types of activities.

Municipal Water Use--all water surface areas used for public-domestic supply, industrial use, power development and other similar uses, and which are often restricted from recreation use. Examples: ponds, reservoirs, fish hatcheries and the land area used for wellfield sites.

Mylar--a transparent sheet of plastic material upon which a map can be drawn, and from which copies or prints can be made.

Natural Areas--areas, often small in size, established to preserve distinctive natural communities of plants and animals of scientific and esthetic interest.

Natural Resource Base--the soils, topography, minerals, plant and animal life, surface, and ground water which can be used by man for his sustenance, convenience, or welfare.

Natural Resource Data Base--an organized system of filed maps and detailed written information about a community's natural resources.

Natural Resource Evaluation Sheets--NRPP forms containing a series of questions for inventory committees to answer as part of the Evaluation and Analysis Phase of the program. The questions are answered, based on the inventory findings and help to raise issues, identify problems, and point out potentials for action.

Natural Resource Hazard--a natural condition or process which presents a danger (whether continually or sporadically) to certain land uses and development. Examples include: floodplains, steep slopes, landslide prone areas, areas with seismic activity.

NRPP (Natural Resources Planning Program)--a program of the USDA, Soil Conservation Service in Massachusetts, in cooperation with other federal and state agencies, which offers the methodology and the technical assistance for communities to systematically collect, evaluate, and utilize information concerning their natural resources. It presents a framework for an ecologically responsible approach to natural resource planning.

NRPP Resources Areas--four regions of the state defined by the resource characteristics particular to those areas. The suggested guidelines for resource use offered by the NRPP reflect the inter-regional resource differences of these separate areas. The areas are the Connecticut Valley, the Berkshires, the Central Highlands, and the Coastal Area.

Natural Resources Technical Team--includes personnel assigned to help each conservation district in its technical assistance to the NRPP community.

Nonrenewable Resources--natural resources that, once used, cannot be replaced.

Objectives--specific, measurable actions to be taken in order to achieve long range goals. Example: the planned purchase, within a certain time period, of land for outdoor recreation.

Open Land Wildlife--wildlife whose habitat lies predominantly outside the forest canopy.

Open Space--land and water areas which are retained in an essentially undeveloped (nonurbanized) state on a permanent or semipermanent basis.

Organization Phase--the initial phase of the NRPP, when community representatives and the Natural Resources Technical Team develop an organizational framework for the community's involvement in the program. The NRTT provides background information and then, if the town chooses to proceed with the program, a Memorandum of Understanding is signed and volunteers are solicited.

Orientation--the directional placement of a facility or map in relation to north or some other specific reference line or point.

Parcel--in NRPP, a contiguous land or water area of a single use or cover type (not to be confused with property ownership).

Park--an area permanently dedicated to recreation use and generally characterized by its natural, historic and landscape features. It is used for both intensive and extensive forms of recreation and may be designed to serve the residents of neighborhood, community, state, region, or nation. (See also "Major Park" and "Town Park".)

Peripheral Species--a species whose occurrence is limited because it is on the edge of its natural range. Habitat conditions are marginal for the species. (See SCS publication "Threatened Species of Massachusetts", 1975, or current edition.)

Picnic Area--an area for outdoor eating designed and used primarily for short term, day use usually including some or all of the following facilities: tables, fireplaces, garbage disposal, water supply, toilets, and off-street parking.

Planning/Implementation Phase--the final phase of the NRPP, when the community outlines its future course of action, natural resource opportunities and constraints are weighed with the community's social, economic and political factors. The leadership role shifts from the NRPP steering committee to the town department heads and/or a permanent natural resources advisory committee.

Playground--a basic recreation area in a residential neighborhood providing a variety of recreation activities.

Present Land Use Map--in NRPP, the map showing the eight primary uses of the land within a community. The uses described on the NRPP Present Land Use Map are agriculture, wildlife land, wildlife wetland, urban land, recreation land and water, woodland, and municipal water.

Preferential Tax Assessment--the assessment of land at its value for its current unintensive uses, rather than its full market value. Example: assessment of farmland under Massachusetts General Laws, Chapter 61A.

Primary Land Use--the principle or representative use of a contiguous area of land. A parcel of woodland may contain hiking trails, but its "primary use" or function is growing trees and, therefore, is classified "Woodland" and not "Recreational Land."

Prime Agricultural Land--prime farmland is land best suited for producing food, feed, forage, fiber, and oilseed crops, and also available for these uses (the land could be cropland, pastureland, rangeland, forest land, or other land, but not urban built-up land or water). It has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops economically when treated and managed, including water management, according to modern farming methods.

Problem Areas--sites in a community which present pollution, erosion, sediment, safety, or other problems. This information can be gathered from townspeople, newspaper files, SCS studies, and other local and regional sources.

Quasi-Public Lands--lands in private ownership or control, but available for public use or protected for public benefit. Examples: Audubon tracts, areas managed by the Trustees of Reservations.

Q-Sort Procedure--a step in the Visual Resource Survey in which a large number of citizen volunteers are surveyed to determine their landscape preferences. The volunteers individually rank a number of photographs of their community and answer a questionnaire about their choices of photographs.

Recreation Land Use--all land areas used primarily for outdoor recreation, excluding wooded areas used for extensive recreation, such as hiking.

Recreation Water Use--those areas used primarily for some type of water-based recreation.

Regional Planning Agency--one of the units of state government created to aid a single town or the entire area within its purview in the planning of economic developments and natural resource management.

Relief--the vertical dimension of hills, valleys, mountains, plateaus, and other land forms. Gross relief of topographic features can be determined from USGS topographic maps.

Rough Lands--in NRPP, those areas characterized by steep slopes (greater than 15 percent slope), by ledgy and extremely rocky land, and by extremely droughty soils.

Sediment--solid mineral and organic material that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice, and has come to rest on the earth's surface above or below sea level.

Sedimentation--the process or action of depositing sediment. In water courses, occurs where the flow slows, as in ponds, lakes and wetlands.

Self-Help Program--a Massachusetts state program which provides up to 50 percent reimbursement for the acquisition of conservation lands by communities with conservation commissions.

Siltation--the process of depositing silt; filling of a channel, lake, pond, or reservoir with silt or mud, occurs primarily in slow moving or still water. More generally termed sedimentation, which applies to all particle sizes.

Soil Limitations Rating--a relative rating of the degree to which the natural characteristics of a soil restrict its use for a specific purpose. Soils limitations may often be overcome with proper design or operation, but normally at an added cost. Limitations ratings of slight, moderate, or severe, are provided for the uses listed on page 4-16.

Soil Suitability Rating--a relative rating of a soils suitability for selected types of plant growth or for use as a resource material. Ratings of good, fair, poor, and unsuited are provided for the purposes listed on page 4-16.

Steering Committee--the citizens' group responsible for overseeing and setting the policy for a community's NRPP involvement. Following the signing of the Memorandum of Understanding by the municipal officials and the respective resource agencies, the committee becomes the motivating force of the program. It delegates responsibility to the coordinator and meets to review the progress of the inventory committees. In the latter phases, the committee addresses problems highlighted by the inventories and instigates strategies to solve problems and to establish a continuing process of local resource management.

Stream Corridor--those lands located along streams that provide a protective zone to the stream. The NRPP maps a stream corridor protection woodland for 150 feet on either side of a stream.

Strip Cropping--alternate bands of crops and grass providing food and cover for wildlife.

Stubble Mulching--crop residues left on fields after harvest to protect the soil from erosion and to provide food for wildlife.

Subdivision--the division of a tract of land into smaller lots, usually in anticipation of selling the lots for homes. Planning boards may regulate the layout of and construction of roads, utilities, and drainage within a subdivision.

Swamp--an area of land supporting trees and shrubs whose soil is waterlogged to within a few inches of its surface during the growing season. Seasonally, may be flooded with 6 inches to 12 inches of water.

Threatened Species--a species which is in danger of extinction or is likely to become in danger of extinction. (See SCS publication "Threatened Species of Massachusetts," 1975, or current edition.)

Town Soil Survey Report--a report prepared by the Soil Conservation Service (of the U.S. Department of Agriculture) in cooperation with the local conservation district. It includes an interpretive soils map and a detailed explanation of the soil interpretations for specific land uses. Also included is a description of the local soil series and land types, and a glossary of technical terms.

Unique Agricultural Land--unique farmland is land other than prime farmland that is used for the production of specific high-value food and fiber crops. It has the special combination of soil quality, location, growing season, and moisture supply needed to produce sustained high quality and/or high yields of a specific crop when treated and managed according to modern farming methods. Examples of such crops are citrus, olives, cranberries, fruit, and vegetables.

Unique Items or Areas--items or places which are generally considered to be unique or unusual by local people. Examples: very large or specimen trees, vantage points for panoramic views, and unusual architecture.

Urban Land Use--all lands used for residential, commercial, industrial, institutional, and transportation purposes.

USGS Quadrangle Sheet--the topographic map produced by the U.S. Geologic Survey at a scale of 1:24,000. This map is enlarged to serve as the base map for the NRPP.

Vegetative Cover--all existing or introduced plant species growing in a particular area.

Viewshed--area seen from a selected vantage point, enclosed by high land or vegetation.

Visual Amenities--those man-made and natural features in the urban setting and in the landscape which are visually appealing.

Visual Character--the grouping of natural and man-made factors which gives an area a distinctive appearance.

Visual Resources--those points or areas deemed significant by townspeople for their value as visual amenities.

Warm Water Fishing--fresh water which supports or is stocked with warm-water species. Examples include bass, pickeral and perch.

Waterfowl Hunting--the stalking, decoying, and shooting of any waterfowl species (ducks, geese, etc.) that is declared a legal game species.

Water Pollution--any change in the physical, chemical or biological properties of water which adversely affects its potential uses.

Watershed--drainage basin; the total area above a given point on a stream that contributes water to the flow at that point. The watershed of a town reservoir may include more land than is protected by the town for protection of water quality and quantity reasons.

Water Table--the depth below which the ground is saturated with water; the upper level of ground water.

Wetland--land with poorly drained or very poorly drained soils, that have the water table at or above the ground surface during the growing season.

Wetland Class--these are types of wetlands as defined in "Massachusetts Map Down," Planning and Resource Development Series No. 25, developed by the Department of Forestry and Wildlife Management, University of Massachusetts.

Wildlife--undomesticated vertebrate animals, except fish, considered collective.

Wildlife Border--a strip of low-growing vegetation, herbaceous or woody; usually more than 10 feet wide, established along the edges of fields, woodlands, or streams to provide food and cover for wildlife.

Wildlife Land--in the NRPP, those areas, generally 3 acres or more, which are used primarily for the production or preservation of openland wildlife and woodland wildlife.

Wildlife Wetlands--in the NRPP, those areas, generally 3 acres or greater, which are used primarily for the production or preservation of wetland wildlife and aquatic animals other than fish.

Winter Sports--outdoor activities engaged in during the winter season requiring the presence of snow or ice, such as skiing, sledding, snowmobiling and ice skating.

Woodland--in the NRPP, all woodland areas, generally 10 acres or greater in size, that have an estimated 30 percent or greater tree crown closure and that are used primarily for growing trees.

Woodland Wildlife--wildlife that normally frequent woodland areas of hardwood trees and shrubs, coniferous trees and shrubs, or mixed growth of such plants. Examples include red foxes, red and grey squirrels, raccoons, white-tailed deer.

Woodlot--an area of woodland usually privately maintained as a source of fuel, posts, and/or lumber.

Work Map--a map used by NRPP volunteers when inventorying "in the field." Information from this map is then transferred to a final inventory map and is incorporated into the Present Land Use Map (PLUM).

Zoning--the division of a community by ordinance into zones or districts, primarily for the purpose of regulating the use of land. However, other elements of use, such as building setbacks, heights, bulk, and coverage, are also controlled through zoning.

APPENDIX B: SAMPLE MEMORANDUM OF UNDERSTANDING

A Memorandum of Understanding forms the basis for the activities of the community, the Conservation District, the members of the Technical Team, the regional planning agency and other agencies in undertaking and carrying out a Natural Resources Planning Program. It is a statement of intent and outlines the responsibilities of signatory parties in the Natural Resources Planning Program. The document is tailored to the specific organizational framework agreed upon by the community and the Technical Team. For further explanation, see Chapter 2, "Organization."

MEMORANDUM OF UNDERSTANDING

PURPOSE

This Memorandum forms a basis for the activities of the town of (name), the (name) Conservation District, state and federal agencies, and the (name) Planning and Economic Development Commission in undertaking and carrying out a Natural Resources Planning Program. Each party to this Memorandum will establish such policies and procedures, and will take such other action as necessary to carry out its responsibilities.

PARTIES

Units of Government

Local 1/

(town name) Board of Selectmen

(town name) Planning Board

(town name) Conservation Commission

(town name) Recreation Commission

State

(name) Conservation District

Regional

(name) Planning and Economic Development Commission

Agencies

Federal

U.S.D.A., Soil Conservation Service

1/ Others participate, as appropriate

State 1/

(name) Extension Service

Massachusetts Department of Food and Agriculture

Massachusetts Division of Conservation Services

Massachusetts Division of Fisheries and Wildlife

Massachusetts Division of Forests and Parks

Massachusetts Division of Marine Fisheries

RESPONSIBILITIES

A. The (town name) Board of Selectmen, Planning Board, Conservation Commission, and Recreation Commission will:

1. Conduct, with the assistance of the (name) Extension Service, an informational and educational program to explain the Natural Resources Planning Program to (town name) residents. This effort will include conducting public informational meetings and prepare news releases for local media throughout the Natural Resources Planning Program.

2. Organize a Steering Committee to have the following duties:

   a. Organize and help train citizen teams to conduct needed inventories, prepare inventory maps, and evaluate these data.

   b. Coordinate assistance from signatories to this agreement, as necessary.

   c. Set target dates, assemble data and materials, and coordinate citizen teams to facilitate completion of the needed inventories and evaluations.

   d. Synthesize and further evaluate inventory data, develop community objectives for resource use, and identify alternative courses of action which will lead to fulfillment of these objectives.

   e. Make and develop with other town boards and commissions proposals and policies for the use and management of community resources.

   f. Develop an implementation schedule to carry out the planning proposals and policies.

1/ Others participate, as appropriate

3. Provide a copy of the natural resources planning proposals and an implementation schedule to the other parties to this Memorandum.

4. Review and revise annually natural resources policies, as necessary, to reflect changed conditions.

5. Provide necessary supplies and working space to carry out the program.

B. The (name) Conservation District will:

1. Arrange for and coordinate the services of the Natural Resources Technical Team.

2. Assist the Town in reviewing and up-dating the natural resources policies.

C. The (name) Planning and Economic Development Commission will:

1. Collect and make available to Technical Team members and the Town such existing information and data that it has which is pertinent to the Natural Resources Planning Program in the Town.

2. Analyze and determine the regional impact of proposed actions by the Town.

3. Advise the Town on methods and procedures for securing state and federal funding to carry out the Town's plans.

D. The Natural Resources Technical Team will:

1. Consist of personnel from signatory federal and state agencies to this Memorandum.

2. Assist the (town name) Selectmen, Planning Board and Recreation and Conservation Commissions in carrying out an informational and educational program to explain the Natural Resources Planning Program.

3. Provide personnel services to assist the Town in the inventory, evaluation and planning, and implementation phases of the Natural Resources Planning Program.

4. Collect and make available to other Technical Team members and the Town information and data that it has which is pertinent to the Town's Natural Resources Planning Program.

E. In addition, the Soil Conservation Service will:

Furnish the Town two mylar base maps at a scale of 1:12,000 and necessary blueline copies for use in making inventories.

IT IS MUTUALLY AGREED THAT

1. This Memorandum is effective on the date signed by the Town.

2. Each of the parties hereto agrees to commence to meet its agreed-to responsibilities forthwith and to continue to do so on a feasibly continuous basis until completed.

3. Assistance supplied to the town by a state or federal agency will be furnished in accordance with the agency's applicable authorities and policies, and contingent on the availability of funds and personnel.

4. This Memorandum shall not be construed to affect the jurisdiction of federal, state, or town government over federal, state or town-owned land that lies within the town limits.

5. Agency personnel and facilities shall be under the normal administrative jurisdiction of the agency involved.

6. This Memorandum may be modified or terminated at any time by mutual consent of the parties hereto.

7. Other agencies and parties may be made a party to the Memorandum by mutual consent and by supplementing this Memorandum.

TOWN OF _____

By: Board of Selectmen

_____

_____

_____

Date: _____

_____ Planning Board

By: _____

Title: _____

Date: _____

_____ Conservation Commission

By: _____

Title: _____

Date: _____

_____ Recreation Commission

By: _____

Title: _____

Date: _____

_____ Planning and Economic Development Commission

By: _____

Title: _____

Date: _____

_____ Extension Service

By: _____

Title: _____

Date: _____

Massachusetts Division of Conservation Services

By: _____

Title: _____

Date: _____

Massachusetts Division of Forests and Parks

By: _____

Title: _____

Date: _____

_____ Conservation District

By: _____

Title: _____

Date: _____

USDA, Soil Conservation Service

By: _____

Title: _____

Date: _____

Massachusetts Department of Food and Agriculture

By: _____

Title: _____

Date: _____

Massachusetts Division of Fisheries and Wildlife

By: _____

Title: _____

Date: _____

Massachusetts Division of Marine Fisheries

By: _____

Title: _____

Date: _____

APPENDIX C

SAMPLE INVENTORY MATERIALS

This appendix contains:

1. Inventory Descriptions for the following inventories:

Present Land Uses

- Agricultural Land Use
- Municipal Water Use
- Recreation Land Use
- Recreation Water Use
- Urban Land Use
- Wildlife Land Use
- Wildlife Wetland Use
- Woodland Use

Resource Conditions and Characteristics

- Prime and Unique Agricultural Lands and Agricultural Lands of Statewide and Local Importance
- Recreation Facilities Location
- Woodland Characteristics (in Woodland Inventory Description)
- Wetland Identification
- Areas of Pending Development
- Unique Items or Areas
- Historic and Archaeologic Sites or Areas
- Problem Areas
- Public and Quasi-Public Ownership
- Rough Land
- Woodland Suitability (in Woodland Inventory Description)

2. A sample Inventory Data Sheet

   Inventory Descriptions and Data Sheets for all inventories are available from the Soil Conservation Service, and are distributed to the inventory committees in the Organization Phase of the program.

3. A sample work map for field inventory

4. A sample final inventory map

5. A sample Present Land Use Map

AGRICULTURAL LAND USE INVENTORY DESCRIPTION

Inventory definition: All land areas that are used primarily for the production of some type of agricultural crop and are 3 acres or greater in size.

Where to find information: aerial photographs, town zoning maps, soil surveys, assessor's map, land use and vegetative cover maps (Massachusetts Map Down), field reconnaissance, and USGS topographic quadrangle maps.

Whom to consult for assistance: NRTT, assessors, and others.

Coding color: Yellow

Coding symbols:

1) Top line - Primary use symbol (A) and parcel number: (i.e. A-1, A-2, A-3 . . . etc.)

2) Bottom line

   a) First symbol - Type of agricultural land:

      T - Tilled or tillable crop land, which is or has been recently intensively farmed.

      P - Permanent grassland used for hay or pasture, or idle land usually mowed annually.

      O - Productive fruit orchards.

      AO - Abandoned orchards. In addition to the decadent fruit trees, grass and woody vegetation are abundant.

      N - Nurseries, including greenhouses and land adjacent to them as well as lands supporting horticultural specialties, ornamentals, shrubs and Christmas trees.

      C - Land in a productive specialty crop, such as cranberries or blueberries.

      AF - Abandoned fields, woody vegetation and grass are abundant, but tree crown cover is less than 30%.

b) Second symbol - Land ownership:

P - Privately-owned	M - State-owned
T - Town-owned	F - Federally-owned
C - County-owned	Q - Quasi-Public

Sample code:

$\frac{\text{A-1}}{\text{O-M}}$ - Parcel No. 1 of agricultural land which is a productive orchard on state-owned land.

Special instructions: Before field work, check preliminary delineations of agricultural land against soils interpretations for agricultural use. Where agricultural use occurs on soils with severe limitations, be particularly alert for problems. During field work, check for sediment, erosion, and waste disposal problems.

MUNICIPAL WATER USE — INVENTORY DESCRIPTION

Inventory definition; All water surface areas used for public-domestic supply, industrial use, power development, agricultural use, and other similar uses, and which are restricted for recreational uses. Includes ponds and reservoirs, fish hatcheries, and the land area used for well field sites.

Where to find information: town water reports, regional planning agency, town water department, consultant's reports.

Whom to consult for assistance: NRTT, local water department, fire department, board of health, and other local agencies.

Coding color: light blue

Coding symbols:

1) Top line - Primary use symbol (M) and parcel number:
(i.e. M-1, M-2, M-3 . . . etc.)

Note: Symbols are used for high yield well sites and well fields, small ponds, and fire ponds which otherwise would appear only as small dots on the inventory map

wells  farm ponds  fire ponds 

2) Bottom line

a) First symbol - Type of municipal water:

R - Reservoir for private and public water supply including standpipes

P - Farm ponds

H - Fish hatcheries

W - Wells or well fields

F - Fire ponds

C - Shellfish or fishing waters managed primarily for commercial production

b) Second symbol - Ownership:

P - Privately-owned

T - Town-owned

C - County-owned

F - Federally-owned

M - State-owned

Q - Quasi-public

Sample code:

$\frac{M-7}{R-M}$ - Parcel No. 7 of municipal water which is a state-owned water supply reservoir.

Special instructions: If 10% or more of the town area is not serviced by a multiple-user system, a survey of 5% of the infividual users is necessary to inventory the condition of individual home or industrial wells. This survey should be carried out in each of the separately-defined districts or areas of the community where individual systems are in use. To determine what questions are necessary, refer to the Resource Evaluation Sheet for Municipal Water.

The municipal water supply inventory map will be more useful to decision-makers if it also shows areas that are served by either a multiple-user system or individual wells. In this fashion relationships to existing town water and sewer networks may be more easily picked out when new municipal facilities are contemplated or if zoning changes are to be made. It should be kept in mind that the service areas are to be shown only on the municipal water supply map itself and not transferred to the Present Land and Water Use composite map. However, all other information on the Municipal Water base map should be transferred to the PLUM composite map.

Boundaries of multiple-user systems service areas should be delineated by a heavy broken line such as: 

Areas not included within this boundary are assumed to be served by individual wells unless otherwise noted.

Boundaries of the watersheds contributing to water supply reservoirs may also be delineated by a dotted line such as: 

The NRTT will provide assistance. This information will assist in evaluation of the impact of other land uses on the water supply.

Areas delineated as public water-supply well sites should include all public or utility-owned land within a 400-foot radius of the well or wells. Note if this 400-foot radius area is not in protected ownership.

All information required on data sheets should be obtained and recorded for town water-supply reservoirs outside of the town boundaries. However, these parcels will not be shown on the map. The community may also wish to take stock of protected watershed lands outside of the town boundaries to determine the adequacy of their protection.

RECREATION LAND USE — INVENTORY DESCRIPTION

Inventory definition: all land areas which are used primarily for outdoor recreation, including wooded areas used primarily for extensive recreation such as hiking.

Where to find information: Natural Resource Inventory, and land use and vegetative cover maps.

Whom to consult for assistance: NRTT, local recreation commission, Mass. Division of Forests and Parks, and others.

Coding color; Yellow-green

Coding symbols:

1) Top line - General use classification code letter Z and parcel number:
(i.e. Z-1, Z-2, Z-3 . . . etc.)

2) Bottom line

a) First symbol - Type of recreation land:

C - Camping area

P - Picnicking area

X - Playgrounds (including small play areas, school playgrounds; and neighborhood playgrounds)

L - Playfields

M - Major parks

R - Neighborhood parks

W - Winter sports area (including skiing, sledding, ice skating, etc.)

G - Golf course (including 18-hole and 9-hole courses, driving ranges, Par-3 courses and driving ranges)

S - Shooting clubs (including fish and game clubs, game raising areas and target ranges for archery, rifle, skeet and pistol)

N - Nature areas for nature study and outdoor laboratories

V - Vista, vantage point, or overlook

T - Trails

b) Second symbol - Land ownership:

P - Privately-owned
M - State-owned
T - Town-owned
F - Federally-owned
C - County-owned

Sample code:

$\frac{Z\text{-}17}{PT}$ - A town-owned recreation area, parcel 17, used only for picnicking

Note: The committee inventorying Recreation Land should complete the "Recreation Facilities Location" map as well.

RECREATION WATER USE — INVENTORY DESCRIPTION

Inventory definition: Those areas used primarily for some type of water associated recreation. Include perennial streams and rivers named on the USGS Quadrangle Sheets, lakes and ponds over 3 feet deep (except municipal water supplies), public pools, swimming beaches, navigational waters such as rivers, harbors, bays, nearshore channels, and anchorages, and fishing grounds.

Where to find information: aerial photographs, USGS Quadrangle Sheets, land use and vegetative cover maps, town recreation plans, Coast and Geodetic Survey Navigational Charts, state and private recreation area brochures, assessor's maps, Inventory of Ponds, Lakes, and Reservoirs (University of Massachusetts, Water Resources Research Center), and Inventory of Sites Having Natural Resource Use and Development Potential (Soil Conservation Service).

Whom to consult for assistance: Town or city engineer, recreation commission, conservation commission, board of health, sportsmen's clubs, NRTT, and others.

Coding color: Dark blue

Coding symbols:

1) Top line - Primary use symbol (R) and parcel number:
(i.e. R-1, R-2, R-3 . . . etc.)

2) Bottom line

a) First symbol - Water use permitted (one or more):

T - Beach	K - Water skiing
S - Freshwater swimming	W - Warm freshwater fishing
Ss - Saltwater swimming	C - Cold freshwater fishing
B - Freshwater boating	X - Saltwater fishing
Bb - Saltwater boating	Z - Shellfishing
H - Hunting	

b) Second symbol - Land ownership:

P - Privately-owned	M - State-owned
T - Town-owned	F - Federally-owned
C - County-owned	Q - Quasi-public

Sample code:

$\frac{R\text{-}3}{SWM}$ - Parcel No. 3 of recreation water which is state-owned and used for freshwater swimming, and warm freshwater fishing.

Special instructions:

A. For rivers used for warm water fishing, the surface area is estimated by the following procedure:

1. Divide the length of the river into "reaches" or sections of approximately uniform width.

2. Scale the length of each reach, in feet, from a USGS Quadrangle map.

3. Determine an average width, in feet, for each reach of the river.

4. Multiply the length of each reach times its average width and divide by 43,560 to obtain the area of the reach in acres.

$$\text{Surface Area of a Reach (Acres)} = \frac{\text{Length (Ft.)} \times \text{Average Width (Ft.)}}{43{,}560}$$

5. Enter on the Recreation Water Data Sheet. For Warm water fishing, tabulate these streams on this sheet and total the acres in all reaches to obtain the total river water surface acreage in the inventory area.

   Note: For cold water fisheries, length of stream or river is used, rather than area.

B. If temperature records are not available, a thermometer should be obtained for summer field work.

URBAN LAND USE INVENTORY DESCRIPTION

Inventory definition: All lands used for residential, commercial, industrial, institutional, and transportation purposes. This includes strip or linear developments along roads for a distance of 200 feet back from the road, turnpikes and interstate highways along the outside edge of the right-of-way, and farmsteads and other isolated structures (house, building, commercial establishment, etc.) for a distance of 100 feet in any direction from the building(s). Playgrounds and athletic fields are not included.

Where to find information: aerial photographs, USGS Quadrangle Sheets, zoning maps, assessor's maps, any previous land use survey, flood plain maps, drainage studies, water or air quality reports, personal knowledge, and field checks.

Whom to consult for information: NRTT, town engineer, board of health, Planning Board, building inspector, and others.

Coding color: Red

Coding symbols:

1) Top line - Primary use symbol (U) and parcel number: (i.e. U-1, U-2, U-3 . . . etc.)

2) Bottom line

   a) First symbol - Type of urban land:

      M - Mixed commercial, industrial and/or residential

      I - Industrial - both light and heavy

      C - Commercial

      R - Residential

      P - Public buildings, colleges, schools, hospitals, churches

      B - Cemeteries

      J - Junkyards

      G - Gravel pits (active or abandoned)

      T - Transportation - (publicly-owned or maintained roads, airports, etc.)

F - Farmstead

S - Sewage treatment or disposal areas, landfills

O - Urban open (open, undeveloped land which is lying idle)

UP - Urban open space (including town commons and beautification areas)

E - Urban estates

b) Second symbol - Land ownership:

P - Privately-owned

I - Private - Institutionally-owned

T - Town-owned

C - County-owned

M - State-owned

F - Federally-owned

Sample code:

$\frac{U-2}{T-P}$ - Parcel No. 2 of Urban Land which is a privately-owned airport.

Special instructions: In general, parcels should be areas of similar density and use characteristics. Examples might be: frontage development along a length of road, a subdivision, a residential area of several similar blocks, or an industrial park. Within a limited area of the town, buildings with similar characteristics, but over 200 feet apart, may be numbered and coded as a single parcel. However, computed acreage should only include the 100-foot radius area surrounding each building.

During field work, record evidence of pollution, erosion, sedimentation, and debris. Note storm drain outlets.

WILDLIFE LAND USE — INVENTORY DESCRIPTION

Inventory definition: Those areas, generally 3 acres or more, which are used primarily for the production or preservation of openland wildlife and woodland wildlife, including:

1) dedicated land which is committed to permanent wildlife use, such as Audubon land or state wildlife management areas.

2) non-dedicated land which is not committed to permanent wildlife use, but is currently managed primarily for wildlife.

3) Power lines and utility rights-of-way, with vegetation management.

Private shooting club lands are not included as wildlife land as they are considered under recreation land.

Where to find information: land use and vegetative cover maps (Massachusetts Map Down), topographic base map, assessor's map, Natural Resource Inventory (NRI), sporting clubs, private and quasi-public conservation organizations, and special studies by universities, Audubon Society, etc.

Whom to consult for assistance: NRTT (particularly the Division of Fisheries and Wildlife), municipal conservation commission, sportsmen's clubs, and others.

Coding color: Brown

Coding symbols:

1) Top line - Primary use symbol (B) and parcel number: (i.e. B-1, B-2, B-3 . . . etc.)

2) Bottom line

   a) First symbol - Type of vegetative cover:

      T - Tilled land

      TU - Unused tillable land without woody vegetation

      P - Pasture or wild hayland

      AF - Abandoned field with less than 30% woody vegetation

      O - Productive fruit orchard

      AO - Abandoned orchard

S1 - Softwood forest - height Class 1 (< 20 ft.)

S - Softwood forest - height class greater than 1

He - Heath plant communities (coastal areas only)

H1 - Hardwood forest - height Class 1 (< 20 ft.)

H - Hardwood forest - height class greater than 1

HS1 - Hardwood-Softwood Mixture, with hardwoods predominant - height Class 1

HS - Hardwood-Softwood Mixture, with hardwoods predominant - height class greater than 1

SH1 - Softwood-Hardwood Mixture, with softwoods predominant - height Class 1

SH - Softwood-Hardwood Mixture, with softwoods predominant - height class greater than 1

Sa - Sand areas (coastal area only)

PL - Power lines and pipe lines

Sc - Scrub vegetation such as bayberry, beach plum, scrub oak (coastal area only)

b) Second symbol - Land ownership:

Pc - Privately-owned land with its principal use being for wildlife and which is not available for public use

Po - Privately-owned land with its principal use being for wildlife and which is available for public use

Q - Privately-owned wildlife land (conservation foundations, trusts, long-term conservation restrictions, easements with individuals, etc.) dedicated for wildlife and available for public use

R - Privately-owned wildlife land (conservation foundations, trusts, long-term conservation restrictions, and easements with individuals, etc.) dedicated for wildlife and not for public use

T - Town-owned wildlife land

C - County-owned

M - State-owned

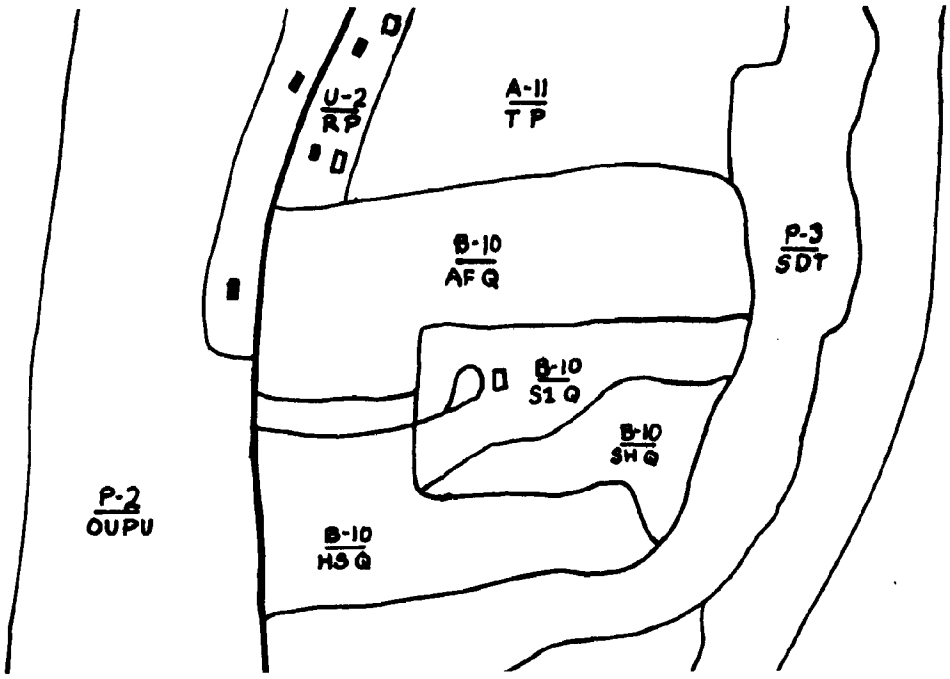
F - Federally-owned

Sample code:

$\frac{\text{B-15}}{\text{SH-Pc}}$ - Parcel No. 15 of wildlife land which is a softwood-hardwood mixture, with softwoods predominant with a height class greater than 1 on private land that is not open for public use.

Special instructions: Parcels will normally coincide with ownership or management units.

A single parcel may contain more than one type of vegetative cover and should be so recorded on the data sheet. The area of each vegetative type should be delineated on the map. These different vegetative types would be coded with the same parcel number, but with the particular appropriate vegetative type code, In the example below, parcel B-10 consists of four different vegetative types.



During field work note:

1. Evidence of other uses - e.g. hiking, camping

2. Posting or other evidence of limited access or use

3. Presence of outside disturbance - e.g. noise, off-the-road-vehicles, excessive recreational, use, abutting urban development

WILDLIFE WETLAND USE — INVENTORY DESCRIPTION

Inventory definition: Those areas, generally 3 acres or greater, which are used primarily for the production or preservation of wetland wildlife and aquatic animals other than fish. Wildlife wetlands include seasonally-flooded basins or flats and areas that have water at or above the surface (to a maximum of 3 feet) for more than nine months of the year. (An exception to this would be occasional bodies of water such as the kettle holes in Barnstable County that may be greater than 3 feet in depth, these bodies of water should be classified as deep marsh).

Shooting clubs and fish and game clubs for the club memberships' exclusive use, working cranberry bogs, or wooded areas with more than 30% tree crown cover are not considered as wildlife wetlands. Cranberry bogs are mapped under agricultural land use. Wooded wetlands with more than 30% tree crown cover are mapped under woodland use. These are also included on the separate Wetland Identification Map.

Where to find information: aerial photographs, land use and vegetative cover maps, soil surveys, Natural Resource Inventory, USDI Circular No. 39, assessor's maps.

Whom to consult for assistance: NRTT (particularly the Division of Fisheries and Wildlife, Division of Marine Fisheries, and the Soil Conservation Service), municipal conservation commission, sportsmen's clubs, and others.

Coding color: Tan

Coding symbols:

1) Top line - Primary use symbol (X) and parcel number: (i.e. X-1, X-2, X-3 . . . etc.)

2) Bottom line

   a) First symbol - Type of wetland:

      SM - Shallow marsh

      DM - Deep marsh

      SS - Shrub swamp

      SF - Seasonally-flooded basin or flat

      BP - Beaver pond

      B - Bog

      M - Meadow

      TSM - Tidal salt water marsh

b) Second symbol - Land ownership:

P - Privately-owned land not open to the public

Q - Privately-owned land available for public use

T - Town-owned

C - County-owned

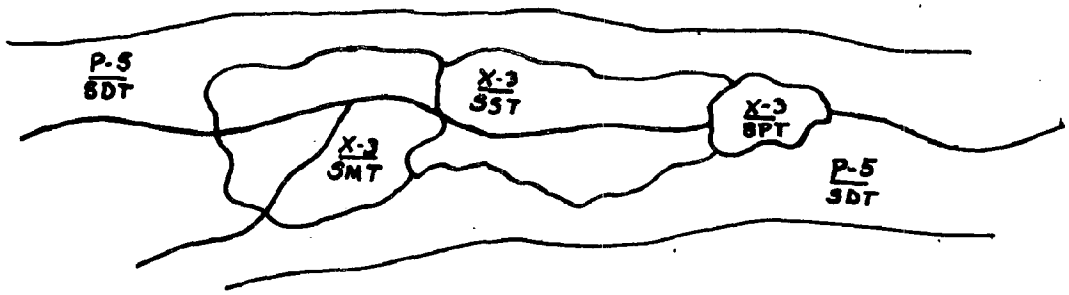
M - State-owned

F - Federally-owned

Sample code:

$\frac{X\text{-}5}{SM\text{-}P}$ - Parcel No. 5 of Wildlife Wetland which is a privately-owned shallow marsh not open to the public.

Special instructions: A single wetland parcel may contain more than one type of wetland and should be so recorded on the data sheet. The area of each type should be delineated on the map. These different wetland types would be coded for the particular type, but would bear a common parcel number. In the example below, parcel X-3 consists of 3 different wetland types.



During field inventory, check for:

1. evidence of pollution
2. presence of threatened or peripheral plants and animals
3. posting or other signs of controlled access or use.

Lineal and areal measurements may be estimated in the field or determined from the map at a later time.

A "protected border" is a strip of land in woodland, wildlife land, or agricultural use that acts as a buffer to the wetland and may or may not be formally protected.

WOODLAND INVENTORY DESCRIPTION

Inventory definition: All woodland areas, generally 10 acres or greater in size, that have an estimated 30% or greater tree crown closure and that are used primarily for growing trees, are to be inventoried. Where scattered residences or farm buildings are located in woodland areas, the structures and the immediate area within 100 feet of the structure in all directions, are considered to be 'Urban Land' and are not to be included with the "Woodland." Forested wetlands with over 30% tree crown cover are mapped under woodland use, but show as wetlands on the separate wetland identification inventory map.

Where to find information: Aerial photographs, USGS Quadrangle Sheets, town maps, Land Use and Vegetative Cover Maps, i.e. "Massachusetts Map Down" maps, and Soil Conservation Service operational soil survey interpretive maps prepared for towns.

Whom to consult for assistance: The Natural Resources Technical Team (NRTT) especially the local representative of the Massachusetts Division of Forests and Parks--member of the NRTT, the town tree warden, and others.

Coding color: Green when transferred to the composite "Present Land and Water Use Map" (PLUM).

Inventory and mapping procedure: The woodland inventory consists of preparing three maps. The three maps have been devised to make the inventory job, mapping, coding and recording data easier. The first of these maps, MAP I is the "WOODLAND USE MAP." The second, MAP II is the "WOODLAND CHARACTERISTICS MAP." The third, MAP III, which is optional, is the "WOODLAND SUITABILITY MAP" based on soils data.

MAP I, "WOODLAND USE MAP" - This map will show several general uses of woodlands and will be used in making the "Present Land and Water Use Map" (PLUM) and for rating the woodland resource. The map should be used in conjunction with the data recording sheet entitled, "Data Sheet for Inventory Map I" - "Woodland Use Map." The map and the data sheet will facilitate evaluating the "quantity" of the woodland resource.

The protective functions or uses of the woodland are categorized as the "Stream Corridor Protection Woodlands" and "Watershed and Critical Areas Protection Woodlands." They are delineated and coded on the map. Woodlands with protective functions serve to prevent soil erosion, maintain water quality, stabilize water yield or flow, etc. Along stream corridors, woodlands serve to protect the stream, its water quality, enhance fish habitats, etc. The remainder of the woodland which serves to enhance the general public welfare in numerous ways will be categorized as "Other Woodland." This general use of woodland also is delineated and coded on the map.

For a base or work map, a blueline print of a topographic map (USGS Quadrangle Sheets) of the town is used. For field work, outline the streams on the base map in a prominent color. Delineate, number, and code the wooded portions of streams on either side of the streams, outlined in color, for the defined distance (see below) beyond the streambanks at right angles to them. Also subdividide, number, and code on the map other woodland parcels in accordance with these two categories: 1) "Watershed and Critical Area Protection Woodland" and 2) "Other Woodland." While entering coded information on the map, it is also important to record appropriate data on the "Data Sheet" for Map I.

Especially helpful as sources of information for making this map are town operational soil survey maps, the "Land Use and Vegetative Cover Maps" - "Massachusetts Map Down," aerial photographs (especially stereoscopic pairs), and Town Assessors' maps. The town tree warden and the local representative of the Massachusetts Division of Forests and Parks may have helpful information to aid in the preparation of this map.

Symbols for MAP I

1. Top line of coded information -

   General land use classification and the number of the parcel: i.e. P-1, P-2, P-3, etc.

2. Bottom line of coded information -

   First symbol - "Other Woodlands"

   O - OTHER WOODLANDS OR

   First symbol - Type of "protection" woodland:

   S - STREAM CORRIDOR PROTECTION WOODLAND - Those woodlands located along streams that provide a protective zone to the stream. For those areas where the streams flow through forests delineate a strip 150 feet on each side of the stream beyond its banks as stream corridor protection woodland.

   The 300-foot zone of a stream is exclusive of its normal channel, but includes the wetlands adjacent to the normal (confined within streambanks) stream flow.

   P - WATERSHED AND CRITICAL AREA PROTECTION WOODLAND - Those woodland areas that directly or indirectly meet one of the following conditions:

   .Watershed Protection Woodland - Those woodland areas that drain into a public water supply. This will include wooded areas that drain into surface reservoirs as well as wooded areas that serve to protect well fields used for public water supply.

.Woodland on Very Steep Slopes - Those areas that are found on 25% slopes or greater where trees serve to keep soil from eroding.

.Woodland on "thin" soils - Those woodland areas that serve to prevent soil erosion where bedrock is at or very close to the surface of the land.

FOR ALL WOODLAND USES OR TYPES - "Other Woodland" and "Protection Woodland":

Second symbol - Woodland status:

D - DEDICATED WOODLAND - Those woodlands that occupy areas that are reserved for public purposes and may include nature areas, town forests, pr areas reserved for some other dedicated woodland conservation purpose.

U - WOODLAND NOT DEDICATED - Those woodlands not dedicated for any of the above purposes.

Third symbol - Woodland ownership:

P - Privately-owned

T - Town-owned

C - County-owned

S - State-owned

F - Federally-owned

FOR "OTHER WOODLAND" only.

Fourth symbol - Woodland treatment:

M - Managed primarily for a specific purpose

U - Unmanaged woodland

Sample Codes:

$\frac{P-1}{SDT}$ - Protection woodland parcel No. 1 that is protecting a stream, is reserved for public purposes, and is town-owned.

$\frac{P-32}{OUPU}$ - "Other woodland" parcel No. 32 that is not reserved for public purposes, is a privately-owned and unmanaged woodland.

MAP II - "WOODLAND CHARACTERISTICS MAP" - This map is somewhat general in nature and when used in conjunction with the "Data Sheet for Inventory Map - II," Woodland Characteristics Map, it will facilitate evaluating the "quality" of the woodland resource.

The map and the data sheet provide information such as delineated woodland parcels, woodland accessibility, woodland composition, numbers of species, growth characteristics, woodland vigor, and tree "stand" condition. Also included is other information on management factors such as degree of stocking, compatible woodland uses, and areas of threatened and peripheral plant and animal species.

For a base map or field work map, a blueline print of topographic maps (USGS QUADRANGLE SHEETS) of the community should be used. As a guide and an aid in preparing MAP II, utilize the "Land Use and Vegetative Cover Maps" (Massachusetts Map Down), aerial photographs, and other town maps or studies, over and above actual field work done.

For field work, divide the town into sectors which are convenient for the organization of the field inventory work. Sectioning the town should be based on identifiable physical features and/or existing road systems. An easy access to each sector should be available. On MAP II and the corresponding "Data Sheet" number each of the woodland parcels in each sector to be inventoried on foot or by vehicle and record data appropriate to the map or data sheet. Proceed from sector to sector in an orderly fashion numbering the parcels in each sector consecutively until the entire "Woodland Characteristics" inventory is completed.

Symbols for MAP II

1. Top line of coded information -

   General land use classification and the number of the parcel within a sector of the town: i.e. W-1, W-2, W-3, etc.

2. Bottom line of coded information -

   First symbol - Diversity of woodland types:

   M - Mixed stand of hardwoods and softwood types (a mixture is considered such if no less than 20% of each type is found in the stand)

   P - Generally pure stands of either hardwoods or softwoods or plantations of single species.

   Second symbol - Diversity of woodland species:

   D - Diverse, four or more hardwood or softwood species of trees present in the parcel

   S - Somewhat diverse, two to three species

   N - Not varied, only one species found in the parcel (plantations or pure stands)

Sample Codes;

W-1 / MCD - Parcel No. 1 of the woodland characteristics map in which there is: a mixed stand of hardwoods and softwoods, 20% or more of each type; a number of tree height classes (3 or more); a number of tree species (four or more) that characterize the stand.

Third symbol - Diversity of woodland height classes:

A - A plantation of uniform height or a seedling of young tree or intermediate tree, or mature stand of uniform height is characteristic of the stand (one height class) and is present in the parcel.

B - Any combination of two height classes (i.e. seedling - inches to 1 foot; young trees - 1 foot to 20 feet; intermediate trees - 20 feet to 40 feet; mature trees - 40 feet in height) is present in the parcel.

C - Three or more height classes as defined in "B" above, are present in the parcel. The stand is characterized as having uneven tree heights.

MAP III - "WOODLAND SUITABILITY CLASSES MAP" - This map is made using the operational soil survey with its interpretive maps and report. The soils map scale should be adjusted to fit the topographic map blueline print used as a base map. The map is optional and if desired, it can be prepared with guidance from the appropriate Natural Resources Technical Team member and graduate student assisting the town. Essentially, the map will show the "Woodland Suitability Classes" that exist in the town and how the existing woodland is distributed within each class. Once the classes have been delineated on the base map, or a transparency of delineated areas prepared, the delineated areas will constitute parcels that can be numbered consecutively.

This map and the corresponding "Data Sheet" for MAP III entitled, "Suitability Classes for Woodland," when completed will facilitate evaluating the "quality" of the woodland resource, and assist in planning for woodland management.

If this MAP III is not prepared, the woodland suitability class information may be obtained by following an alternative procedure explained on the "Data Sheet" for MAP III (see "note" there).

PRIME AND UNIQUE FARMLANDS AND FARMLANDS OF STATEWIDE AND LOCAL IMPORTANCE

INVENTORY DESCRIPTION

Inventory definition: All lands of high productive use or potential for agriculture, based on soils or present use.

Where to find information: Detailed soils maps, Operational Soils Report, and agricultural land inventory. The Soil Conservation Service will provide lists of soils that meet the necessary criteria.

Whom to consult for assistance: Soil Conservation Service, local farmers and farm organizations, and tax assessors.

Coding: Selected reproducible patterns ("zipatone" or similar material, or hand drafted) on mylar overlay,

OR

Selected colors on a paper base map or paper detailed soils map.

Classifications: (Select patterns or colors, as appropriate)

Prime Farmland

Prime farmland is land best suited for producing food, feed, forage, fiber, and oilseed crops, and also available for these uses (the land could be cropland, pastureland, rangeland, forest land, or other land, but not urban built-up land or water). It has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops economically when treated and managed, including water management, according to modern farming methods.

Unique Farmland

Unique farmland is land other than prime farmland that is used for the production of specific high-value food and fiber crops. It has the special combination of soil quality, location, growing season, and moisture supply needed to produce sustained high quality and/or high yields of a specific crop when treated and managed according to modern farming methods. Examples of such crops are cranberries, fruit, and vegetables.

Additional Farmland of Statewide Importance

This is land, in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oilseed crops.

Additional Farmland of Local Importance

In some local areas there is concern for certain additional farmlands for the production of food, feed, fiber, forage, and oilseed crops, even though these lands are not identified as having national or statewide importance.

Special Instructions:

1. From the Soil Conservation Service, obtain the detailed soils map and a list of all the soils for the community which meet the above criteria.

2. On a paper print of the soils map, directly color or code the listed soils.

3. Overlay a mylar or paper base map on this soils map, outline the colored soils, and apply the selected pattern or color.

   NOTE: The above three steps can be completed before or during the Agricultural Land Use Inventory. The following must be done following that inventory.

4. Overlay the above map on the Present Land Use Map or Agricultural Land Use map and delineate any additional areas of Unique Farmland or Farmland of Local Importance.

5. Overlay the above map on the Present Land Use Map to determine:

   a. Areas not now in agricultural use, with potential for conversion to agriculture.

   b. Areas of potentially or previously productive soils that have been converted to urban use.

RECREATION FACILITIES LOCATION INVENTORY DESCRIPTION

Inventory definition: This map shows the site location of the different types of public and private recreation facilities which are presently available in the town. Land and water areas associated with most of these facilities will be shown on the "Recreation Land Use Inventory Map" or "Recreation Water Use Inventory Map."

Where to find information: It is recommended that the same committee preparing the "Recreation Water Use" or "Recreation Land Use" Inventory Maps also prepare this map. Much of the information required for both maps can be collected at the same time.

Whom to consult for assistance: NRTT, local Conservation Commission, and Massachusetts Division of Forests and Parks, Recreation Commission, and others.

Coding Pattern: for small areas: ⊙ or similar point symbol as desired.

for larger areas: outline crosshatch, or color, as desired.

for trails and paths: Indicate bicycle paths with a solid line, showing the route on the map. Show nature walks, hiking, and cross-country skiing available for public use) with a long dashed line. Show bridle paths (available for public use) with a short dashed line. Show motorized recreation vehicle trails (available for public use) with a dashed line.

Coding Symbol:

1) Top line

   a) First symbol - Facility number

   b) Second symbol - Type of facilities (one or more)

      A - Courts for tennis, volleyball, basketball, etc.

      B - Boat ramp or boating access

      C - Camping sites

      D - Diamonds for baseball and/or softball

      E - Fields for football and/or soccer

      F - Fireplaces

      I - Ice skating (managed areas)

J - Totlot facilities (sandbox, swings, slides, wading pools, etc.)

K - Sledding and/or tobagganing

L - Track facilities

M - Marinas

P - Picnicking facilities

R - Riding ring

S - Swimming (either pool or beach)

T - Target range and/or skeet area

U - Sanitary facilities

V - Vistas, vantage points or overlooks

W - Parking area for recreation facilities

X - Roadside or trailside rest area

Y - Cross country skiing facilities

Z - Downhill skiing facilites

2) Bottom line - Ownership

P - Private	M - State
T - Town	F - Federal
C - County	Q - Quasi-Public

Sample Code:

$\frac{1\text{-}B,\ 5}{M}$ - Site No. 1 is a state-owned boat access with swimming available. (Other pertinent information, such as name of water body, type of boat access, and size of swimming area would be listed on a "Data Sheet.")

Special Instructions: Determine the location of each facility and denote the location on a base map, as close to the exact area as possible, by using a press-on dot or other symbol. Beside each symbol place a number to identify that particular facility and the appropriate code letter(s). Fill in appropriate information on the "Data Sheet."

WETLAND IDENTIFICATION INVENTORY DESCRIPTION

Inventory definition: This map shows the general location and type of all wetlands above a size limit determined by the community, including marshes, swamps, bogs, wet meadows, and other areas where ground water is at or near the surface for a significant part of the year. Wooded swamps, wet soils in agricultural use, and wetlands in recreational use are not included on the Wildlife Wetlands Use Map, but are shown on this map.

Areas mapped include:

1. Wetland soils classified as "poorly drained" or "very poorly drained" in the community's operational soils report. In poorly drained soils, the water table is commonly at or near the surface for 7 to 9 months of the year. In very poorly drained soils, the water table remains at or near the surface most of the time.

   AND (if additional field work is conducted by the community)

2. Coastal and Freshwater Wetlands as defined in the Massachusetts Wetlands Protection Act (Mass. G.L. Ch. 131, S. 40). The Act defines Coastal Wetlands as "any bank, marsh, swamp, meadow, flat or other lowland subject to tidal action or coastal storm flowage." Freshwater Wetlands are defined as: "wet meadows, marshes, swamps, bogs, areas where ground water, flowing or standing surface water or ice provide a significant part of the supporting substrate for a plant community for at least five months of the year; emergent and submergent plant communities in inland waters; that portion of any bank which touches an inland waters." Specific wetland types are further defined in the Act by their plant communities.

This map, in itself, has no regulatory force. Actual jurisdiction of the Wetlands Protection Act is determined on a site-by-site basis by the municipal Conservation Commission.

The map may be used by the community in the Planning and Implementation Phase of the MNRPP:

- as a component of a Sensitive Areas Map,

- as the first step in development of a Wetlands Zoning District Map,

- as an aid in planning for conservation land acquisition and wildlife habitat improvement

- if combined with the best flood plain map available, to identify areas probably under the jurisdiction of the Wetlands Protection Act. Copies might be provided to the Planning Board, Board of Health, Department of of Public Works, and Building Inspector to guide them in referring project proposals to the Conservation Commission.

Where to find information: Detailed soils map, Operational Soils Report, Wildlife Wetlands Use Inventory, Massachusetts Map-Down Maps, USGS topographic base map, aerial photographs, special studies and consultants reports, USDI Circular No. 39.

Whom to consult for assistance: Conservation Commission, NRTT (particularly the SCS), local biologists, naturalists, and botanists.

Coding: Selected colors on a paper topographic base map,

or

Selected reproducible patterns ("zipatone" or similar material, or hand drafted) on a plain mylar sheet, registered to a mylar topographic base map.

Coding symbols: (if desired)

1) Top line - parcel number

2) Bottom line

a) First symbol - Type of wetland:

SM - Shallow marsh	BP - Beaver pond
DM - Deep marsh	B - Bog
WS - Wooded swamp	M - Meadow
SS - Shrub swamp	TSM - Tidal salt water marsh
SF - Seasonally-flooded basin or flat	TF - Tidal flat

b) Second symbol - Land ownership:

P - Private	C - County
R - Private land under Conservation Restriction, easement, or Restrictive Order	M - State
	F - Federal
Q - Quasi-Public	

Sample code:

$\frac{5}{SM\text{-}P}$ - Wetland Parcel No. 5 which is a privately-owned shallow marsh.

Special Instructions: Steps one through six below can best be done before field work for the Wildlife Wetlands Use Inventory and will help in preparation for that inventory. Field work for both inventories may then be done concurrently.

1. Obtain a paper copy of the detailed soils map from the SCS.

2. Prepare a list of poorly drained and very poorly drained soils for the community from the operational soils report.

3. Color all soils fitting these classifications on the soils map. Use separate colors for each drainage class.

4. If the soils map is not on a topographic base, trace the identified wet soils boundaries onto a print of the topographic base map and color as appropriate.

5. Delineate and color any additional wetlands shown by swamp symbols on the topographic base map.

6. Overlay this map on the Massachusetts Map-Down and add any additional wetlands to the working map.

7. Field check by inventory volunteers to verify approximate boundaries and wetland types. If map is to be used to assist in administration of the Wetlands Protection Act, the Conservation Commission should be involved in the field checks, and boundaries should be checked in light of the legal definitions and plant communities.

8. Draft final map onto a plain mylar sheet or a reverse printed mylar topographic base, for future reproduction and continued updating.

AREAS OF PENDING DEVELOPMENT — INVENTORY DESCRIPTION

Inventory definition: This map shows proposed road construction or relocation and areas within a community that are approved for specific development projects. This will include:

1) Sites with currently valid building permits for new structures.

2) Approved and currently valid subdivisions, for which subdivision approval was required.

3) Approved and currently valid subdivisions for which subdivision approval was not required (frontage lots meeting all zoning requirements).

4) Proposed road and highway construction or relocation.

5) Other development and construction projects known to be approved or pending.

Where to find information: Subdivision Plans, Building Inspector's files, Registry of Deeds, Assessor's maps, Department of Public Works.

Whom to consult for information: Planning Board, Building Inspector, Local and Massachusetts Department of Public Works.

Coding Pattern: Selected patterns on a mylar overlay ("Zipatone" or similar material, or hand drafted).

Coding Symbol:

1) Top line

   a) First symbol - parcel number (record also on a data sheet)

   b) Second symbol - projected use (use Urban Land Inventory coding)

2) Bottom line - for subdivisions only -

   Number of approved undeveloped lots on plan (outline only entire subdivision)

Sample Code:

$\frac{3\text{-R}}{46}$ - Parcel No. 3, which is a residential subdivision of 46 lots.

Special Instructions: For subdivisions, parcel boundaries should approximate property lines of undeveloped area, but precision is not necessary. Individual lots within subdivisions need not be delineated. For isolated individual lots with current building permits, a point symbol may be used.

UNIQUE ITEMS OR AREAS — INVENTORY DESCRIPTION

Inventory definition: Within a community, there are many items or areas which are generally considered by local residents to be unique or unusual. Although an item may be plentiful in other areas, it may be unusual in the local area.

Unique items could include:

a. Trees - The largest or oldest tree in the general vicinity or one of unusual shape or species.

b. Views - A panoramic view of something, the like of which is available nowhere else in the immediate area. For example: the view of the Connecticut Valley from the top of Mount Sugarloaf, or the view of Cape Cod from the top of Scargo Hill.

c. Buildings - An unusually constructed building. For example: an octagonally shaped house; a house of foreign architecture; a building made out of unusual materails; or one of unusual architecture.

d. Natural Area - A natural area containing unusual flora or fauna that are found nowhere else in the town or region of the state. For example: the only white cedar swamp in the immediate vicinity.

e. Landforms - An unusual geologic feature or shape. For example: the Gay Head Cliffs on Martha's Vineyard, a natural bridge, an escarpment, or an esker.

There may be other areas or items which could be considered unique in the town. The committee should include these items on the map legend and assign an appropriate code letter or symbol.

Where to find information: field observations, local citizen interviews, newspapers, tourist and promotional borchures, New England Natural Areas Inventory, local clubs and organizations, local schools and universities, and others.

Whom to consult for information: NRTT, local Conservation Commission, historical society, local citizens, New England Natural Resources Center, and others.

Coding pattern: For areas: crosshatching or a pattern of zipatone or similar material such as: 

For items: (point locations: symbol such as: "  "

For views: an arrow showing the direction and breadth of the view

Coding symbol:

1) Top line

   a) First symbol - item or area number

   b) Second symbol - type of item or area

      T - Trees N - Natural area (draw boundary lines)

      B - Buildings (add other codes, as necessary)

      L - Landform

   For views, use an arrow pointing in direction of view.

2) Bottom line - Ownership

      P - Private M - State

      T - Town F - Federal

      C - County Q - Quasi-public

Sample code:

$\frac{3\text{-}B}{P}$ - Site number 3 which is an unusual building, privately-owned. (Exact type, with other pertinent information, would be listed on a "Data Sheet").

HISTORIC AND ARCHAEOLOGIC SITES INVENTORY DESCRIPTION

Inventory definition: These are sites of historic or archaeologic significance, either local, regional, or national. Any sites included in the "National Register of Historic Sites" are to be included. Generally, these historic sites contain less than 5 acres. Larger areas, such as the "Minuteman National Park," would be included on the "Recreation Land Inventory Map." This map shows those sites of historic or archaeologic significance which should be preserved.

Historic sites could include:

a. Old mill dams, which may no longer be used, but are aesthetically pleasing.

b. Old mill buildings, either active or inactive, which would show mill operations a century or more ago.

c. Houses or other buildings of historic significance due to age or historical events connected with them.

d. Battle grounds or an area on which a historic event took place (such as the tree on which the last horse thief was hung).

e. Historic markers commemorating a particular event.

f. Archaeological sites, such as pre-columbian remains.

Where to find information: Local historic society, town citizens, town library, "National Register of Historic Places" - Federal Register, Vol. No. 39, No. 18 - Part II, p. 800.10, January 25, 1974, as supplemented, County Natural Resources Atlas, and others.

Whom to consult for assistance: Local historians, Historical Commission, local high school history department, colleges and universities, and others.

Coding: Selected location symbol such as: 

Coding symbol:

1) Top line

   a) First symbol - Site number

   b) Second symbol - Type of site

D - Mill dam	G - Battle grounds
M - Mill	H - Historic marker
B - House or building	(add other symbols, as necessary)

2) Bottom line - Ownership

P - Private	M - State
T - Town	F - Federal
C - County	Q - Quasi-Public

Sample Code:

$\frac{4\text{-H}}{P}$ - Site No. 4 which is a historic marker on private land. (Exact historic event denoted, with other pertinent information, would be shown on a "Data Sheet").

PROBLEM AREAS — INVENTORY DESCRIPTION

Inventory definition: "Problem Areas" include a wide range of situations that the community may wish to pinpoint for possible future action. Problem areas may be small in size and affect only a limited land or water area or may be large-scaled and affect an entire town or region. This inventory should also show significant problems identified in the course of the other NRPP inventories.

Some of the things that could be identified are:

a. Pollution from road drainage--either from salt and sand used on the road, or from erosion of road banks and ditches.

b. Pollution from individual residential septic systems--either due to unsuitable soils, faulty systems, or direct release to nearby surface waters.

c. Pollution from commercial or industrial wastes such as detergents from a laundry, oil and grease from service stations, or dirty waters released from a manufacturing process.

d. Trash heaps--generally small in area and often located behind commercial or industrial buildings or in wooded areas.

e. Old car bodies--either wrecked or abandoned and that are not in a screened junk yard. Unscreened junk yards could be included in this category.

f. Noise pollution areas--such as noise from heavily traveled roads, airports, and manufacturing plants. In these areas noise is loud enough to be objectionable.

g. Sediment sources--such as high roadbanks which are eroding and sliding, streambanks which are undercutting and falling into streams, land under development which is bare and where soils are eroding, and coastal erosion areas.

h. Sediment deposition areas--areas where sediment is collecting in significant quantity; filling ponds, wetlands, or reservoirs; blocking stream channels or culverts; covering fields, lawns, or roads.

i. Dead or dying trees which could be a hazard to life or property.

j. Areas with local flooding, drainage problems, or flooded basements.

k. Unsafe and/or abandoned bridges, dams, and buildings

l. Over-used or deteriorating recreation facilities

Where to find information: Local residents, newspaper stories, requesting such information through the local paper, regional planning agencies, section "208" studies, NRPP data sheets, and others.

Whom to consult for assistance: Steering Committee, local boards, commissions, and departments, other NRPP inventory committees, and others.

Coding pattern: for small areas: (·) or similar symbol as desired.

for larger areas: outline, crosshatch, or color as desired.

Coding symbol;

1) First symbol - problem area number

2) Second symbol - type of problem:

R - Road drainage pollution

S - Septic system failure

T - Trash heaps

N - Noise

D - Sediment deposition areas

F - Dead trees

C - Local flooding and drainage problems

G - Deteriorating Recreation Facilities

W - Wastes (commercial or industrial)

E - Sediment sources

J - Car bodies

B - Unsafe bridges, dams, or buildings

(add others, as needed)

Sample code:

11-J - Problem Area No. 11 which contains old car bodies or a junk-yard. (Exact type of problem, with other pertinent information, should be listed on the "Data Sheet").

PUBLIC AND QUASI-PUBLIC OWNERSHIP INVENTORY DESCRIPTION

Inventory definition: Lands owned or administered by a public or quasi-public agency or organization, or private lands under a Conservation Restriction or similar easement.

Where to find information: Municipal assessor's maps, local boards and commissions, USGS Quadrangle maps, and other NRPP inventory maps.

Whom to consult for assistance: NRTT, Conservation Commission, Planning Board, Assessor, quasi-public organizations, and others.

Coding pattern: A selected pattern of zipatone or similar material on a plain mylar overlay or selected color on a paper base map.

Coding symbol:

1) First symbol - parcel number

2) Second symbol - type of ownership or restriction

T - Town-owned	R - Trustees of Reservations
C - County-owned	N - Nature Conservancy
S - State-owned	M - Metropolitan District Commission
F - Federally-owned	P - Privately-owned lands, under a Conservation Restriction or easement)
A - Audubon	

(add other codes, as necessary)

Sample Code:

7-A - Parcel No. 7 which is land owned by the Audubon Society (other pertinent information on this panel would be listed on a "Data Sheets").

ROUGH LAND — INVENTORY DESCRIPTION

Inventory definition: Those lands which are steep, ledgy and extremely rocky, or extremely droughty.

Steep lands are those lands where the average slope is over 15 percent (15 feet of rise in 100 feet of distance). Steep slopes are shown in the following two categories: slopes between 15% and 25% and slopes over 25%. These lands are subject to erosion and runoff management problems if disturbed. They require extensive grading for most development, and are unsuitable for normal septic system installation.

Ledgy and extremely rocky lands are those lands on which the bedrock is exposed, the soils are shallow to bedrock, or boulders or cobbles cover over 50% of the ground surface. (Grading excavation and septic system installation are difficult on these lands).

Extremely droughty soils are those soils which are excessively well drained and through which water moves rapidly. An example would be the sand dunes on Cape Cod. These soils form unstable banks and are difficult to revegetate if disturbed.

Where to find information: Latest USGS Quadrangle maps, town operational soils report, aerial photographs, and field observations.

Whom to consult for assistance: NRTT (particularly the SCS) and others.

Coding Patterns:

1) Selected colors on a paper print of the detailed soils, map or

2) For a final map that can be reproduced and used as an overlay, selected reproducible patterns on a plain mylar. Patterns may be hand drafted or applied with zipatone or similar material.

Special Instructions:

1) Prepare a list of the soils found in your community that meet the above criteria for Rough Lands. The NRTT will provide assistance.

2) Obtain a paper print of the detailed soils map for your community. In consultation with the NRTT (particularly the SCS), color in the soil types fitting these criteria.

3) Overlay a plain mylar sheet on this colored map, trace necessary roads and other landmarks and registration marks, and trace the boundaries of the soils onto the mylar. Draft or apply selected patterns, title, and legend.

Note: Steep slopes can also be identified using a topographic map. The NRTT can explain this alternative procedure.

DATA SHEET FOR INVENTORY MAP

Agricultural Land

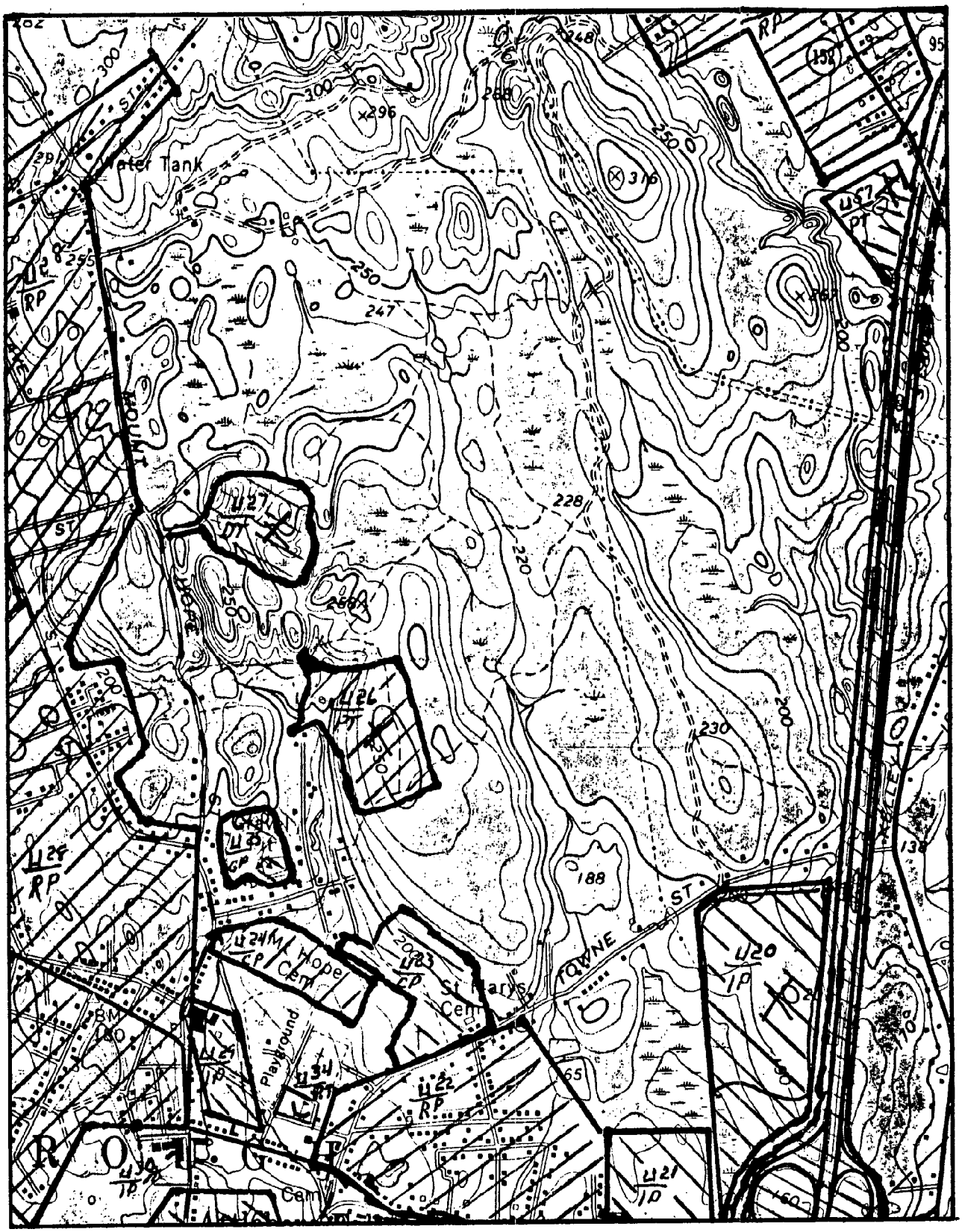
Sheet 1 of 1

For details refer to Resource Evaluation Sheets

Parcel No.	Total Area	TYPE OF AGRICULTURAL LAND					Amount of soils with slight limitations	Amount under conservation	Farms with Pollution Problems			Area Open to public	Amount rated as "Good" Wildlife Habitat	Land Ownership (Use Coding Symbol)
		Cropland (T)	Grassland (P)	Orchard (O)	Nursery (N)	Cranberry Bog (C)			Waste Disposal	Fert. and Pest.	Sediment and Erosion			
"A"	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Yes or No	Yes or no	Acres	Acres	Acres	Type

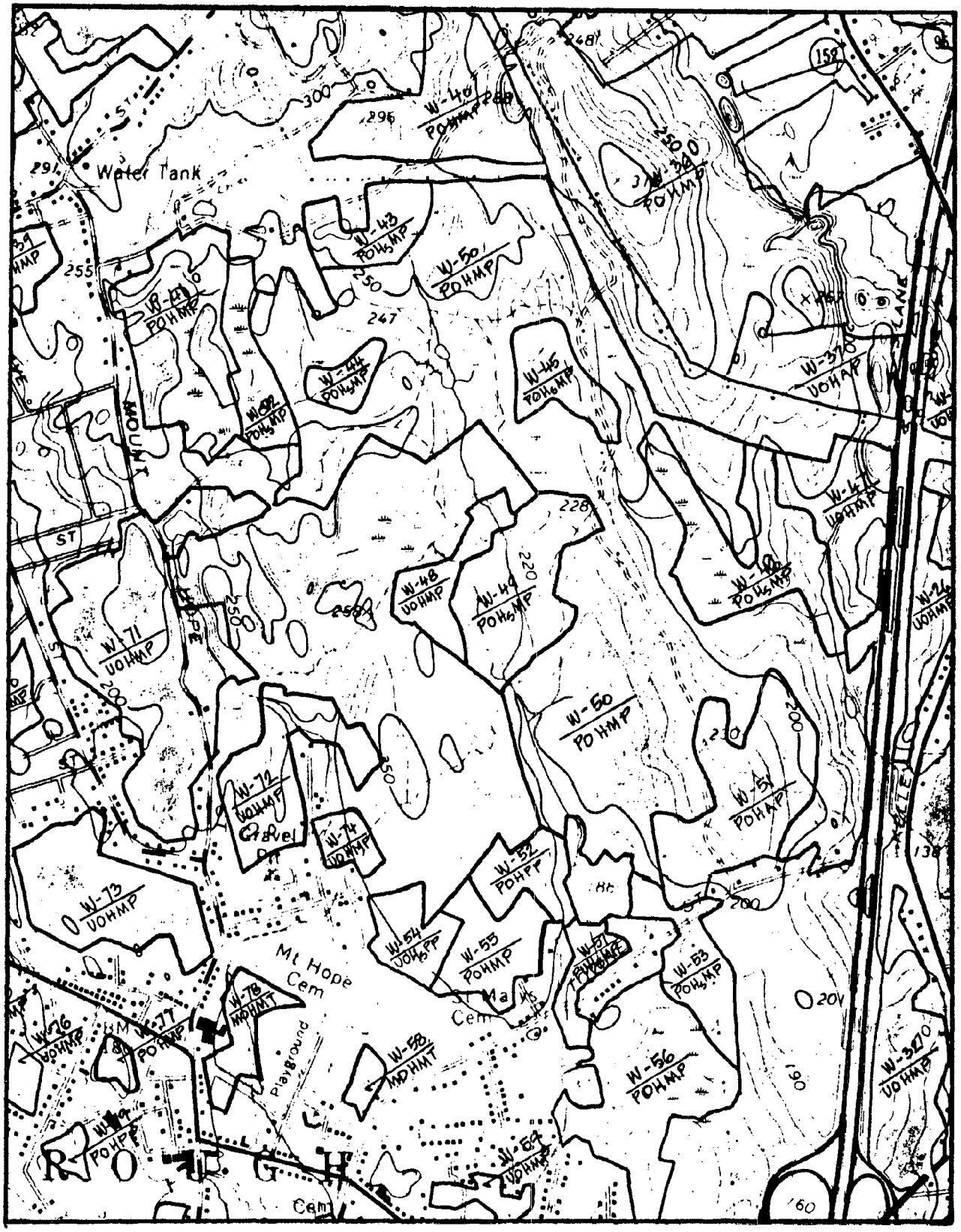
SAMPLE DATA SHEET

SAMPLE WORK MAP FROM FIELD INVENTORY



SAMPLE FINAL INVENTORY MAP

SAMPLE PRESENT LAND USE MAP



APPENDIX D

SAMPLE NATURAL RESOURCE EVALUATION SHEET

As an aid to the community in evaluating the information compiled in the inventory phase, committees are provided with Natural Resource Evaluation Sheets for the 8 primary land and water use inventories. These sheets are designed to assist the committees to summarize and evaluate the inventory information. They contain a series of questions for the committee to answer that will help to raise issues, and to identify problems, needs, and potentials for action. Much of the required information is collected by field and map work, but some may come from community officials or others and from library reference sources.

The questions on the Resource Evaluation Sheets concern the quantity, quality, and distribution of the land uses or resources inventoried and also suggest consideration of town policies and plans. These sheets also provide the community with the opportunity to compare its land use characteristics with the suggested guidelines. These guidelines are discussed in Chapter 4 and explained in "Rationale" provided for each Resource Evaluation Sheet. The guidelines have been developed through the research and experience of professional natural resource managers and can provide valuable guidance for land use decisions.

When completed, the Resource Evaluation Sheets provide the basis for an Inventory Report as described on page 4-7. A Sample Resource Evaluation Sheet for Agricultural Land follows and the associated Rationale for Guidelines are found in Appendix E. Resource Evaluation Sheets for the following eight primary land and water use inventories can be obtained from the Soil Conservation Service:

Agricultural land
Recreation land
Recreation water
Municipal water
Urban land
Wildlife land
Wildlife wetland
Woodland

RESOURCE EVALUATION SHEET

AGRICULTURAL LAND

I. QUANTITY - The questions below will highlight trends and the current status of the quantity of agricultural land use in your community. Comparison of past and present figures for acreage will indicate the rate of overall change. The "suggested guideline" provides a guide based on average figures for the region concerned and considering the several environmental values of agricultural land. See the attached Rationale for detailed explanation.

Total land area of town = _____ acres

Total population of town = _____ persons

A. Past Agricultural Land Use from MASS Map Down figures:

1951: _____ acres _____% of total land area of town

1971: _____ acres _____%

B. Present Agricultural Land total from inventory:

(year _____) _____ acres _____%

C. Suggested Guideline (select guideline for appropriate area)

1. For Central Highlands Area: 50 acres agricultural land/1000 acres total area plus 35 acres agricultural land/1000 population

a. $\frac{\text{total town area} \times 50}{1000} = \frac{\qquad \times 50}{1000}$ _____ acres

b. $\frac{\text{total population} \times 35}{1000} = \frac{\qquad \times 35}{1000}$ _____ acres

c. Total suggested agricultural land area = (a. + b. above) _____ acres

or

2. For Coastal Area: 30 acres agricultural land/1000 acres total land area

$\frac{\text{total town area} \times 30}{1000} = \frac{\qquad \times 30}{1000}$ _____ acres

3. Surplus or deficiency of agricultural land = _____ acres

II. QUALITY - The questions below focus on qualitative issued related to your community's agricultural land use.

A. Soils: The productivity, environmental impact, and economic viability of agricultural land use is based in part on the nature of the supporting soils. The higher the degree of limitation for agricultural use, the more intensive the management required to obtain optimum yields or prevent erosion and sediment production.

1. Area in present agricultural use with slight soils limitations for agriculture = _____ acres

2. Areas in present agricultural use with moderate soils limitations for agriculture = _____ acres

   Area in present agricultural use with moderate soils limitations on which adequate management practices to prevent off-site problems are not in effect = _____ acres

3. Area in present agricultural use with severe soils limitations for agriculture = _____ acres

   Area in present agricultural use with severe soils limitations on which adequate management practices to prevent off-site problems are not in effect = _____ acres

4. Area in present agricultural use mapped as "Prime Agricultural Land" (based on SCS soils classification) = _____ acres = _____% of total agricultural land.

5. Area in present agricultural use mapped as "Land of Statewide Importance" (based on SCS soils classification) = _____ acres = _____% of total agricultural land.

6. Area in present agricultural use mapped as "Unique Agricultural Land" = _____ acres = _____% of total agricultural land.

B. Conservation Planning and Practice: The Soil Conservation Service assists landowners to plan and install management practices on their lands to minimize erosion, obtain better production, and avoid a "worked-out" condition. Conservation planning and practices can both improve agricultural productivity and reduce its environmental impacts.

1. Total number of farms (full and part-time) = _____

2. Number of farms which have conservation plans and have conservation practices applied in the management = _____ = _____% of total number. (guideline: 75% or more)

3. Acreage of farmland with conservation plans and recognized conservation practices = _____ acres = _____% of total area in present agricultural use.

C. Agricultural Related Pollution: Agricultural land can be the source of water pollutants such as sediments, fertilizers, pesticides, and herbicides. Inadequate waste disposal can lead to objectionable odors, pests, pollution, and health problems. Proper management practices can significantly reduce or eliminate such problems.

1. Waste Disposal

Number of farms where waste products are not properly disposed of or neighbors have made complaints about odor, unsightliness or polluted runoff = _____ = _____% of total number. (guideline: 50% or less)

2. Fertilizers and Pesticides

Number of farms with evidence of improper use of fertilizers and pesticides = _____ = _____% of total number. (guideline: 50% or less)
Note: List problem sites or identify on map.

D. Erosion and Sediment Production Problems: Erosion not only reduces the long-term productivity of agricultural land, but also results in water-borne sediments that can cause problems downstream, destroying aquatic habitats, clogging ditches and culverts, filling ponds and reservoirs, increasing eutrophication, and increasing water supply treatment costs. Proper management can both protect the land's productivity and reduce off-site impacts.

1. Total acreage in agriculture with evidence of erosion problems = _____ acres = _____% of total agricultural land.

2. Number of farms with identified erosion problems = _____ = _____% of total number. (guideline: 50% or less)

3. Number of sites with evidence of significant sediment of agricultural origin entering ditches, watercourses, ponds, or wetlands = _____.
Note: List problem sites or identify on map.

E. Multiple Use of Agricultural Land: The value of agricultural land to a community stems in part from the several benefits it provides in addition to crop production. It can be an integral part of a seasonal outdoor recreation supply, provide vital elements of wildlife habitat, and enhance the visual and scenic character of the community.

1. Informal Recreation Uses:

   a. Acreage of agricultural land open for informal public use and not posted, or, if posted, open by permission, = _____ acres = _____% of total agricultural land.
   (guideline for Central Highlands: 80% or more)
   (guideline for Coastal Area: 50% or more, excluding cranberry bogs)

   b. Common complaints registered by farm-landowners regarding public access or use: (list)

2. Wildlife Habitat: (See Inventory Description for explanation).

   Acres of agricultural land rated as "good" wildlife habitat = _____ acres = _____% of total agricultural land,
   (guideline: 75% or more)

3. Visual Attributes:

   a. List areas of agricultural land that enhance your community's visual character and note why.

   b. List areas of agricultural land that detract from the community's visual character and note why.

5. Present and planned water and sewer services - (adjacent to services or not)

6. Floodplains - (Is agriculture a significant and compatible floodplain land use?)

7. Zoning and projected development patterns - (threatening agricultural use or not?)

8. Scenic roads and vistas - (Are agricultural lands located such that they are an important visual resource?)

9. Other -

IV. PROTECTION AND PROMOTION of Agricultural Land Use

A. Potential Agricultural Land: The figures below will suggest the feasibility of expanding your community's agricultural land use if desired.

1. Prime Agricultural Land (based on SCS soils classifications)

Total area mapped as "Prime Agricultural Land" now in woodland or wildlife land use = _____ acres

2. Land of Statewide Importance (based on SCS soils classification)

Total area mapped as "Land of Statewide Importance" now in woodland or wildlife land use = _____ acres

3. Pasture Land

Total area with slight limitations for pasture (based on soil interpretations) now in woodland or wildlife land use = _____ acres

B. Protection and Promotion Measures:

1. Land under Chapter 61A agricultural assessment:

   Number of farms = _____ Total acreage = _____ acres

2. Agricultural land under Conservation or Agricultural Preservation Restriction:

   Number of farms = _____ Total acreage = _____ acres

3. Public or Quasi-Public land rented, leased, or used for agriculture:

   Number of parcels = _____ Total acreage = _____ acres

4. Public garden plots available to residents:

   Number of plots = _____ Total acreage = _____ acres

5. Local markets for local produce:

Type of Market	Number	Estimated $ Volume

C. Town Policies:

List town boards, commissions and agencies, and summarize policies of each affecting agricultural land use or related enterprises. Indicate the effects of these policies on agricultural land use.

Board, commission, or agency	Policies affecting agriculture	Effect

D. Economic Benefit

1. Assessed value of land in agricultural use = $_____
2. Assessed value of improvements and farm buildings = $_____
3. Assessed value or gross sales of agricultural suppliers or processors = $_____
4. Number of persons employed in agriculture year-round = _____
   seasonally = _____
5. Number of persons employed by agricultural suppliers or processors = _____
6. Number of "part-time" farmers = _____

APPENDIX E

RATIONALE - GUIDELINES FOR AGRICULTURAL LAND

I. QUANTITY

A. Background of Quantity Guidelines

These guidelines are based on the concept that emphasis should be placed on retaining as much of the present agricultural land as possible. This applies in particular to prime agricultural land and to unique agricultural land such as cranberry bogs or orchards--see "Protection and Promotion" section of agricultural land evaluation sheet.

Agricultural land fulfills a variety of environmental needs. It produces food and fiber to feed and clothe the population. While Massachusetts has long since passed the point where its agriculture satisfies the needs of its people; still, agriculture is a $170-million industry in the state (5) and supplies a significant amount of the food needs.

Agricultural land also furnishes ecological support for diversity of animal, bird, and insect life. It provides aesthetic satisfaction and it serves educational purposes. Agricultural land supports a "way of life"; a mingling of suburbia and rural area, a support for open space, and a preservation of colonial heritage.

B. Central Massachusetts

The quantity guidelines developed for central Massachusetts are based on 50 acres of agricultural land per 1,000 acres total area in the community, and an additional 35 acres of agricultural land per 1,000 people living in the community. Using the most recent statewide census, and the total land area in Massachusetts; these Quantity criteria, applied statewide, would be approximately equal to the total agricultural land in the state. (3)

The figure of 50 acres agricultural land per 1,000 land acres establishes a base of "open space"; a green-belt to provide ecological support, and to help meet aesthetic needs.

The additional figure of 35 acres per 1,000 population recognizes (a) at least a vestigial need for agricultural land to grow crops to feed the population; (b) the difficulty, or impossibility, of returning land to agricultural purposes, once taken for other uses and (c) a need for open space.

One may question the empirical approach of using statewide agricultural land figures as a benchmark for the guidelines. Taken as an average, however, between croplands, pastures, and idle land of sparsely-populated rural communities and densely-populated cities; the guidelines represent a working figure for outer-suburb communities, where population influx is just beginning, and the older suburbs, where overcrowding and commercialization have started to deteriorate the quality of life.

As Ann Louise Strong states: "Thus far there has been little effort to weigh open space advantages of preservation of agricultural land against the value to the urban area of the land for development purposes. Nor has there been much effort to consider how much land, if any, should be kept if agricultural, or to determine the economic cost to the public of a decision in favor of open space preservation for agriculture." (4)

Let it be noted that a pragmatist could develop, using production rates of fundamental food stuffs, calorie values, and production values of given soils, a theoretical evaluation of agricultural land acreage requirements to sustain each thousand population. When, however, proper diet, taste preference, climate, crop suitability, etc., are considered, the project becomes one that is beyond the scope of the Natural Resources Planning Program.

C. Cape Cod and the Islands

The Cape Cod and the Islands resource area is water-oriented and ocean-influenced. Where other parts of the state have fields, pasture, and idle agricultural lands, this area has shoreline, dunes, heath, and woody shrubs. These lands and cover types in this resource area take the place of agricultural lands found elsewhere in the state.

Thirty acres of agricultural land per 1,000 land acres is a guideline which provides diversity of land use, and recognizes the "basic need" function of agricultural land. It is a figure readily attainable in most of this resource area. Where it is not attainable, local people participating in the Program may find that other land types are suitable substitutes.

The central Massachusetts guidelines also allot 35 acres per 1,000 population. It is recommended this guideline be deleted for the Cape and Islands resource area. Other cover types take the place of agricultural lands. The population varies greatly with the season. Most of the Capes' presently productive agricultural land is committed to the cranberry industry (Brennan). Cranberry bogs should be identified as "Unique Agricultural Land" as well as mapped as present agricultural land use.

II. QUALITY

A. Preservation of Prime Agricultural Land

Agricultural land, once covered by paving, houses, roads, manufacturing plants, or shopping centers, becomes a lost resource. Yet, many times, the prime agricultural land is the first to be developed on. The same characteristics that make it well-suited for agriculture (drainage, slope, soil texture) also make it choice for development.

The criteria are set up to emphasize the retention of prime agricultural land for the following reasons:

1. Agricultural land satisfies aesthetic, ecological, and educational needs. It supports a way-of-life that is respected, and rooted in our culture.

2. Prime agricultural land is often located adjacent to streams or rivers, on a flood-plain, and therefore in a flood-hazard area.

3. Once converted, it is prohibitively expensive (and probably not feasible from other considerations) to return land to agricultural uses. In light of various shortages of meat, grains, vegetables which have begun to occur, retention of land which does best at growing agricultural commodities should be encouraged.

B. Conservation Planning and Practices

Land should be used within its capabilities, in a planned manner, and with the application of needed conservation practices in order to minimize erosion, obtain the best production, and avoid a "worked-out" condition.
Guideline: 75% of farms under conservation plans.

C. Agricultural-Related Pollution

Agricultural land can be the source of contaminants in water by sediments, fertilizer, pesticides and herbicides. Inadequate waste disposal leads to objectionable odors and pests such as flies and rats and mice.
Guideline: 50% or less of farms with pollution problems.

D. Multiple Use of Agricultural Land

Given the context of Agricultural Land as supplying a demand for aesthetic "open space," then that open space legitimately services other related demands; as recreational uses (e.g. hunting or hiking), or wildlife propagation.
Guideline for Central Highlands: 75% or more of agricultural land services in formal multiple use).

Guideline for Coastal Area: 50% or more of agricultural land (except cranberry bogs) services informal multiple use).

Signs of "good wildlife habitat and hunting" are presence of contour farming, windbreaks, stripcropping, stubble mulching, hedges, managed grazing, cover crops, odd acres, field borders, practiced in agricultural land management.

E. Variety of Enterprises

Greater diversity of the crop or livestock enterprises produce more stable agricultural base.
Guideline: three or more different enterprises.

III. DISTRIBUTION

Significant size is 25 acres. The subcommittee made a judgment decision in selecting 25 acres, feeling that a block of agricultural land should be of at least this size to have impact; and probably represents a minimum acreage upon which a farmer might expect to make a living and, therefore, maintain his land as agricultural land.

Separated blocks of 25 acres or greater in size and distributed over the town, will add to the scenic value of agricultural land, and break up monotony in the landscape.

As a means to quantify "Distribution," the ratings were based on existence of agricultural land in each "quadrant" of the subject area, where the quadrants were four sections of roughly equal-size which could be obtained by drawing a horizontal line bisecting a map of the area, then likewise vertically. (4)

"Open and green space--These are essentially undeveloped, visually attractive natural areas strategically located where most needed to ameliorate intensifying urbanization patterns."

Note the emphasis placed on " . . . strategic . . . " location to " . . . ameliorate intensifying urbanization patterns."

CENTRAL HIGHLANDS

BIBLIOGRAPHY - AGRICULTURAL LAND

1. Soil Conservation Service, Conservation Needs Inventory, U.S.D.A., 1968.

2. Strong, Ann Louise, Open Space for Urban America, Urban Renewal Administration, Department of Housing and Urban Development, Washington, D.C., 1965.

3. USDA, Agricultural Statistics, 1971.

4. Water Resources Council, Proposed Principles and Standards for Planning Water and Related Land Resources, Federal Register, Volume 36, No. 245, Part II, Tuesday, December 21, 1971.

5. Whyte, William H., The Last Landscape, Doubleday and Company, Inc., Garden City, New York, 1968.

APPENDIX F

SENSITIVE AREA CHARTS

Sensitive areas are areas of land and water that are integral parts of the community's ecological system and whose protective or productive functions would be lost through improper management. Such areas include:

- wetlands/inland and coastal
- aquifers and recharge areas
- hillsides and steep slopes
- streams and creeks, and their banks
- others as selected by the community
- lakes and ponds
- beaches and dunes
- floodplains
- water supply watersheds and well fields
- critical wildlife habitat
- scenic and unique areas

Sensitive Area Charts that follow are provided as a general informational aid to assist communities in protection and sound management of these areas. For each of the sensitive areas covered, the chart lists the ecological function, values to society (which includes both the community and individuals), the impacts of alterations, and management approaches. Appendix H, References, includes sources of more detailed information on each of these aspects of sensitive areas. Similar charts may be developed as needed by a community for other sensitive areas not included with the following charts.

SENSITIVE AREAS CHART

APPENDIX F

UNDERSTANDING AND PROTECTING: INLAND WETLANDS

Ecological Function	Values to Society	Impacts of Alteration	Management Approaches
Improve water quality: .nutrient cycling .trapping sediments Moderate extremes in water supply: .recharge of groundwater (in some cases) .discharge of groundwater. Retain storm runoff and release waters over longer time period. Provide stability within the wetland ecosystem and in adjacent ecosystems by species diversity and by above-mentioned water quality and quantity functions. Provide essential habitat for fish and wetland and upland wildlife. Are highly productive.	Protection from sedimentation and pollution. Groundwater protection and replenishment of groundwater resources (in some cases). Visual-cultural values: .wildlife .recreation .education .aesthetics .diversity of experience Minimizes destructive effects of flood waters.	Development* in upland can create more nutrient and sediment inflow than wetland is able to absorb. Development in and around wetland can destroy ecological health. Increased nutrient and sediment input can speed change to woody vegetation. Dredging and filling--destruction of all values. Filling wetlands may increase nutrient and sediment load downstream. Excessive pumping from aquifer may lower the water table and change the character of the wetland. Once polluted and damaged will remain so for many years. Filling of wetland removes flood storage capacity.	Wetlands Overlay District Mapping and Zoning. Use restrictions. Fill and dredge restrictions. Wetland Protection Act review process, Mass. G.L. Ch. 131, S.40. Building Code provisions. Cluster Zoning and Transfer of Development Rights to permit flexibility in land use. Land acquisition and conservation restrictions. Runoff and erosion controls on contributing watershed lands. Buffer zones with restricted use to protect the wetlands. Septic system regulation (Title 5 of the Mass. Environmental Code).

*Development = agricultural and urban land uses.

SENSITIVE AREAS CHART

APPENDIX F

UNDERSTANDING AND PROTECTING: COASTAL WETLANDS

Ecological Functio	Values to Society	Impacts of Alteration	Management Approaches
Improve water quality: .nutrient cycling .filtering of sediment Store coastal flood waters. Provide ecological diversity in association with adjacent ecosystems. Provide essential habitat for fish, shellfish, and wetland and upland wildlife. Are highly productive for marine food chains. Absorb coastal storm impact. Provide an abundant diversity of marine habitats.	Protection from sedimentation and pollution. Visual-cultural values: .wildlife .recreation .education .aesthetics .diversity of experience Minimize destructive effects of flood waters. Support many marine shell and fin fish industries. Minimize destructive storm action on shoreline, marine life, and property.	Development* in upland can create more sediment inflow than wetland is able to absorb. Development in and around wetland can destroy ecological health. Dredging and filling--destruction of all values. Removing wetlands. Decreased flows from incoming streams and rivers can decrease amount of fresh water entering estuary and alter ecological communities. Restriction of tidal flow can change character of wetland. Pollution of fresh water streams entering salt marshes and salt water areas can be harmful to coastal plant and animal communities. Alterations through structural means or encroachment on salt marshes and shorelands of estuaries can be harmful to coastal plant and animal communities.	Wetlands Overlay District Mapping and Zoning. Use restrictions. Fill and dredge restrictions. Wetland Protection Act review process. Building Code provisions. Cluster Zoning and Transfer of Development Rights to permit flexibility in land use. Land acquisition and conservation restrictions. Differential tax assessment based on wetlands use. Runoff and erosion controls on contributing watershed lands. Buffer zones with restricted use to protect the wetlands.

*Development = agricultural and urban land uses.

SENSITIVE AREAS CHART

APPENDIX F

UNDERSTANDING AND PROTECTING: RIVERS, STREAMS AND CREEKS

Ecological Function	Values to Society	Impacts of Alteration	Management Approaches
Transport runoff from uplands. .Storage and transport of flood waters. Transport and deposit sediments and nutrients to floodplains, lakes, and ponds. Provide diversity of wildlife habitats. .Support aquatic community. .Food and water for upland animals. .Spawning and migration pathways. Maintain balance in surface and groundwater supplies. Natural digestion or oxidation of nutrients and wastes through aeration and biologic action. Moderate micro-climate extremes.	Natural drainage system that safely transports runoff. Maintains water quality by dilution, oxidation, and biologic action. Supplies water to surface and some groundwater reserves. Visual-cultural values. .recreation .aesthetics .education .wildlife .diversity of experience In some drainages, supplies fine sediment materials and nutrients to flood-prone areas, thus benefiting agricultural land use.	Development* increases runoff and erosion resulting in: .Increased downstream flood hazard. .Increased streambank and channel erosion. .Lowered water table and irregular stream flow. .Higher water temperatures. .Sedimentation of stream channel reduces channel capacity, increases flooding and degrades aquatic habitat. Sewage discharge and polluted runoff degrades water quality resulting in: .Contamination of water supplies. .Reduced visual-cultural values. .Destroyed natural vegetation and wildlife with accompanying noxious odors. Alterations to stream channel can increase downstream erosion and flooding and can lower water table. Removal of streambank vegetation and filling woody wetlands causes heat pollution, bank erosion and sedimentation.	Stream corridor overlay zoning district to create: .Buffer zone along stream margins (sensitive wetlands and hillside areas) with a system of permitted uses to maintain natural conditions. .Flood hazard zone to limit flood damages. Land acquisition and conservation easements. Runoff and erosion control standards for land uses. Bank stabilization, land management and structural measures to control sedimentation and channel erosion. Cluster zoning and density transfer type legal instruments to control hydrologic impact of development. "Wetland Protection Act" review process, Mass. GL. Ch. 131, S.40. .Control dredging, filling and altering of streambanks. Floodplain zoning. Mass. Environmental code. .Septic system regulations. .Sanitary landfill siting and operation. Control of polluted runoff. .Regulate use of road salt, fertilizers, pesticides. .Performance controls for land uses. Intergovernmental cooperation in water quality management.

*Development = agricultural and urban land uses.

SENSITIVE AREAS CHART

APPENDIX F

UNDERSTANDING AND PROTECTING: HILLSIDES

Ecological Function	Values to Society	Impacts of Alteration	Management Approaches
Location of greatest erosional activity--source of material that forms valleys and plains. .Erosion increases with steepness and length of slopes. .Slope steepness, soils and drainage pattern are in dynamic balance with vegetation, geology and rainfall. Hillside vegetation controls runoff, traps sediment, anchors soil and: .Protects downstream areas from destructive flooding and sedimentation. .Regulates water flow to wetlands, streams and ponds. Permeable soils and terraces at base of hills are prime aquifer recharge areas. Hillsides provide a diversity of natural habitats: .Variety of elevations. .Variety of exposures to sun and wind.	Regulation of erosion and runoff by natural vegetation and drainage: .Controls catastrophic floods and landslides. .Minimizes erosion, gullying and downstream sedimentation. .Protects public water supply and controls the sedimentation of dams and reservoirs .Stabilizes water flow to aquifers, wetlands and streams. Visual-cultural values: .aesthetics .recreation .diversity of experience .vistas Buffers wind, noise and screens eye sores.	Development* removes vegetation, alters topography, exposes soils and distrubs natural drainage causing: .Increased amount and rate of runoff resulting in destructive erosion, downstream sedimentation and flood hazard. .Ugly erosion scars and exposed development reducing visual values. .Soil erosion and compaction reducing hillside's ability to support vegetation. .Reduction in groundwater recharge and water quality. .Destruction of wetlands and streams. Grading and water use associated with development can upset hillside stability causing mass movements--landslides, slumps, and creep: .Road cuts and home site grading can undercut natural retaining formation of hillsides causing mass movement. .Vegetation removal (reduced shade) hastens snow melt and encourages landslides and erosion. Hillside development can jeopardize public safety and generate unnecessary public expenses: .Increased runoff and sedimentation increases public expenses for drainage, flood control and protection of water supply. .Installation and maintenance of public utilities is more expensive--roads, sewers, water, public buildings. .Poorly designed and constructed development can incur public expense for repairs or damage protection.	Hillside overlay (zoning) district based on slope or on soil type to regulate: .Permitted uses. .Amount of grading. .Amount of impermeable surfaces. .Disturbance of natural vegetation. Subdivision control--cluster zoning, P.U.D.'s, and density transfer approaches to limit development impacts. Performance zoning--land use standards for runoff and erosion. Grading control ordinance: .Review grading plans. .Cut and fill standards. .Regulate time and location of grading. Catch basins, spreader drains and revegetation. Innovative design and construction approaches. .Site roads and structures with natural contour of land. .Limit grading for home sites. .Preserve natural vegetation and drainage. Control the extension of public utilities and roads. Purchase development rights. Underground utilities and architectural standards to protect visual values.

*Development = agricultural and urban land uses

SENSITIVE AREAS CHART

APPENDIX F

UNDERSTANDING AND PROTECTING: AQUIFERS

Ecological Function	Values to Society	Impacts of Alterations	Management Approaches
Supply water to wetlands, streams, and ponds during dry periods. Supply soil moisture needed by wetland plants. Enrich surface water with minerals essential to aquatic life. Moderate stream temperatures.	Provides public drinking water and industrial water supplies. Helps to maintain surface water levels in dry periods to sustain surface water supplies, visual character, water-based recreation, wetland wildlife, and fisheries. Helps moderate the effects of flooding. Supplies soil moisture to wetland vegetation.	Depletion of groundwater quantity: .Unregulated pumping can deplete groundwater and can cause land subsidence. .Development on permeable recharge areas or the alteration of wetlands and streams can inhibit the recharge of groundwater supplies. .Lowered groundwater level can reduce dry season flows and damage wetlands, streams, and lakes. Contamination of groundwater quality: .Land use practices on permeable recharge areas can pollute the aquifer--improperly sited septic systems, leaking sewer lines, landfill operations, or improper handling of chemicals. .Overuse of groundwater can draw in contaminating saltwater (coastal), polluted surface waters, or groundwater of inferior quality. .Deterioration of water quality may escalate public expense for treatment.	Study and map the critical aquifer recharge areas and determine the safe yield of the aquifer. Prevent pollution of the aquifer: .Designate a "prime recharge area" and adjacent buffer zone with permitted uses. .Performance controls and land use standards within sensitive areas. .Enforcement of sanitary code and landfill regulations. Maintain recharging of aquifer: .Runoff and erosion control ordinances to maintain natural drainage. .Limit the amount of impermeable surfaces. .Artificial recharge using catch basins, berms and wells. .Purchase recharge areas for public open space or purchase conservation restrictions. Conserve water supply: .Meter water usage. .Public education programs.

APPENDIX G

IMPLEMENTATION TECHNIQUES AND SOURCES OF ASSISTANCE

INTRODUCTION

TOOLS AND TECHNIQUES FOR THE MANAGEMENT AND DEVELOPMENT OF A COMMUNITY'S NATURAL RESOURCES

STOP GAP MEASURES
- Building Moratoriums

LAND ACQUISITION
- Fee Simple Acquisition
- Less-Than-Fee Simple Acquisition
- Methods of Land Acquisition
  - Pre-emptive Buying
  - Installment Purchase
  - Purchase and Leaseback
  - Purchase and Re-Sale
  - Purchase of Option
  - Land Banking
  - Land Trusts
  - Acquisition of Tax Delinquent Land
  - Donations
  - Bargain Sale
- Federal and State Funding

LAND USE REGULATION

- Zoning Regulations
  - Special Permit
  - Cluster Zoning
  - Large Lot Zoning
  - Flood Plain and Wetland Zoning
  - Aquifer Recharge Zoning
  - Critical Resource or Special Conservancy Zoning
  - Contract Zoning
  - Incentive Zoning
  - Performance Zoning
- Designation of Scenic Roads
- Wetlands Protection
- Subdivision Control
- Design and Site Review
- Historic Districts
- Growth Regulations
- Septic System Regulations

TAX POLICIES

- Woodland
- Farmland
- Land under Conservation Restrictions

TRANSFER OF DEVELOPMENT RIGHTS

LOCATION OF COMMUNITY SERVICES (INFRASTRUCTURE)

DESIGN, CONSTRUCTION, AND OPERATION

WHERE TO GO FOR HELP

FEDERAL

- U.S. Environmental Protection Agency
- Department of Housing and Urban Development
  - Community Development Block Grant
  - National Flood Insurance Act
- USDA, Soil Conservation Service
- USDI, U.S. Geological Survey

STATE

- Office of State Planning
- Executive Office of Environmental Affairs
  - Division of Forests and Parks
  - Division of Fisheries and Wildlife
  - Division of Conservation Services
  - Department of Environmental Quality Engineering
- Massachusetts Cooperative Extension Service
- Massachusetts Department of Community Affairs
- Massachusetts Department of Public Works
- Regional Planning Agencies
- Conservation Districts

QUASI-PUBLIC AGENCIES

- Watershed Associations
- Nature Conservancy
- The Trustees of Reservations
- Massachusetts Audubon Society
- Conservation Law Foundation
- New England Natural Resource Center
- Massachusetts Federation of Planning Boards
- Massachusetts Association of Conservation Commissions
- Massachusetts Public Interest Research Group

SELECTED BIBLIOGRAPHY

- General References
- Specific and Technical References

INTRODUCTION

This appendix presents, discusses, and illustrates the many tools, techniques, and sources of assistance available to communities for the implementation of land use or natural resource planning proposals. The format is designed to enable members of the Natural Resources Technical Team (NRTT), community Steering Committee, its subcommittees, town boards, and other interested citizens to become familiar with the different means to protect, develop, and manage natural resources.

Land use management programs may have a profound effect on the economic, ecological, and social environment of a community. Before adopting any of the resource management techniques presented in this appendix, a community should recognize and evaluate the impact of the specific techniques on the town and surrounding towns. Although many techniques appear to solve a community's problems, upon closer inspection they only bring additional complications. Land use management plans should be considered in view of their long term as well as their short term effects. The primary purpose of the land use management program and the secondary effects should be understood by the community to assure the desired results.

This appendix is organized in the following manner: Section II illustrates the tools and techniques for the management and the development of natural resources. Section II begins with stop gap or temporary measures for guiding growth so that significant natural resources are not destroyed during the organization and planning of a more permanent program. The major portion of the section is then devoted to longer range techniques which vary from land acquisition, land regulation, and design and construction to such innovative concepts as transfer of development rights and growth regulations. Section III cites specific agencies and organizations that may assist community planning efforts or administer state or federal programs which may affect local land use. Finally, Section IV identifies selected references where more detailed information can be found concerning procedures for the protection, development, and management of natural resources. These references will assist communities in formulating and implementing natural resource policies and planning programs.

In each section the general techniques are discussed first, followed by a discussion of several specific applications or variations. Whenever possible, examples of communities which have used a particular method are included, as well as references of where additional information may be obtained. In instances where a town or a town by-law is cited, further information may be obtained by contacting the town clerk, planning board chairman, or conservation commission chairman. In other cases the reader may wish to contact the state or federal agencies and private organizations which have a special knowledge of a certain technique. Addresses are included. Also following the discussion of most implementation devices are references of publications which may be consulted for a more detailed explanation or analysis of the planning tool under consideration. They are listed by author, title, relevant page numbers, and, in many instances, a brief annotation. For the publisher, and in some cases the cost, refer to the bibliography at the end of the appendix.

This appendix is not intended to be an exhaustive analysis of all natural resource development and land use management methods. Rather, it is hoped that the brief descriptions, comments, and references of the implementation programs and sources of assistance included in this chapter will establish a basis and direction from which a community may seek further assistance and knowledge. Communities should consult with legal counsel, consulting land use planners, or public or private agencies for assistance in the selection and valid application of these procedures.

TOOLS AND TECHNIQUES FOR THE PROTECTION, AND DEVELOPMENT OF A COMMUNITY'S NATURAL RESOURCES

The development and management of natural resources may be considered from two basic approaches: development of a community's natural resources by the management and development of individual sites, and the planning and regulation of future growth and development in the community. Individual sites may be acquired and improved for the

benefit of the community or neighborhood for recreation, wildlife, or protection of a renewable resource such as farmland or woodland. As more individual sites are improved, use of the community's natural resources improves. The treatment of individual sites, however, may produce a spotty effect--islands of relief--unless attention is paid to the broader patterns of resource use. The planning and regulation of future growth and development in the community can be directed at guiding the pattern of growth to best utilize and protect its natural resources. New development may be encouraged in areas well suited for intensive use, while sensitive or fragile areas may be regulated so that a minimum of the natural environment is altered or damaged.

The tools and techniques for natural resource management and development discussed in this appendix could be grouped into one of the above approaches. Depending on the particular situation of each community and the scale of the project, certain techniques and combinations of techniques will be more suitable than others. Specific site situability and areas with special characteristics (such as development limitations or high recreation potential) may be determined from the inventory and analysis maps and other data and evaluations resulting from the NRPP.

General references:

.The Rockefeller Brothers Fund, Reilly, William K., ed. 1973. The Use of Land: A Citizens' Policy Guide to Urban Growth.
Excellent summary of present values, practices, and regulatory measures.

.Council of Environmental Quality. 1974. Fifth Annual Report on Environmental Quality. Chapter 1, "Land Use."
Provides a clear, concise discussion of the effects of development, stimulants, and land use controls.

.Franklin, Hebert M.; Falk, David; and Levin, Arthur J. 1974. In-Zoning, A Guide for Policy-makers on Inclusionary Land Use Programs. An evaluation of land use policy literature for policy-makers on land use controls and their connection with the equitable distribution of housing in growth areas.

.League of Women Voters. 1975. Land Use, Can We Keep Public and Private Rights in Balance. Easy to understand summary of land use issues.

.Peskin, Sarah. 1976. Guiding Growth and Change: A Handbook for the Massachusetts Citizen. Massachusetts Audubon Society.

STOP GAP MEASURES

There are two major reasons why communities wish to control growth temporarily. First, a community may want to prevent unplanned or inappropriate development until plans are prepared to regulate the location and quality of future development. Communities may use stop-gap techniques to allow adequate time to prepare or revise natural resource inventories, natural resource plans, zoning by-laws, subdivision ordinances, and master or comprehensive plans. A second reason for communities to delay future development is to present pollution problems such as sewage overflows, and shortages of water supply or other municipal services such as schools or fire protection. Overuse of natural resources or inadequate development of existing natural resources can be identified by the evaluation process of the NRPP.

To achieve these objectives, building moratoriums might be employed or growth rates regulated. The building moratorium is a stop-gap measure which has been used by many Massachusetts communities to prevent unplanned or inappropriate development, or to forestall added stress on already overworked municipal services or resources. Three different forms of moratoriums may be adopted:

1. The general moratorium prohibits all types of construction for a predetermined time period.

2. The use-restriction moratorium may be directed at different kinds of new development, such as apratments, mobile home parks, motels, and commercial development.

3. Growth rates may be regulated by requiring that major developments be timed according to a specific percentage of the total proposed development. The town of Tisbury, on Martha's Vineyard, has adopted a growth rate regulation of this type which restricts subdivisions of greater than seven units from constructing more than one-seventh the total approved number of units each year.

.Massachusetts Department of Community Affairs. . Building Moratoriums in Massachusetts, Their Uses, Effects, and Legal Implications.
Definitive work on building moratoriums including survey of cities and towns with recently enacted or expired building moratoriums.

.Massachusetts Department of Community Affairs

.Conservation Law Foundation

LAND ACQUISITION

Land acquisition, either fee simple (outright ownership) or less than fee simple (easement or deed restriction), is one of the most secure ways to assure proper land use management. The major problems with land acquisition are its initial cost, long-term maintenance costs, and loss of tax revenue. Land may be acquired by eminent domain, negotiated purchase, or donation.

.Massachusetts Association of Conservation Commissions. 1973. Massachusetts Conservation Commission Handbook. pp. 16-20.
Concise explanations of how to acquire land.

Fee Simple Acquisition involves the full title to the land with all property rights being passed on in the deed. This is the surest way to influence the future use of the land, but it is usually the most expensive. It is particularly applicable when the community must completely control the land to develop facilities such as schools, recreation facilities, or water supply reservoirs. It is also normally used to acquire conservation lands where major public access or resource management measures are planned.

Less-than-fee simple acquisition includes easements and Conservation Restrictions, under which ownership is retained by the owner, but certain rights are transferred in the deed to the holder of the easement or restriction. A municipality or charitable organization might use this method to preserve forest, farmland, or other open space in its present state, or to provide public access to valuable resources. Rights which are transferred in the deed can include development rights, access rights, scenic easements, water, mineral, or air rights.

The Massachusetts General Laws, Chapter 184, Sections 31-33, formally establish a mechanism whereby Conservation and Preservation Restrictions can be held by any governmental body or charitable corporation or trust, without having to be periodically re-recorded, and allowing the holder to enforce the restriction despite lack of ownership of related land. Restricted land must also be assessed separately, which may result in lower taxes, increasing the appeal of this program to landowners.

Landowners who consider permanent restrictions to be unacceptable because of their inflexibility may wish to grant a short term (10-20 years) restriction. Special tax provisions and reversion clauses would be needed for short term restrictions.

Some advantages of easements are: less cost than total acquisition; the land remains on the tax roles, although its value may be lower; the land will still be available to the owner for recreation, farming, or other permitted uses as specified in the restriction; the owner will maintain the land without cost to the community, and yet the community will have the benefit of protecting natural resources and, depending on the terms of the restriction, may be allowed access and its use for passive recreation. In addition, the value of land adjacent to restricted land may increase.

.Kline, Elizabeth. 1975. Protecting Open Space, A Guide to Selected Protection Techniques. pp. 47-52.
Easy to understand explanation with examples.

.Massachusetts Association of Conservation Commissions. 1973. Massachusetts Conservation Commission Handbook. pp. 24-31.
Brief, clear explanation of conservation restrictions.

.Metropolitan Area Planning Council. 1969. Open Space Law, Volume 4, pp. 18-23.
Complete discussion including tax consequences and legal particulars.

.Metropolitan Area Planning Council. 1972. Open Space Law, Volume 4, Supplement. pp. 22-23.
General discussion of the basic elements of conservation restrictions.

Methods of Land Acquisition :

The following methods of acquisition may use either fee simple or less than fee simple acquisition.

Pre-emptive Acquisition

Because the costs of large tracts of land may be prohibitive, a municipality can purchase a few strategically located parcels. In this manner, access may be controlled. As abutters, the community or private group would have legal standing as to the use of adjacent land. This technique has been used very effectively by:

.The Nantucket Conservation Foundation, Inc.

.The Nature Conservancy

Installment Purchase

Purchase of a pre-determined amount or percentage of property annually can lessen the burden of acquisition, not only to the community, but also to the seller. By distributing the profit from the land sale over a number of years, capital gains taxes are reduced. Also, when a percentage of land is purchased annually, the entire tract may be controlled by the town agency and/or be put in a holding status. This technique has been used by:

.The Nantucket Conservation Foundation, Inc.

.The Nature Conservancy

Purchase and Leaseback

Communities or private groups may acquire land and then lease it back to the previous owners or to new tenants. The community benefits by the restrictions which are placed upon the lease which may prohibit uses that will have an adverse effect on the natural resources. The restrictions should be enumerated in the lease so that all parties are aware of the nature of the restrictions. The lesee benefits by the use of land which he could not afford to buy outright. This program has been used successfully with agricultural land.

.International Independence Institute. 1972. The Community Land Trust, A Guide to a New Model for Land Tenure in America. Introduction, concept, and descriptions of how land trusts operate. West Road, Box 183, Ashby, Massachusetts 01431.

Purchase and Re-sale

Like the previous technique, land is purchased by the town or a private group. It is then sold back, rather than leased, to the previous owner or to a new owner. During the transfer, restrictions are fixed on the deed to define the future allowable uses of the property. These restrictions do not decrease the existing use value of the land, only the speculative value. The sell-back price will be lower than the purchase price because of the lost speculative value of the land.

Another type of purchase and re-sale can also be used. There are some organizations, such as the Nature Conservancy, which will step in in an emergency to buy a valuable parcel if it comes on the market suddenly and if the town or state cannot raise the necessary funds in time. The private group will purchase the land and hold it until the governmental body can allocate the funds and buy it from them. This coordination allows for more flexibility in order to take advantage of changing situations than governmental agencies often have.

.Connecticut River Watershed Council, 125 Combs Road, Easthampton, Massachusetts 01027

.The Coastal Foundation, Box 98, South Gardiner, Maine 04359

.The Nature Conservancy

Purchase of Option

In situations where a community has insufficient funds available for immediate purchase of a particular parcel of land, and if there is not a clear need to acquire the area immediately, the purchase of an option is a viable alternative. The cost of an option is generally a small fraction of the total purchase price. Land encumbered by an option agreement could remain in its present use unless it is offered for sale, at which time the community can exercise its option to purchase.

.Massachusetts Association of Conservation Commissions. 1973. Massachusetts Conservation Commission Handbook. p. 21. Brief explanation of details of option purchase.

Land Banking

Land banking is the acquisition and holding of land by the community for future use. Parcels may be acquired well in advance of actual need for specific public purposes (schools, sewage treatment plants, roads, parks and open space). Another aspect of land banking is to acquire large tracts of land to enable better planned future development. Land acquisition may be in the form of options, contracts to purchase, or fee simple. A land banking program enables the community to actively determine and direct the nature of future development. The community may sell or lease the land to developers or farmers, or both, with stipulations as to what land uses are permitted.

The concept of land banking has been taken up in Lincoln, Massachusetts, as a way of planning land use. A group of concerned citizens formed the Rural Land Foundation, a quasi-public charitable foundation which, under an elected Board of Trustees, can acquire land and subsequently dispose of it, either for private development, public development, open space or farming. This transfer can be fee simple, less than fee simple, sale, lease, or gift, and the RLF can make a profit on the transaction as long as it is put back into the land acquisition fund. By being able to both protect and develop land, the RLF can accomplish this prime goal of open space preservation while at the same time initiating innovative development and providing benefits to the town such as low-income housing. The key

difference between land banking, and the somewhat similar concept of the RLF, and other acquisition and disposal techniques is that the land is acquired for a future use, not an immediate purpose, although continuing its present use might be very beneficial to the community.

.American Law Institute. 1975. A Model Land Development Code. pp. 253-283.
An in-depth, legal discussion which includes model ordinances and extensive explanatory notes.

.Fishman and Gross. 1972. "Public Land Banking," In Case Western Law Review Vol. 23, No. 4, 1972, pp. 897-975.
Comprehensive discussion including background, experiences in other countries, and examples of land banking in this country with detailed explanations of public corporations, financing, and operations.

.Fitch, Lyle C., and Mack, Ruth. 1974. "Land Banking," In Harriss, Lowell C. The Good Earth of America. pp. 134-154.
General concepts.

.Franklin, Herbert M., Falk, David; Levin, Arthur. 1974. In-zoning, A Guide for Policy-makers on Inclusionary Land Use Programs. pp. 177-197.
Comprehensive coverage of many aspects of land banking.

.Redlich, Susan. 1974. Guiding Growth: A Handbook for New Hampshire Townspeople. p. 82.
Good introduction to land banking.

Land Trusts

A land trust is a quasi-public body which owns and acquires land for the public good. A conservation land trust may be initiated by owners of large tracts of land who no longer want the responsibility of land ownership but desire to retain some authority or trusteeship over the land. A second form of land trust, the community land trust, is also formed by a group of individuals. Its objective is to lease the land with the purpose of maintaining the land's long-range resource value.

By their nature, quasi-public land trusts may be established quickly and may acquire land without complex procedures. Land trusts may work with local governments to acquire land when it is available, and then sell it to local governments when the community is able to appropriate funds.

There are other advantages of land trusts. They are generally acceptable to landowners whereas public purchase may be frightening. They also have a long cultural and societal history and may act as a holding mechanism for long and short-range strategies.

.International Independence Institute. 1972. The Community Land Trust, A Guide to a New Model for Land Tenure in America.
Introduction, concept, and descriptions of how land trusts operate.

.Redlich, Susan. 1974. Guiding Growth: A Handbook for New Hampshire Townspeople, pp. 87-88.
Good description with examples of land trusts in New Hampshire.

.Abenaki Regional Land Trust, Windmill Hill, Putney, Vermont 05346, (802) 387-5732.
An operating land trust.

.New Canaan Land Conservation Trust, 72 Park Street, New Canaan, Conn. 06840
An operating land trust.

Acquisition of Tax Delinquent Land

Tax delinquent land may be acquired by the community when the person or persons who hold title to the land either cannot be located or cannot pay the accrued property taxes. Towns may be able to acquire significant parcels of land by the acquisition of tax delinquent land.

.Kline, Elizabeth. 1975. Protecting Open Space, A Guide to Selected Protection Techniques. pp. 53-55.
Easy to understand descriptions with examples.

.Massachusetts Association of Conservation Commissions. 1973. Massachusetts Conservation Commission Handbook. pp. 21-22.
Brief explanation of the mechanics of tax delinquent land transfer.

Donations

A municipal body, agency, or organization may receive land from private donations, and gifts with restrictions for certain uses. Individuals, businesses, and organizations may increase the amount of conservation land in this manner. For such charitable gifts, the donor may be able to make significant deductions from federal and state income taxes. Community conservation groups may encourage donations by demonstrating the tax benefits and generating a feeling of town pride and cooperation.

.Kline, Elizabeth. 1975. Protecting Open Space, A Guide to Selected Protection Techniques. pp. 62-67.
Explanation of the benefits of donations and how to encourage donations.

.Massachusetts Association of Conservation Commissions. 1973. Massachusetts Conservation Commission Handbook. pp. 16-17.
Technical aspects of land transfer.

.Platt, Rutherford H. 1971. Open Land in Urban Illinois, Roles of the Citizen Advocate.
Good discussion of legal implications and tax benefits.

.Redlich, Susan. 1974. Guiding Growth, A Handbook for New Hampshire Townspeople. p. 84.
Brief summary.

.Conservation Law Foundation

Bargain Sale

A bargain sale is a sale at less than fair market value, which means that a person who could not afford to donate his land could sell it to a public or private group for what he originally paid for it. The landowner has his investment returned tax-free (Treasury Regulation S1 1001-1(e)(1957)), since the capital gains tax the owner avoided is sometimes higher than the revenue lost by the bargain sale.

Federal and State Funding

Federal funding for outdoor recreation land acquisition and development is available through the Land and Water Conservation Fund of the Bureau

of Outdoor Recreation (BOR), which provides up to 50% reimbursement to states and municipalities. The Massachusetts Self-Help Program provides up to 50% reimbursement to communities for the acquisition of conservation lands. When both programs approve a request, the federal share is 50%, state 25%, and local 25%. In order to qualify for these funds, a community must have an approved plan on file with the Division of Conservation Services. The plan could be a conservation/recreation plan, an element of a comprehensive or master plan, or a separate plan concerning the land for which the applying agency is responsible, but must comply with the Division of Conservation Services planning requirements.

Community Development Block Grant Funds, administered by the U. S. Department of Housing and Urban Development, can also be used for certain land acquisition projects, and may be used to match funds from the above programs.

.Massachusetts Association of Conservation Commissions. Massachusetts Conservation Commission Handbook. 1973. pp. 24-28.
Clear descriptions of the complex state and federal programs.

.Massachusetts Division of Conservation Services

.U. S. Department of Housing and Urban Development

.Massachusetts Department of Community Affairs

LAND USE REGULATION

All rights to the private use of property are subject to the "police power," which can limit the use of property without compensating the owner for any loss in value. The basic requirement of all land use regulations is that they must be in the interest of the public health, safety, and welfare. Such land use regulations may be used only to prevent a public harm or nuisance. Examples of such valid uses are to prevent overcrowding,

pollution, or unnecessary hazards. But land use regulations may not be used to create a public benefit such as a recreation area or open space.

The proper use of the regulatory authority is a complex and continuing question. The following reference will help to clarify the legal limitations of land use regulation.

.Bosselman, Fred; Callies, David; and Banta, John. 1973. The Taking Issue.
An in-depth, legal, technical study of the constitutional limits of governmental authority to regulate the use of private land.

Zoning Regulations

Zoning regulations are the most common type of land use controls. In Massachusetts, the basic authority for municipal zoning is found in M.G.L. Ch. 40A, the Zoning Enabling Act. Zoning may be used to separate conflicting and incompatible land uses such as industrial and residential areas. This type of control may also be used to determine the proper location of land uses such as conservation and agricultural areas.

A second use of zoning is to regulate the manner in which land is used so that public harm may be prevented. To prevent overcrowding and pollution and assure proper health conditions, minimum lot sizes, structure set-backs, and special provisions for hazardous or sensitive areas may be required.

Zoning regulations are generally drafted by the planning board, with input from the conservation commission, townspeople, and commercial and industrial interests. Accompanying the regulations must be a detailed zoning map or a similarly detailed description which indicates to all landowners the zone category of their land and its permitted uses. The zoning by-laws or ordinances then must be approved by a town meeting or city council, after public hearing.

The issues and ramifications of zoning regulations are complex and far reaching. When considering developing new regulations or revising existing regulations, communities should investigate the following general sources:

.Babcock, Richard F. 1966. The Zoning Game.
Realistic treatment of the actual operations of zoning from the viewpoints of its key participants - developers, planners, legislators, lawyers, and judges.

.U. S. Department of Agriculture, Federal Extension Service. 1967. Zoning--An Aid to Community Resource Development.
Basic, brief (15 pages) guide to understanding the objectives and the process of zoning.

.Massachusetts Zoning Enabling Act, Chapter 808 of the Acts of 1975.

.Massachusetts Department of Community Affairs

.Conservation Law Foundation.

The remainder of this section will cite selected types of zoning regulations which are often used for the protection and management of natural resources. For a general reference on the limitations of many types of natural resource zoning see:

.Kusler, Jon A. 1972. "Open Space Zoning; Valid Regulation or Invalid Taking." In Minnestoa Law Review, 51:1, November.
Excellent discussion of the constitutionality of open space zoning techniques, such as: scenic zoning, minimum lot sizes, and other innovative approaches.

1. Special Permit (Special Exceptions, Conditional Use) - This can be used to grant an exception to a district's normal uses when a specific use may be desirable under certain circumstances but when that use might pose problems if it were allowed throughout the entire zone. The uses for which a special permit may be obtained (usually from the Board of Appeals) must be stated in the zoning by-law, and, if

carefully drafted, the terms of the special permit will ensure that the developer will meet requirements and standards which are adequate to prevent or alleviate potential problems of the use. For instance, in many by-laws special permits are used to allow cluster development in a conventionally zoned district, providing the developer meets certain criteria regarding open space, resource protection, and community facilities, etc. The use allowed by the special permit must be in accord with the purpose and intent of the by-law.

The special permit procedure may also be required for specified uses in flood plains, wetlands, and other environmentally hazardous areas, providing review of plans to ensure that the design will minimize hazards or impacts.

2. Cluster zoning allows for an adjustment in the location and density of development upon a site so long as the total number of units does not exceed a set number or density ratio. Thus on a twenty-acre site zoned for one house per acre, cluster zoning would allow twenty houses but instead of being spread out one to an acre plot, they could be clustered on a small portion of the site, such as five acres, with the rest left as open space. The open space can be dedicated to the town as recreational land, to a conservation group, or left in common ownership to the homeowners. Cluster zoning may be used with single family detached housing, townhouses, duplexes, or other housing types, and if a town desires to increase the density, or encourage developers to use cluster zoning, the by-law may allow higher than normal densities (for that district) as an incentive to cluster units and leave larger areas of contiguous open space.

Cluster zoning is used to protect environmentally sensitive areas or portions of sites such as steep slopes, woodlands draining into ponds, etc. It is usually combined with a special permit procedure so that a developer would obtain a special permit in order to use the cluster concept in a residence zone.

3. Large lot zoning, one dwelling unit on two to five acres, is usually used in areas of poor drainage, steep slopes, or in fragile and sensitive landscapes. Areas which do not have municipal water or sewage may require large lots to insure the adequate separation of on-site septic tanks and water supply wells.

In some cases, the purpose of large lot ordinances is the preservation of an area's character. Care must be exercised when using large lot zoning not to create an exclusionary effect. Minimum lot areas may not be made so large that a private rather than public interest is served. Large minimum lot sizes can also increase the cost of a lot to the extent that it is no longer marketable, thus constituting an unconstitutional confiscation of property without compensation.

.Metropolitan Area Planning Council. 1969. Open Space Law, Volume 4. pp. 28-33.
General discussion of large lot zoning uses and limitations.

.Town of Sherborn, Mass., Zoning By-Law.
Two and three-acre zones in areas where there are soil limitations for septic tanks. There are no municipal water or sewer services.

.Town Soil Surveys, by USDA, Soil Conservation Service. Many interpretive maps will be helpful including depth to water table, slope, limitations for septic tanks and home sites.

4. Flood plain and wetland zoning is an effective means of maintaining the natural hydrologic mechanism of storing and carrying high seasonal and storm flows and of protecting life and property. Building on flood plains can be hazardous to occupants of such structures, and can also increase flood hazards to others in the flood plain. Construction in wetlands can result in both on-site problems and off-site impacts. Uses may be limited or a special permit requirement can provide the review of projects based on specified standards.

.Massachusetts Association of Conservation Commissions.

.Department of Housing and Urban Development, Federal Insurance Administration, Regional Office, Boston, Massachusetts.

.Flood Hazard Boundary Maps

.Natural Flood Insurance Program

.U. S. Army Corps of Engineers

.U. S. Geological Survey

.USDA, Soil Conservation Service

5. Aquifer recharge area zoning is an innovative technique which may be used by communities which rely on groundwater as their source of water supply. Urban development such as high density housing, industry, or shopping centers, with a large percentage of impervious surfaces such as roofs, streets, and parking areas may reduce the recharge of aquifers (groundwater sources). Street runoff, road salts, landfills, septic systems, or industrial wastes can pollute the aquifer, thus destroying or impairing an economical source of municipal water supply.

.EPA. 1975. Performance Controls for Sensitive Lands, pp. 107-157. Practical guide for decisionmakers with clear explanations and model ordinances.

.Town of Amherst, Massachusetts. Proposed Zoning - By-Laws, 1975. Amherst attempted to enact an aquifer recharge zone in October 1975, but it was defeated because of other more controversial sections of the zoning by-law.

6. The critical resource or special conservancy zone may act as an overlay zone in sensitive areas such as areas of steep slopes, wildlife habitats, and fragile vegetation. Development in these zones would require approval and assurance that there would be no adverse environmental effects. In the town of Sunderland, Massachusetts, Zoning By-Law, the Critical Resource District includes a 90-day delay for any construction in the Critical Resource District. During this

90-day waiting period, the town evaluates the acquisition of the property. If the town rejects acquisition, and there are no adverse environmental effects, the development may proceed.

7. Contract zoning and conditional zoning involve the re-zoning of property to a zoning classification with fewer restrictions based on an agreement of conditions between the property owner and the community. This would allow a landowner to develop his property more intensively by granting concessions to the community. The legality of these techniques has been questioned in many states but they have been upheld in Massachusetts.

8. Incentive or bonus zoning establishes a system whereby developers who meet certain conditions are permitted higher profits from more intensive development in return for public benefits. These benefits could be for building in certain areas, providing open space, or providing recreation land. This technique has been commonly used in developed urban areas for the purpose of encouraging attractive buildings with facilities that the public can use and enjoy.

.Town of Natick, Massachusetts. . "Incentive Bonuses" - Philip Herr and Associates, 230 Boylston Street, Boston, Mass. 02116.

.Babcock, Richard F., Banta, John S. 1966. New Zoning Techniques for Inner City Areas.

9. Performance zoning allows for flexible and innovative design and site planning for sensitive areas, such as stream corridors, aquifers, wetlands, and hillsides. The community establishes the way that it wants the land to perform, and then it allows the developer to determine the best method to meet the performance criteria. The advantage of this approach is that it ensures local review in the development of sensitive areas. However, problems arise because few communities have the staff or expertise to enable the proper administration of performance criteria.

.EPA. 1975. Performance Controls for Sensitive Lands: A Practical Guide for Local Administrators.
To be used as a handbook by local planning officials in planning for and regulating the use of five distinct natural areas: streams and creeks, wetlands, woodlands, hillsides, and groundwater recharge areas--included are references of where and how techniques for protecting the sensitive areas are being used.

.Duxbury, Massachusetts, Zoning By-Laws.

.Rahenkamp, Sax, Wells, and Associates, Philadelphia, Pa.
This consulting firm developed the performance zoning system for Duxbury.

Scenic Road Designation

The designation of scenic roads in Massachusetts is authorized by the Scenic Roads Act, Mass. G.L. Ch. 40, s. 15C. If a community designates a road as scenic, road alterations which involve destruction of trees and stone walls in the right-of-way require planning board approval after a public hearing. Some towns such as Leverett, Massachusetts, have designated all town roads as scenic.

.Conservation Law Foundation.

Wetlands Protection

Wetlands Protection is authorized by the Wetlands Protection Act and the Inland Wetlands Restriction Act.

The Wetlands Protection Act (MGL Ch.131, 5.40) regulates, but does not ban development on wetlands and flood plains. The law requires that any person intending to remove, dredge, fill, or alter a wetland must file a "notice of intent" and plans with the local conservation commission. The conservation commission is mandated to impose any conditions on the proposed activity necessary to protect public or private water supplies, groundwater supply, fisheries, and land containing shellfish, to prevent pollution and storm damage, and to control flooding.

2. The Inland Wetlands Restriction Act (Mass. General Laws Ch. 131, s 40A) and The Coastal Wetlands Restriction Law (Mass. G. L. Ch. 130, s 105) are designed to supplement the regulatory approach of the Wetlands Protection Act. These laws authorize the Department of Environmental Management (DEM) to impose development restrictions on designated wetlands and flood plains, after notification of all affected property-owners and a public hearing.

.Massachusetts Association of Conservation Commissions. 1973. Massachusetts Conservation Commission Handbook. pp. 34-42.

.Metropolitan Area Planning Council. Open Space Law, 1972 Supplement. pp. 13-17.

.Conservation Law Foundation.

.Massachusetts Audubon Society, Wetlands Project

Subdivision Control

Subdivision is the process by which undeveloped land is divided into two or more lots for building or sale, if the new lots do not have legally required frontage on an existing public way. Subdividing requires the construction of new rights-of-way and approval by the planning board. Subdivision controls are designed to protect the buyer and the abutting residents from haphazard and poorly planned development by requiring minimum standards for lot size and road frontage, road design, drainage, and the location of utilities and municipal services. Environmental impact statements and plan review and approval may be required.

.Subdivision Control Law. Mass. G.L. Ch. 41, ss. 81K-81GG.

.Massachusetts Department of Community Affairs.

.Metropolitan Area Planning Council. Open Space Law 1972 Supplement. pp. 7-13.
Good discussion of Subdivision Regulation.

Design and Site Review

Communities may take measures to preserve their general appearance both for the purpose of controlling future development and for the purpose of preserving the character of historic areas. The two techniques for exercising such control are design and site review.

Design and site review may be implemented in the following ways: amendment to the zoning by-law to create site plan review process; the creation of a special permit process for the construction of certain types of buildings; zoning amendment to create a special design district; and the creation of a historic district.

One problem which may arise when design or site review is accomplished through the zoning process is that the actual design or site review is performed by the zoning board of appeals. Therefore, the success of the program is dependent upon the interest and expertise of the zoning board of appeals.

Historic Districts

The creation of a historic district protects significant historic areas from the natural attrition which might occur from the encroachment of modern development. Rigorous controls may be imposed in historic districts to prevent visible changes of the historical quality of the area. Many districts prohibit any alteration of building exteriors which includes changing the color of the building. Massachusetts communities that have adopted historic districts include: Nantucket, Boston, Concord, Lexington, Salem, Falmouth, Ipswich and Deerfield.

.Ipswich Historical Commission. 1975. Something to Preserve. Background and detailed descriptions including legal forms and descriptions of Ipswich's historic preservation program.

.Lower Pioneer Valley Regional Planning Commission. 1974. A Future For the Past: Historic Preservation in the Lower Pioneer Valley. Includes discussion on local preservation planning, sources of technical and financial assistance, benefits from preservation and the evolution of the preservation movement.

.Massachusetts Historical Commission. Guidelines for Establishment of Historic Districts.
Explains process of creating a historic district.

.Massachusetts Historical Commission, 40 Beacon Street, Boston, Massachusetts 02108.

Growth Regulations

Growth regulations which control the rate of growth within developments are the most innovative and, in some cases, untested land use control. Care must be exercised in the use of such controls to insure that the constitutional "right to travel" principle is not violated and that one social class is not excluded. Another issue which must be considered is the community's obligation to accept its share of the regional demand.

Two approaches to growth regulations are growth relations and growth stretching. The growth relations technique has been adopted by Ramapo, New York, where it has been tested and upheld by the courts. This system permits residential development only if the developer can demonstrate that certain capital improvements are either available or will be available by the time the project is completed. The municipal services that are considered are: sewers, drainage, public parks, recreation, major road facilities, and fire stations. The growth stretching approach has been adopted by the town of Tisbury, Massachusetts, on Martha's Vineyard, but as yet has not been exercised or court tested. The Tisbury by-law permits the town to require that subdivisions of greater than 7 units be developed at the rate of one-seventh each year of the total proposed lots. This system can prevent sudden surges of growth, but it cannot alter previous development trends.

.Golden v. Planning Board of town of Ramapo, 334 New York State 2d. 138 (1972).
This case describes the Ramapo growth regulations and the ensuing legal issues.

Septic System Regulation

On-site sewage disposal systems are regulated under Title 5 of the Mass. State Environmental Code, which delegates many powers to local boards of health. Good local enforcement of septic system suitability requirements can be a powerful tool in controlling location and, indirectly, amount of growth. Knowledge of soils and natural resource base can be used to identify areas of town which require particularly careful evaluation by the local board of health, due to soil character, slope or proximity to ground and surface water. Local boards of health can adopt regulations more stringent than the state minimums.

TAX POLICIES

In Massachusetts, preferential tax assessment for open space land is authorized for forest land, farm land, and land under a conservation restriction.

Forest land

To qualify under the Forest Tax Law (General Laws, Chapter 61, Sec. 1-7, as amended in 1969 by Chapter 873) forest land must be in parcels greater than 10 contiguous acres with a value not in excess of $400 per acre. The purpose of the law is the preservation of watershed protection and timber-producing land. The land must be managed under an approved plan and the local board of assessors must classify land as forest land to qualify for the tax reduction.

Farm land

The Farmland Assessment Act (General Laws, Chapter 61A) provides for taxation based on the agricultural use of the land, not for its speculative or real market value. To quality the agricultural land must be greater than five acres and have a gross sale of agricultural products of at least $500 per year.

Land under Permanent Restriction

Under Massachusetts General Laws, Chapter 59, Sec. 11, land under permanent restriction, such as a conservation restriction, must be assessed as a separate parcel. Based on the value with the restriction, this will normally result in lower taxes to the owner.

- Conservation Law Foundation
- Massachusetts Department of Food and Agriculture
- Massachusetts Division of Forests and Parks

TRANSFER OF DEVELOPMENT RIGHTS

Transfer of Development Rights (TDR) is one of the more recent techniques to be utilized for the protection and preservation of natural resources areas. TDR's are based upon the principle that a parcel of land is comprised of a set of rights or fees which may be considered as a whole (fee simple) or separately (less than fee simple). Development rights may be sold or transferred in the same manner as mineral rights and utility easements.

Easements which prohibit development or a change in the character of the land have the same effect as TDR systems. TDR's extend the easement process to include an additional step. Land in one place is protected by the sale of development rights (like scenic easements) and then the development rights are utilized elsewhere by a developer to increase density within a predetermined maximum.

Four applications of TDR of different scale and purpose may be utilized by communities:

1. Transferring rights to adjacent property--This system is analogous to present cluster zoning, as provided for by the Zoning Enabling Act;
2. transferring rights within a district--This system has been considered to protect historic landmarks by transferring the density of the landmark to another portion of the district (see Costonis, 1974);

3. Transferring rights to different districts--This system allows for the protection of open space, agricultural land and environmentally sensitive areas by transferring the density of development which would have occurred in these areas to other districts which are more suitable for development;

   In Massachusetts, a limited form of the TDR approach has been incorporated into the zoning by-law of Sunderland. That town hopes to preserve some of its agricultural land by permitting the transfer of the dwelling units which could have been built thereon to land within cluster developments, resulting in clusters with a higher density than would otherwise have been allowed. This density transfer is conditioned upon the signing of restrictions which limit the agricultural land involved in the transfer to agricultural use.

4. TDR's as a total land use package--Proposals for Maryland and Fairfax Counties, Virginia, represent the most extensive application of TDR. Under these systems, all land is assigned development rights, but development is allowed only where indicated by the comprehensive plan. In order to build in development areas, developers must buy development rights.

.Costonis, John J., 1973, "Development Rights Transfer: An Explanatory Essay." In The Yale Law Journal. Technical, legal analysis.

.Costonis, John J., 1974, Space Adrift: Landmark Legislation and the Marketplace.
Detailed discussion of proposed historic preservation plan for Chicago, with general applications of TDR's.

.Rose, Jerome G., ed., 1974, The Transfer of Development Rights: A New Technique of Land Use Regulation.
Compilation of TDR techniques and applications, citing many examples of existing programs and proposals.

.Sunderland, Massachusetts, Zoning By-law. 1975. Philip Herr and Associates--Preservation of prime agricultural land by transferring density to "open space communities."
Transfers have not occurred as of this writing.

LOCATION OF COMMUNITY SERVICES (INFRASTRUCURE)

The location of infrastructure, such as roads, sewers, and utilities, can have a major effect on where, when, and how new development will occur. Municipal boards, private groups, and the general public should all be advised of future plans for municipal services and contribute to decisions about their location. Public hearings, required for all projects with federal fundings, are ideal opportunities for discussion of the issues.

DESIGN, CONSTRUCTION, AND OPERATION

This final technique is the most direct method for a community to develop and manage its natural resources. Communities may seek technical assistance in the preparation of plans for wildlife areas, recreation areas, and other conservation-oriented areas. Financial assistance may also be available for certain projects, through a variety of federal programs. The scale or size of project can vary from a conservation plan for a single site to the design of flood control systems for an entire watershed.

.SCS. The Watershed Protection Handbook

Guidance and a set of procedures for use in preparation of contract documents, advertising for bids, and administration of the contract.
This is available at any SCS office.

.Local Conservation District.

.Soil Conservation Service.

.Consulting Engineers and Landscape Architects.

.Division of Conservation Services.

III. WHERE TO GO FOR HELP

This section identifies the many federal, state, quasi-public agencies, and private groups that have an expertise in some aspect of land and water use planning. Many of these agencies and groups have been established to serve the public and should be consulted when land use problems arise. Rather than give an in-depth discussion, this section will briefly describe the agency or group function and explain how to contact them. For a more complete listing of natural resource agencies, see:

.Massachusetts Cooperative Extension Service, 1975, Massachusetts Natural Resource Agency Directory. Publication No. 29, University of Massachusetts, Amherst, Massachusetts.

FEDERAL

U. S. Environmental Protection Agency (EPA)
Room 2203, John F. Kennedy Federal Building
Boston, Massachusetts 02203.

The EPA is one of the most influential federal agencies in affecting land use. It is the mandate of EPA to control and prevent problems of air and water pollution from solid waste, pesticides, radiation, and noise. EPA has established minimum pollution levels for air, water, solid waste, and noise pollutants, in addition to monitoring these potential hazards. EPA has also been very important in sewage treatment plant siting and construction at the municipal, regional, and river basin scales. The current EPA program which could be the most influential in land use control is the "208" Water Quality Program. This program is directed at all wastes which effect water quality, including such non-point sources as sanitary landfills, private septic systems, construction and mining activities.

U. S. Department of Housing and Urban Development (HUD)

Regional Administrator
John F. Kennedy Federal Building
Boston, Massachusetts 02203

Area Director
HUD Boston Area Office
15 New Chardon Street
Boston, Massachusetts 02114

The Section 701 Comprehensive Planning Assistance program of the National Housing Act continues, with HUD paying two-thirds of the cost of state or community planning studies. Communities, other than large cities, can apply for 701 assistance through Regional Planning Councils or the Bureau of Planning Programs, Massachusetts Department of Community Affairs, as long as a study is geared to a comprehensive planning effort.

The HUD National Flood Insurance Program can have a significant effect on local land use. The purpose of the program is to help protect lives and property from floods by regulation of flood plain development. Communities may qualify for the program by initiating a planning process for the flood plain and by adopting flood plain zoning ordinances.

Landowners in communities that have adopted the program may purchase flood insurance at substantially reduced rates. Through this program, the flood plains of all participating communities are being mapped.

HUD's Community Development Block Grant Program provides communities with funds for a variety of projects, including certain natural resource and recreation development activities.

U. S. Department of Agriculture
Soil Conservation Service
29 Cottage Street, P. O. Box 848
Amherst, Massachusetts 01002
(413) 549-0650

Purpose: The Soil Conservation Service is a technical soil and water conservation agency of the U.S. Department of Agriculture. It is responsible for developing and carrying out a national soil and water conservation program, and to provide leadership in conservation, development, and productive use of the Nation's soil, water, and related resources.

Activities: The Soil Conservation Service in Massachusetts carries out its work mainly through cooperation with the fifteen conservation districts in the state. (See inside back cover for district offices.)

.Assists farmers and landowners in preparing and carrying out conservation plans and in the application of conservation practices.

.Assists groups and units of government with its soil and water conservation and resource development programs. Provides technical assistance to communities in inventorying, planning, and implementing conservation measures for the wise use of its soil, water, and related natural resources.

.Carries out the responsibilities of the U.S. Department of Agriculture (USDA) in watershed protection and flood prevention projects and in river basin surveys and investigations.

.Administers the federal part of the national cooperative soil survey.

.Provides leadership in USDA's land inventory and monitoring program.

.Assists the Agricultural Stabilization and Conservation Service in the development of USDA's Rural Environmental Conservation Program, provides technical assistance to farmers and ranchers participating in the cost-sharing provisions of that program, and provides technically adequate designs and specifications for jobs undertaken.

.Provides technical assistance in the planning and application of soil and water conservation practices financed by loans from the Farmers Home Administration.

.Has departmental leadership in assisting in the establishment of income producing recreation areas on private land and public recreation areas in watershed protection projects.

.Helps local sponsors develop and carry out resource conservation and development plans.

.Assists communities in inventorying its natural resources and in preparing plans of the natural resource base resulting in the maintenance and enchancement of the communities' environmental quality.

.Gives technical help in rural areas development, cropland conservation and related activities involving wise use of land and water resources.

U.S. Geological Survey (USGS)
District Chief
Water Resources Division
Room 2300, J.F.Kennedy Federal Building
Boston, Massachusetts 02203
(617) 223-2824

The programs of the USGS include studies of ground and surface water resources, topographic mapping, and geological mapping.

STATE

Office of State Planning (OSP)
One Ashburton Place
Boston, Massachusetts 02108

The Office of State Planning was established in February 1975 by the Governor to serve as the central planning agency for the state. OSP has no regulatory authority. To date, its function has been to coordinate the policies and activities of state agencies to minimize conflicts between them. This purpose is also the focus of the OSP preliminary draft of Towards a Growth Policy for Massachusetts, 1975.

In addition to the Growth Policy Statement, the OSP is administering the State Growth Policy Development Act which will be used as a basis for developing state growth policy.

The Executive Office of Environmental Affairs (EOEA)
100 Cambridge Street
Boston, Massachusetts 02202
(617) 727-7700

The purpose of the Executive Office of Environmental Affairs is to protect and improve the quality of the natural environment and its resources. EOEA has jurisdiction over such functions as pollution control, land use planning, outdoor recreation planning and facilities, planning and monitoring of water resources and supplies, enforcement and administration of the Massachusetts Environmental Policy Act.

All of the agencies under EOEA are available to assist communities in some capacity regarding their natural resources. The Division of Forests and Parks and the Division of Fisheries and Wildlife, both members of the Natural Resources Technical Team, are discussed below.

Massachusetts Division of Forests and Parks

100 Cambridge Street
Boston, Massachusetts 02202
(617) 727-3180

The purpose of the Division of Forests and Parks is to promote the wise use of the state's natural resources. Their activities include: forest improvements; inventory of state forest land; reforestation; study and control of tree diseases and insect pests; mosquito abatement; recommendation of safe and proper pesticides; administration of state parks and forests; forest fire protection; and technical assistance on open space issues to other agencies, communities, organizations, and individuals.

Massachusetts Division of Fisheries and Wildlife

100 Cambridge Street
Boston, Massachusetts 02202
(617) 727-3151

Purpose: To protect, enhance, and otherwise to manage the fish and wildlife resources of the Commonwealth for the greatest benefits to the public coincident with the highest use of the resource.

The Division of Fisheries and Wildlife is under the supervision and control of the Five Man Board. They have power of appointment of the director and superintendent. The board sets policy and votes on regulations.

Activities:

.Promulgation of regulations pertaining to protection and use of the resource.

.Control of the resources by licensing and permit systems for hunting, fishing, trapping, rearing, liberation, and other uses.

.Improvement of habitat for fish and wildlife.

.Acquisition of lands and waters for public use relating to enjoyment of fish and wildlife resources.

.Propogation of fish and wildlife species and release to suitable environments.

.Research programs to increase basic knowledge, to develop improved methods of rearing and management, and to assess results of various programs.

.Dissemination of information and establishment of educational programs relating to public understanding and acceptance of highest uses of the fish and wildlife resources.

.Providing technical assistance relating to fish and wildlife.

.Coordinating fish and wildlife programs with activities and programs of other public and private interests.

.Planning for recreational use of fish and wildlife management areas.

.General management of the resource by means of field surveys, construction and improvement to roads, trails, buildings, bridges, boat ramps, etc., reclamation, law enforcement assistance, nuisance control, etc.

Massachusetts Division of Conservation Services

100 Cambridge Street
Boston, Massachusetts 02202
(617) 727-1552

Purpose: To assist communities, agencies, groups, organizations, and individuals in instigating and maintaining a sound program for conservation and development of open space and recreational areas.

Activities:

.Administer Self-Help Program assisting communities financially to acquire open space areas.

.Administer Land and Water Conservation Fund programs as provided by the Bureau of Outdoor Recreation.

.Coordinate activities of the 15 Massachusetts Conservation Districts.

.Develop and promote education in conservation and development of renewable natural resources.

.Develop liasion with other public agencies concerning renewable natural resources.

.Disseminate pertinent information to conservation districts and conservation commissions.

.Assist regional planning districts in relevant matters.

Massachusetts Department of Environmental Quality Engineering (MDEQE)

100 Cambridge Street
Boston, Massachusetts 02202
(617) 727-7436

The MDEQE is responsible for protecting the public against a wide range of environmental hazards and pollutants. The department assures the safe disposal of solid and water carried wastes from housing and industry. The MDEQE establishes minimum standards for drinking water quality, septic tank system regulations, and pollutant discharges into surface waters. It is also concerned with appeals under the Wetlands Protection Act and with construction in waterways.

Massachusetts Cooperative Extension Service

Stockbridge Hall
University of Massachusetts
Amherst, Massachusetts 01003
(413) 545-2766

The Extension Service serves as the educational arm of the land-grant colleges and universities. They provide educational assistance, analysis, interpretation, and dissemination of information. Their programs involve agricultural production and marketing, natural resources development and use, home economics and consumer services, and youth (4-H).

On a county basis, the County Extension Service provides assistance in Community Resource Development by:

.Providing leadership in developing and coordinating Community Resource Development Programs designed to help people solve community or group problems.

.Evaluating and developing alternative uses and methods of using and managing land.

.Identifying and improving controls of the biological, chemical, and economic factors of air, water, and land pollution.

.Applying soil classification principles and practices for the improved use and management of soils.

.Understanding and applying the principles and practices of regional and community resource planning; developing resource inventories and descriptions.

.Understanding the environmental biology of animals and indigenous and naturalized plants and the conditions necessary to maintain or improve the quality of the environment.

Activities:

.Provide advice to communities regarding planning, zoning, housing, and development.

.Establish a training program for municipal personnel in planning, parks, and recreation work.

.Discharge duties imposed by law relating to formation of any new towns.

.Formulate and submit annually to the Governor and the General Court a program in community and environmental development including recreation centers, urban parks, beautification, and recreation.

Massachusetts Department of Public Works (MDPW)

100 Nashua Street
Boston, Massachusetts 02114
(617) 727-4897

The primary function of the Massachusetts Department of Public Works is the planning, construction, and maintenance of the state highway system. The MDPW allocates federal and state funds for appropriate projects. Road improvements, either on existing or new rights-of-way, can encourage development by reducing travel time and increasing accessibility.

Regional Planning Agencies

The function of the 13 regional planning agencies in Massachusetts is primarily advisory. They make comprehensive plans for and recommendations to the cities and towns, and they coordinate such regional planning

activities as environmental quality (pollution control), transportation, recreation, and housing, all of which clearly transcend local boundaries. Finally, regional commissions act as clearing houses for many federal and state programs.

Massachusetts Conservation Districts

The 15 Conservation Districts in Massachusetts review soil, water, and related natural resource problems and establish priorities of where and how technical assistance can be used most efficiently. Conservation Districts offer a variety of services to communities and landowners, such as agricultural land planning, improvement of land for wildlife, and reduction of erosion hazards. See inside back cover for a list of the Conservation Districts.

QUASI-PUBLIC AGENCIES

Watershed Associations

Watershed associations provide many services within their river basin boundaries. River basins are commonly referred to as the most logical natural boundaries. Privately-funded watershed associations act as clearing houses for local environmental information and for the coordination of river basin planning activities.

Nature Conservancy

294 Washington Street
Boston, Massachusetts 02108
(617) 542-1908

The Nature Conservancy is a Connecticut-based private preservation trust that seeks to acquire sensitive and regionally significant resources to prevent their development and destruction. The Nature Conservancy can

provide assistance and information concerning fund raising techniques, ways to encourage donations, and tax benefits accrued by varying combinations of gifts and acquisition.

The Trustees of Reservations

224 Adams Street
Milton, Massachusetts 02186
(617) 698-2066

The Trustees of Reservations is a charitable nonprofit organization whose goal is to preserve places of environmental and historic significance for the public. To date, the Trustees maintain 53 open space and historic areas which total more than 11,800 acres of seashore, woodlands, rivers, wetlands, and wildlife areas.

Massachusetts Audubon Society

South Great Road
Lincoln, Massachusetts 01773
(617) 259-9500

The Massachusetts Audubon Society is a private environmental education agency whose primary purpose is to increase public awareness of the natural environment. At present, the Society manages 9,000 acres in 56 parcels in Massachusetts, including 14 wildlife sanctuaries which are open to the public. In addition, the Society sponsors the Wetlands Project, a special program to increase community awareness of the importance of wetlands and flood plains to the environment.

Conservation Law Foundation of New England, Inc.

3 Joy Street
Boston, Massachusetts 02108
(617) 742-2540

The Conservation Law Foundation (CLF) provides legal assistance on environmental issues to citizens and town boards. CLF specializes in legal interpretation and research, with the objective of disseminating useful information to towns for the maximum utilization of existing environmental legislation.

New England Natural Resources Center

506 Statler Office Building
Boston, Massachusetts 02116
(617) 542-9370

The New England Natural Resources Center is a nonprofit organization formed to feature education and communication to bring about new environmental management concepts for New England. The objective of the Center is to improve and strengthen the flow of environmental information and understanding among all sectors of the New England community. A recent project of the Center was to catalog close to 5,000 natural areas of New England based on natural characteristics, location, size, level of significance, and present threat to the area.

Massachusetts Federation of Planning Boards, Inc.

420 Washington Street
Braintree, Massachusetts 02184
(617) 843-5486

The purpose of the Federation of Planning Boards is to promote town, city, and regional planning by assisting planning and appeal boards. The Federation provides specific advice to any member board upon request.

Massachusetts Association of Conservation Commissions

Lincoln-Filene Center
Tufts University
Medford, Massachusetts 02155
(617) 628-500, Extension 352

The Massachusetts Association of Conservation Commissions (MACC) is a nonprofit association which provides assistance to local conservation commissions. It encourages coordination and cooperation with governmental agencies to promote conservation. The MACC also has prepared one of the most useful guides for the conservation of natural resources, The Massachusetts Conservation Commission Handbook.

Massachusetts Public Interest Research Group, Inc. (Mass. PIRG)

120 Boylston Street
Boston, Massachusetts 02116
(617) 423-1796

Massachusetts PIRG is a nonprofit corporation which investigates, lobbies, and litigates to defend citizen rights; and advocates the public interest in a variety of consumer, energy, and environmental projects.

IV. SELECTED BIBLIOGRAPHY

This bibliography is divided into two sections: first is a list of general references which apply to all techniques and are easily understood by nonprofessionals; second, is a much larger listing of references, many of which are legal, technical, and very detailed. This second listing should be referred to when further information on a specific technique is desired.

GENERAL REFERENCES

Council of Environmental Quality. 1974. "Land Use." Chapter 1 In: Fifth Annual Report on Environmental Quality. U.S. Government Printing Office.

Ellis, Robert A. and Alexandra D. Dawson. 1973. Massachusetts Conservation Commission Handbook. Massachusetts Association of Conservation Commissions, free.

Kline, Elizabeth. 1975. Protecting Open Space, A Guide to Selected Protection Techniques. Society for the Protection of New Hampshire Forests, Concord, New Hampshire, $2.00.

League of Women Voters. 1975. Land Use, Can We Keep Public and Private Rights in Balance, League of Women Voters Education Fund, $.75.

Massachusetts Cooperative Extension Service. A Massachusetts Heritage, a periodical publication of the Community Resource Development Program.

_____. Revised 1975. Massachusetts Natural Resource Agency Directory. Compiled by John H. Noyes, Publication No. 29.

Metropolitan Area Planning Commission. 1969. Open Space and Recreation - Program for Boston, Volume 4: Open Space Law Government's Influence Over Land Use Decisions, by Stephen F. Ells, MDC and DNR, free.

_____. 1972. Open Space Law, 1972 Supplement. Alexandra Dawson.

Redlich, Susan. 1974. Guiding Growth: A Handbook for New Hampshire Townspeople. Society for the Protection of New Hampshire Forests, Concord, New Hampshire, $1.50.

Rockefeller Brothers Fund, Reilly, William K., ed. 1973. The Use of Land: A Citizen's Guide to Urban Growth. A Task Force Report by the Rockefeller Brothers Fund. Thomas Y. Crowell Company, New York, $3.95 - paper.

SPECIFIC AND TECHNICAL REFERENCES

American Law Institute. 1975. A Model Development Code. $15.80.

Babcock, Richard F. 1966. The Zoning Game, Municipal Practices and Policies. University of Wisconsin Press, Madison, Wisconsin, $3.50.

_____ and Fred P. Bosselman. 1973. Exclusionary Zoning, Land Use Regulation and Housing in the 1970's. New York: Praeger Publishers, $3.50.

_____ and John S. Banta. 1973. "New Zoning Techniques for Inner City Areas," In: ASPO, Planning Advisory Service, Chicago.

Bosselman, Fred P., David Callies, and John Banta. 1973. The Taking Issue. Prepared for the Council on Environmental Quality, Washington, D.C., U.S. Government Printing Office, $2.70.

_____ and David Callies. 1971. The Quiet Revolution in Land Use Control, for the Council on Environmental Quality, U.S. Government Printing Office, $3.25.

_____. 1974. EPA, Authority Affecting Land Use. Chicago, Ross, Hardies, O'Keefe, Babcock, and Parsons. Distributed by NTIS, p. 99.

Brooke, Mary E. 1970. "Bonus Provisions in Central City Areas." In: ASPO, Planning Advisory Service. Chicago.

Burchell, Robert Wm. and David Listokin. 1975. The Environmental Impact Handbook. Center for Urban Policy Research, Rutgers University, New Brunswick, New Jersey, $8.95.

Costonis, John J. 1973. "Development Rights Transfer, An Exploratory Essay." In: The Yale Law Journal. 83:75.

_____. 1974. Space Adrift: Landmark Legislation and the Marketplace. University of Illinois Press, Urbana, Illinois, $10.00.

Dawson, Alexandra D., Esq., and Gregor I. McGregor. 1975. Environmental Law, $4.00.

EPA. 1975. Performance Controls for Sensitive Lands: A Practical Guide for Local Administrators. EPA #600/5-75/00.

Department of Community Affairs. 1974. Building Moratoriums in Massachusetts - Their Uses, Effects, and Legal Implications. Research Document No. 5.

Fishman and Gross. 1972. "Public Land Banking." Case Western Law Review. Volume 23, No. 4, pages 897-975.

Franklin, Herbert M., David Falk, and Arthur Levin. 1974. In-Zoning - A Guide for Policy-makers on Inclusionary Land Use Programs. Washington, D.C.: The Potomac Institute, $3.50.

Fitch, Lyle C. and Ruth M. Mack. 1974. "Land Banking: In: Harriss, Lowell C., ed. The Good Earth of America. The American Assembly, Prentice-Hall, Inc., New Jersey, $2.95.

International Independence Institute, Swann, Robert S., et al. 1972. The Community Land Trust, A Guide to a New Model for Land Tenure in America. Cambridge, Massachusetts: Center for Community Economic Development, $3.50.

Ipswich Historical Commission. 1975. Something to Preserve. $4.00.

Kusler, John A. 1972. "Open Space Zoning: Valid Regulation or Invalid Taking." In: Minnesota Law Review, 51:1 pp. 1-81. November.

Lower Pioneer Valley Regional Planning Commission. 1974. A Future for the Past: Historic Preservation in the Lower Pioneer Valley.

Massachusetts Department of Community Affairs. 1974. Building Moratoriums in Massachusetts - Their Uses, Effects, and Legal Implications. Research Document No. 5.

Massachusetts Zoning Enabling Act, Chapter 40A, General Laws.

_____ Municipal Planning/Subdivision and Control Legislation, Chapter 41, General Laws.

Office of State Planning, Commonwealth of Massachusetts. 1975. Legal Authority for Guiding Growth.

Peskin, Sarah. 1976. Guiding Growth and Change: A Handbook for the Massachusetts Citizen. Massachusetts Audubon Society, Lincoln, Massachusetts, March.

Platt, Rutherford H. 1971. Open Land in Urban Illinois, Roles of the Citizen Advocate. Dekalb, Illinois: Northern Illinois, University Press.

Rose, Jerome G., ed. 1974. The Transfer of Development Rights: A New Technique of Land Use Regulation. Center for Urban Policy Research, Rutgers University, New Brunswick, New Jersey, $12.95.

Scheffey, Andrew J. W. 1969. Landscape and Community, Conservation Commissions in Massachusetts. Massachusetts Audubon Society.

Urban Land Institute. 1975. Management and Control of Growth: Issues, Techniques, Problems, Trends. 3 volumes.

U.S. Department of Agriculture, Cooperative Extension Service. 1967. Zoning--An Aid To Community Resource Development. U.S. Government Printing Office, Washington, D.C. PA-814, p. 15, $15.00.

_____, Soil Conservation Service. 1975. Guidelines for Soil and Water Conservation in Urbanizing Areas of Massachusetts. Amherst, Massachusetts.

Van Alstyne, Carol, ed. 1972. Land Bank Handbook. Greensboro, North Carolina: Piedmont Triad Council of Government.

Williams, Norman, Jr. 1975. American Planning Law: Land Use and the Police Power, Chicago: Callegan Company.

APPENDIX H - REFERENCES

Andrews, William A., Ed. (1974) Terrestrial Ecology. Ontario: Prentice Hall of Canada.

Baldwin, H. L. and C. L. McGuinness (1963) A Primer on Ground Water, U.S. Geological Survey, U.S. Government Printing Office, Washington, D.C.

Berg, Barthrop T. (1975) A Methodology of Determining Development Suitability for Urban Land Use. Thesis: Department of Landscape Architecture and Regional Planning, University of Massachusetts, Amherst, Massachusetts.

Bishop, A. B., et al. (1974) Carrying Capacity in Regional Environmental Management. U.S. Environmental Protection Agency, Washington, D.C.

Bornemann, Geoffrey. (1975) Toward a Sub-model for Ecosystem Stability in the Natural Resources Planning Program. Thesis: Department of Landscape Architecture and Regional Planning, University of Massachusetts, Amherst, Massachusetts.

Brewer, Michael F. and Patrick Petersilia. (1974) "Carrying Capacity as a Potential Guide for Community Growth and Regional Development," A National Public Works Investment Policy, background papers prepared for the Committee on Public Works, U.S. House of Representatives. U.S. Government Printing Office, Washington, D.C.

Chandler, T. J. (1970) "Mankind's Impact on the Atmosphere." The Geographer Magazine. 42(2): 83-90.

Clawson M., R. Heldand, and C. Stoddard. (1960) Land for the Future. Resources for the Future, Inc., Baltimore: John Hopkins Press.

Coates, W. H. and J. N. Noyes, Ed. (1969) Conservation for the Commonwealth. Twenty Years of Progress and a Look at the Future in the Bay State's Conservation Districts. Cooperative Extension Service, University of Massachusetts in cooperation with the U.S. Department of Agriculture and SCS; Publication No. 29.

Colman, Steven L. (1974) An Analytical Evaluation of the Environmental Quality Planning Program of the Soil Conservation Service. Thesis: Department of Landscape Architecture and Regional Planning, University of Massachusetts, Amherst, Massachusetts.

Conservation Foundation. (1974) "Carrying Capacity Analysis is Useful but Limited." Conservation Foundation Letter (June 1974).

Cooper, Ronald. (1974) An Application and Evaluation of Three Landscape Planning Models for the Town of Granby, Massachusetts. Thesis: Department of Landscape Architecture and Regional Planning, University of Massachusetts, Amherst, Massachusetts.

Cooperative Extension Service. (1974) Wildlife in an Urbanizing Environment. Amherst, Massachusetts.

Cotner, Skold and Krause. (1975) Farmland: Will There Be Enough? Economic Research Service, U.S. Department of Agriculture, ERS-584.

Cudnohufsky, Walter L. (1970) "Qualities of Landscapes That Please." The Massachusetts Heritage. Planning and Resource Development Program--Cooperative Extension Service in cooperation with the U.S. Department of Agriculture Vol. VIII (Dec.) #4.

Dasman, Raymond F. (1964) Wildlife Biology. New York: John Wiley and Sons, Inc.

Economic Research Service. (1971) Agriculture in the Environment. Bulletin No. 481.

Environmental Policy Division Congressional Research Service. (1975) "A Selection of Recent Articles and Studies on Land Use Policy Issues and Activities in the United States." Readings on Land Use Policy. Library of Congress. U.S. Government Printing Office, Washington, D.C., pp. 321-356.

Gabrielson, Ira. (1967) Wildlife Conservation. New York: The MacMillan Co.

Geraghty and Miller, Inc. (1973) The Ground Water Environment, Port Washington, New York.

Gill, D. and P. Bonnett. (1973) Nature in the Urban Landscape: The Study of City Ecosystems. Baltimore: York Press.

Hansen, R. P. (1968) "Urban Open Space: Psycho-Socio and Legal Dimensions." Man and the Quality of His Environment. Western Resources Conference. 1967, Boulder, Colorado: University of Colorado Press, pp. 209-220.

Hartley, Brent A. (1975) "Current Management Practices on the Baltimore Municipal Watersheds." Municipal Watershed Management Symposium Proceedings. USDA Forest Service, General Technical Report NE-13.

Hawaii Environmental Simulation Laboratory. (1975) "Carrying Capacity Analysis in Context: Application to Growth Management." Hawaii Report to the 8th Legislature. University of Hawaii, Honolulu, Hawaii.

Higbee, Edward. (1972) The Squeeze. New York: William Morrow Co.

Hirshfleifer, Jack, et. al. (1960) Water Supply. Chicago, Illinois: University of Chicago Press.

International Union for Conservation of Nature and Natural Resources. (1967) Towards a New Relationship of Man and Nature in Temperate Lands. No. 8. Morges, Switzerland.

Iowa State University Center for Agricultural and Economic Adjustment. (1961) Dynamics of Land Use: Needed Adjustment. Iowa: Iowa State University Press.

Isgur, B. (1968) Beyond the Planning Dilemma. Journal Soil and Water Conservation, Vol. 23, No. 2, May-June 1968.

Isgur, B. (1972) A Suggested Methodology for Environmental Quality Planning of the Natural Resources Base. The Earth Around Us--Proceedings of the 27th Annual Meeting, Soil Conservation Society of America, August 1972, pp. 166-169.

Isgur, B. and C. Johnston. (1973) How Environmental Planning Can Work. 1973 Yearbook of Agriculture, USDA, pp. 351-357.

Kaiser, Edward J., et. al. (1973) Promoting Environmental Quality through Urban Planning and Controls. U.S. Environmental Protection Agency, Washington, D.C.

Ladd, Elisabeth, et. al. (1975) Wetlands and the Water Cycle. Massachusetts Audubon Society, Lincoln, Massachusetts.

Larson, Joseph. (1973) A Guide to Important Characteristics and Values of Freshwater Wetlands in the Northeast. Water Resources Center, University of Massachusetts, Amherst, Massachusetts, Publication No. 31.

Larson, Joseph and Francis Golet. (1974) Classification of Freshwater Wetlands in the Glaciated Northeast. Bureau of Sports Fisheries and Wildlife, Resource Publication No. 116.

Larson, J. S., et. al. (1976) Models for Assessment of Freshwater Wetlands. Publication No. 32, Completion Report FY-76-5, Water Resources Research Center, University of Massachusetts, Amherst, Massachusetts.

Lavine, David, et. al. (1974) Evaluation of Inland Wetland and Watercourse Functions, Connecticut Inland Wetlands Project, Middletown, Connecticut.

Lee, Douglas B., Jr. (1973) "Requiem for Large-scale Models." AIP Journal (May): 163-178.

Leopold, Luna B. (1968) Hydrology for Urban Planning, A Guidebook on the Hydrologic Effects of Urban Land Use. Geological Survey Circular 554, U.S. Geological Survey, Reston, Virginia.

Leopold, L. B. and W. B. Langbein. (1960) A Primer on Water. U.S. Geological Survey, U.S. Government Printing Office, Washington, D.C.

Liem, Mimi. (1975) Assessment of the Natural and Cultural Values of the Coastal Zone. Thesis: Department of Landscape Architecture and Regional Planning, University of Massachusetts, Amherst, Massachusetts.

Linaweaver, F. P., Jr., et. al. (1967) A Study of Residential Water Use. Baltimore, Maryland: Department of Environmental Engineering Science.

MacConnell, William P. (1975) Remote Sensing 20 Years of Change in Massachusetts 1952-1972 - Classification Manual, Land Use and Vegetative Cover Mapping. Research Bulletin Number 631, Massachusetts Agricultural Experiment Station, University of Massachusetts, Amherst, Massachusetts.

Maire, B. L., et. al. (1976) Wetlands and Floodplains on Paper. Massachusetts Audubon Society, Lincoln, Massachusetts.

Massachusetts Association of Conservation Commissions, (1973) Massachusetts Association of Conservation Commissions Handbook, Beacon Publishing Co., Inc., Acton, Massachusetts.

Massachusetts Department of Environmental Management (1976) Massachusetts Outdoors - Statewide Comprehensive Outdoor Recreation Plan.

McHarg, Ian L. (1971) Design With Nature. New York: Doubleday and Co., Inc.

Michigan Department of Agriculture. (1973) Agriculture Land Requirements: A Projection to 2000 A.D.

National Academy of Sciences. (1974) Productive Agriculture and a Quality Environment. Washington, D.C.

National Park Service. (1934) "Recreational Use of Land in the United States." Part XI of the Report on Land Planning, Superintendent of Documents, Washington, D.C.

Neiring, W. A. (1966) Life of the Marsh. New York: McGraw-Hill.

Odum, Eugene P. (1971) Fundamentals of Ecology. W. B. Saunders, Philadelphia, Pennsylvania.

Ottoson, Howard W. (1964) Land Use Policy and Problems in the U. S. Lincoln: University of Nebraska Press.

Ovington, T. D. (1965) Woodlands. London: English University Press, LTD.

Peskin, Sarah. (1976) Guiding Growth and Change, A Handbook for the Massachusetts Citizen. Massachusetts Audubon Society, Lincoln, Massachusetts.

Pope, Dale E. (1972) Planning for Groundwater Protection: A Case Study of the Hydrologic Implications of Land Use on an Unconsolidated Aquifer, unpublished Master's Degree Thesis, University of Massachusetts, Amherst, Massachusetts.

Reid, George K. (1961) Ecology of Inland Waters and Estuaries. New York: Reinhold Publishing Corporation.

Ridker, Rondla G. (1972) "Future Water Needs and Supplies, With a Note on Land Use." Population, Resources, and the Environment, Volume 3. U.S. Commission on Population Growth and the American Future, U.S. Government Printing Office, Washington, D.C.

Savini, John and J. C. Kammerer. (1961) Urban Growth and the Water Regimen. U.S. Government Printing Office, Washington, D.C.

Shaw, Samuel P. and C. Gordon Fredine. (1956) Wetlands of the United States. U.S. Department of the Interior, Fish and Wildlife Service Circular No. 39.

Siles, Robert H., Jr. (1969) Wildlife Management Techniques. The Wildlife Society, Washington, D.C.

Simmons, I. G. (1974) The Ecology of Natural Resources. New York: John Wiley and Sons, Inc.

Smith, Robert L. (1966) Ecology and Field Biology. Harper and Row, New York, New York.

Smith, Robert Leo. (1974) Ecology and Field Biology. New York: Harper and Row.

Stober, W. J. and L. U. Falk. August (1967) "A Benefit-Cost Analysis of Local Water Supply." Land Economics, Volume 43:3, pp. 328-335.

Swenson, H. A. and H. L. Baldwin. (1965) A Primer on Water Quality. U.S. Geological Survey, U.S. Government Printing Office, Washington, D.C.

Teal, John and Mildred. (1968) Life and Death of a Salt Marsh. Boston: Little and Brown.

Thomas, B. F. (1970) Preserving Our Freshwater Wetlands. New London: Connecticut College Bulletin.

Thorow, C., et. al. (1975) Performance Controls for Sensitive Lands, A Practical Guide for Local Administrators. U.S. Environmental Protection Agency, Washington, D.C.

Tourbier, Joachim and Richard Westmacott. (1974) Water Resources Protection Measures in Land Development: A Handbook. University of Delaware Water Resources Center, Newark, Delaware.

Trefether, James B. (1964) Wildlife Management and Conservation. Boston: D. C. Heath and Company.

U.S. Department of Agriculture. (1974) Farming in the City's Shadow. Agricultural Economics Report No. 250.

U.S. Department of Agriculture. (1974) Our Land and Water Resources: Current and Prospective Supplies and Uses. U.S. Government Printing Office, Washington, D.C.

U.S. Department of Agriculture, Soil Conservation Service. (1975) Guidelines for Soil and Water Conservation in Urbanizing Areas of Massachusetts. Soil Conservation Service, Amherst, Massachusetts.

U.S. Department of Health, Education and Welfare, Public Health Service. (1970) Community Water Supply Study: Analysis of National Survey Findings. U.S. Department of Health, Education and Welfare, Public Health Service, Washington, D.C.

Van Woodtke, Mark. (1970) "The Carrying Capacity of the Los Angeles Basin." Cry California. 5: 22-26.

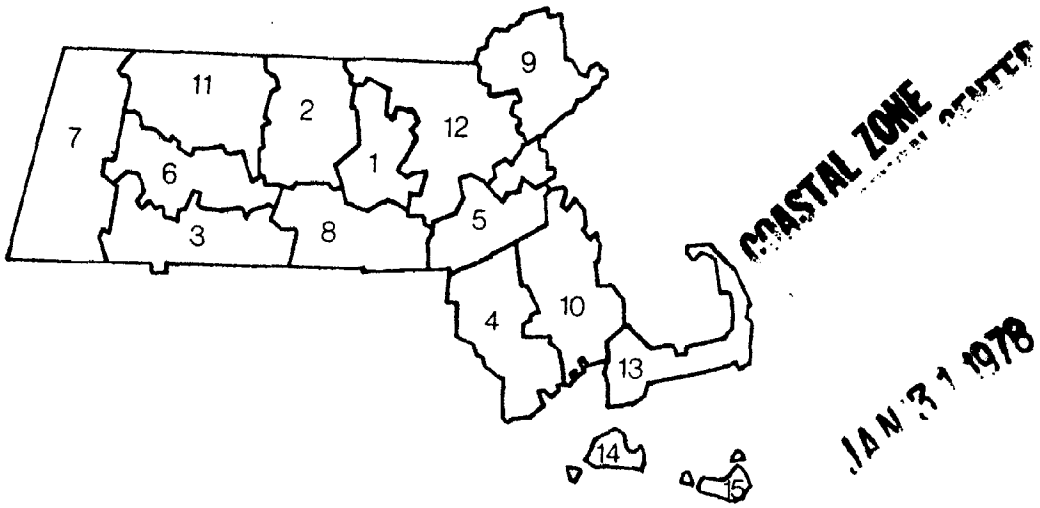
Water Resources Center. (1972) The Christina Basin: The Protection of Water Resources as a Basis for Planning in Developing Areas. Newark, Delaware: Delaware University.

Whittaker, Robert H. (1970) Communities and Estuaries. London: The MacMillan Company.

Whyte, William H. (1968) The Last Landscape. Garden City, New York: Doubleday and Company, Inc.

Zube, Ervin. (1974) "Strategies for Land Use Planning." In Proc., Soc. Am. For Appalachian Sec. Mag. January 31-February 1, Greensboro, North Carolina.

Zube, Ervin H. and B. Isgur. (1975) Agency-University-Local Cooperation in Natural Resources Planning. Journal of Soil and Water Conservation, Vol. 30, No. 5, September-October 1975, pp. 233-235.



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3. Hampden
4. Bristol
5. Norfolk
6. Hampshire
7. Berkshire
8. Southern Worcester
9. Essex
10. Plymouth
11. Franklin
12. Middlesex
13. Barnstable
14. Dukes
15. Nantucket

Applications for NRPlanning Assistance are processed by the Conservation District (CD) office serving the area in which the applicant town is located. The offices of the 15 CD's are within easy reach throughout the Commonwealth.

ACTON (01720) - Middlesex CD,
15 Craig Road, Acton.
Tel: (617) 263-2679

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