

THINKING IN FOREST TIME
A STRATEGY FOR THE MASSACHUSETTS FOREST



Charles H. W. Foster & David R. Foster

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Photographs by D. R. Foster

Front cover: Beaver pond adjacent to the Quabbin Reservoir

Back cover: Millers River watershed

INTRODUCTION

In the fall of 1998, Harvard University's John F. Kennedy School of Government offered a graduate-level course, *Using History to Inform Policy: Lessons from the Massachusetts Forest*. The instructors were Charles H. W. Foster, adjunct research fellow and lecturer, and former Massachusetts state forester, secretary of environmental affairs, and dean of the Yale University School of Forestry and Environmental Studies; and David R. Foster, director of the Harvard Forest.

The course had an enrollment of fifteen students (Appendix A). Nineteen outside lecturers (Appendix B) were invited to share their views and experiences with the class. A special colloquium of national forest history experts was convened to provide added perspective on the relationship between history and policy.

The course was inspired by the recently published history of the Massachusetts Forest, *Stepping Back to Look Forward* (Charles H. W. Foster, editor, Harvard Forest/Harvard University Press, 1998), which chronicles more than three centuries of forest use in the Commonwealth of Massachusetts. Students were asked to identify the principal lessons they learned from the book and to develop policies and actions that would make the current cycle of growth and utilization one of intent and design, not simply an accident of history. In so doing, it was hoped that these future public and private managers would learn how history can and should be used to inform policy.

The first third of the course constituted an introduction to the principles and practices of forestry, culminating in a field trip to the Harvard Forest and metropolitan Boston's Quabbin Reservoir watershed in north central Massachusetts. During the second unit, students systematically examined the historical record pertaining to ecology and land use, economic uses, state forestry programs, private and community forestry, and the national and cultural context for Massachusetts forests and forestry. During the final unit, students posed questions on possible initiatives to invited non-governmental, governmental, and legislative policy leaders. From a

series of substantive and implementation memos developed by student teams, and a set of individual papers (Appendix C), the findings and recommendations of this policy paper have been derived. Its title underscores several important themes that we feel need to be kept in mind.

The importance of "thinking in forest time" echoes a thesis first set forth by Harvard University faculty members Richard E. Neustadt and Ernest R. May, whose own *Thinking In Time: The Uses of History for Decisionmakers* (The Free Press, 1986) has guided national security experts and inspired generations of Kennedy School students in their preparation for public policy careers. We are grateful to Professor May for encouraging us to apply this concept to environmental and natural resources issues.

In brief, the concept asserts that problems occur simply as elements in a continuous time stream — the process by which the present moves to become part of the past. Thus, problem solving in the absence of an historical context can lead to inadequate or even flawed solutions. In the case of forests, this concept is particularly appropriate as historical events, processes or decisions may control future conditions for many centuries — at the very least.

But "thinking in forest time" also identifies a principal problem in forestry today. In Massachusetts, forests grow and mature over periods of 80 to 100 years or more, whereas the ownership of forests changes about once every seven years. Thus, to grow a forest to full maturity requires a dozen or more owners, each committed to completing the full biological and economic cycle — under normal circumstances, an unrealistic expectation. For these reasons, the typical Massachusetts forest will likely be harvested just as soon as it achieves any economic value, thereby depriving the Commonwealth of the full range of goods, services, and values this remarkable resource is capable of delivering.

The subtitle of this book is our answer to this problem — the need for a thoughtful strategy, illuminated by history, to apply reason and intent to the natural process of forest growth and development. In a state like Massachusetts where forests are predominantly privately-owned, and where the tradition of individual freedom is still

fiercely defended, the idea of foresight and intervention may prove anathema to some. But, as the lens of history informs us, for at least the last few centuries of forest growth and utilization, the *laissez faire* approach has determined the management, use, and ultimate condition of the Massachusetts forest. For our current forest, we are convinced that we can and should do better.

Charles H. W. Foster

David R. Foster

THE FORESTS OF MASSACHUSETTS

The vegetation in Massachusetts is controlled by climate, physiography, geology, natural disturbances such as windstorms and fire, and human activities past and present. Excluding Cape Cod, the state is rectangular, 125 miles east to west and 50 miles north to south, and receives approximately 40 inches of precipitation annually. With a mean temperature near 50 degrees F., the climate is very well suited for forest growth. Geology varies, but except for the Connecticut Valley and Taconic Mountains, it is generally acidic and fairly nutrient-poor, producing shallow soils.

Forest zones are broadly determined by temperature, which varies principally with elevation. Southeastern Massachusetts, Cape Cod, and the Islands fall within the pitch pine-oak type, which predominates on sandy soils and is characterized by drought-tolerant and fire-adapted pitch pine, tree and scrub oaks, and huckleberry. Elsewhere, in the coastal lowlands, southern Worcester county, and the Connecticut Valley is the central hardwoods-hemlock-white pine zone; the northern extension of the oak-hickory forest of the central Appalachians and middle Atlantic States. To the north and west, and extending up river valleys in western Massachusetts, is the transition hardwoods zone, characterized by greater amounts of northern species. Higher elevations in the Berkshires and northern Worcester County support northern hardwoods and spruce-fir forests, dominated by sugar and red maple, yellow birch, beech, spruce, and fir.

Natural and Pre-settlement Disturbance

Major natural disturbances affecting the region's forests include windstorm (hurricanes and downbursts), pathogens, ice-storms, and fire. Catastrophic hurricanes are uncommon and generally parallel the path of the 1635, 1815, and 1938 storms, which strongly affected central and eastern Massachusetts. Fire, like windstorms, varied geographically and over time in response to climate, vegetation, and ignition by lightning, Indians, and European settlers. Fires are generally frequent in southeastern Massachusetts where droughty, sandy soils support very flam-

mable and fire-adapted vegetation. In contrast, forests of northern hardwood and hemlock in the Berkshires experience few fires. Although there is extensive debate over the frequency, extent and broad-scale impacts of aboriginal burning, there is general agreement that Indians did burn the New England landscape to create fields and rejuvenate understory browse for deer and other game animals, and that this activity decreased inland from the coast. These frequent and widespread, Indian-caused fires may have had an important impact on the vegetation.

Historical Dynamics

Commencing in the early seventeenth century, European settlement spread inland and up the Connecticut Valley at uneven rates, with the northern portions of Worcester County and the Berkshires settled as late as the late eighteenth century. Initial clearing occurred slowly due to the lack of markets and transportation, however, starting in the late 1700s, the rural economy shifted from home production and local consumption to market-oriented intensive agriculture, and farmers began clearing more forested land. By the mid-nineteenth century most rural towns reached their agricultural and population peaks. However, the start of regional industrial concentration, national transportation networks, and westward expansion signaled the eventual decline of New England agriculture. Hilltowns began a gradual decline and the factories of river valleys and urban centers grew tremendously, while the developing railroad network could transport raw materials and finished products across the land. The new roads and railroads allowed many non-perishable farm products to be shipped from the Midwest less expensively than they could be produced in Massachusetts.

State-wide, peak deforestation for agriculture was reached about 1860 when nearly 70 percent of the land was cleared. Remaining forests were harvested intensively as growing rural populations required large amounts of cordwood for fuel. For example, many hardwood forests were managed using a "coppice" system, in which trees were harvested every 20-40 years, left to resprout, and harvested again. Although fuelwood

represented the greatest demand, hemlock and chestnut were also cut to provide tanbark, lumber was cut for construction, and various woods were used for charcoal production and assorted building materials.

Post-Settlement Dynamics — Post-agricultural and Modern Periods

The decline of agriculture in the second half of the nineteenth century initiated a corresponding expansion and growth of forest. Consequently, the modern forest can be divided into secondary forest on land once cleared, and primary forest on land that remained in forest through the historical period. The secondary forests that established themselves on abandoned fields were often dominated by white pine and, by the late nineteenth century, these forests were harvested across the region for lumber, boxes, and assorted containers. Tremendous volumes of "old-field" white pine and other species were cut, peaking in 1910–1911. In turn, these cutover lands recovered rapidly to produce large tracts of even-aged, young, low-value stands, dominated by oak, red maple, ash, birch, and cherry. The hurricane of 1938 reinforced the effect of the earlier logging as it selectively blew down the tall and susceptible white pine, most of which were then salvaged. Many of the cut-over stands, considered nearly worthless at the time, were acquired by the state and now form the basis of our state forest system.

Humans have been unwitting accomplices in other recent disturbances. In particular, with increasing transport of products internationally, many exotic forest pests and pathogens have been introduced, including the gypsy moth, chestnut blight, Dutch elm disease and, most recently, the hemlock woolly adelgid. Logging and land conversion to suburban use are direct human activities most affecting our forests over recent decades. Significant numbers of people are now building homes on large, forested lots, clearing trees immediately around the buildings and fragmenting the forest land into increasingly smaller parcels. Meanwhile, the maturing forest of Massachusetts has and is being harvested with varying intensity, particularly as environmental disputes have placed limitations on harvesting of

federal lands elsewhere in the country and a strong export market has increased prices. However, despite these pressures, the size and age of trees and the total volume of wood in the Massachusetts forest are steadily increasing.

Present Conditions

Today, open land in rural parts of the state is primarily restricted to broad river valleys and the crests of broad ridges. Urban areas, which developed first along the coast and along major rivers, have spread inland and suburban development has increased, especially near the junctions of major highways. Today, forests predominate outside these zones and in protected reserves; the greatest pressure on these forest areas occurs at the edges of these zones.

The history of our land has favored a modern landscape of even-aged forest stands with sharp boundaries in species composition and forest structure between adjacent stands. Land-use regulations and land ownership boundaries create visible breaks that are perpetuated through time and subsequent ownership changes. The even-aged structure and imposed forest pattern that exist across much of our landscape today increase the potential for future disturbances to be more damaging than they might be in a more compositionally diverse but structurally homogeneous forest. Moreover, the decline in open areas and the relative absence of very young forests has led to a regional decline in species dependent on such habitats.

The human dimensions of our present forest are also worthy of note. For example, fragmentation of forest ownership patterns has reduced the average parcel size to approximately 10 acres, half of what it was a decade ago. The new group of owners has different expectations of the forest and seemingly less commitment to sustainable management than preceding generations. Smaller ownerships have resulted in larger numbers of owners, making it increasingly difficult to reach those who control the bulk of the resource and to coordinate management efforts.

Topping all of these human-related issues has been the steady urbanization of the state's population. Our citizenry is now spatially and psycho-

logically removed from the land. Environmental battles are increasingly fought over growth management, open space, recreational access, and biodiversity without much consideration of the actual biology or resource potential of the forest that forms the basis of most land use in Massachusetts. Yet, in our judgment, the Commonwealth's high levels of education and noteworthy concern for the environment make it perhaps the ideal place to develop and practice innovative and sophisticated forms of forest stewardship.

A COMPREHENSIVE PLAN FOR THE MASSACHUSETTS FOREST

Blessed with an abundance of woodland located within easy reach of its five million citizens, the Commonwealth seemingly needs little incentive to develop a comprehensive plan for its nearly three million acres of productive forest. But appearances can be deceiving. The Massachusetts citizenry literally cannot see the forest for the trees. For example, there is tacit recognition that trees abound, but little realization that trees form larger complexes, *forest ecosystems*, which are carefully shaped and fitted to the land, and *forested landscapes*, which support important natural processes and a wealth of biological diversity. The uses and values derived from forests, such as water, wildlife, recreation, and carbon storage are but dimly understood. Little connection is made between the wood that helps warm our hearths, sustains our business enterprises, and graces our households, and the trees that are needed to produce the material. Aesthetically, of course, trees have always occupied a firm place in the affections of humankind, but principally as backdrop or ornament. Natural forests are too frequently cut down indiscriminately to make way for developments, only to be replaced later at considerable expense with largely exotic plant material. To the average citizen, the prospect of harvesting trees triggers instant environmental concern notwithstanding the fact that carefully managed forests tend to provide more uses, values, and benefits than those lacking responsible stewardship actions. The net result has been a Massachusetts landscape in which forest is quan-

titatively abundant but qualitatively deficient.

A Vision for the Massachusetts Forest

Before proceeding with a comprehensive forest plan, Massachusetts needs to first develop a thoughtful vision of how this extensive resource could be made to contribute more substantially to the present and future well being of the Commonwealth. The visioning process should examine the forest as a whole, from individual trees to entire landscapes, watersheds, and regions. It should reach out to a wide range of interests and be participatory in nature. Upon completion, the public and/or the legislature should validate it. The vision should attempt to answer five basic questions:

1. What is the status of the Massachusetts forest today?
2. How did it get that way?
3. What future conditions do we want to create and why?
4. Where are we now relative to our vision of the future?
5. How should we act to achieve these desired conditions?

To develop the vision that is contemplated, we propose that the secretary of environmental affairs, acting under the provisions of Section 5 of Chapter 21A, establish a forest environment program review board of nine to fifteen individuals who have demonstrated interest, competence, and leadership in matters relating to the Massachusetts forest. The scope of the inquiry should embrace private as well as public forests. The board should include, but not be limited to, members with professional training in forestry and related disciplines. As examples, those with land trust, municipal, watershed, wildlife, and scientific experience and competence would be especially welcome. The board should be given ready access to the technical facilities and resources of Commonwealth agencies but operate entirely independent of them.

In his selection of members and his charge to the board, the Secretary should recognize that the forest is Massachusetts's principal landscape attribute. Thus, in addition to its own physical

attributes, the forest should be evaluated as a contributor of plentiful and pure water, a place for recreation and enjoyment, an important component of biodiversity, a crucial element of open-space conservation, and a source of continued cultural enrichment, education, and inspiration.

The Secretary should encourage a vision of the forest as a means to interconnect disparate programs operating within the Executive Office of Environmental Affairs, thereby advancing the goal of enhanced interagency cooperation. Examples include the land, water, wildlife, and agricultural management activities conducted by state agencies, but also special watershed, wetlands, and biodiversity initiatives; state and local park and conservation land acquisition; areas of critical environmental concern designations; riverways and greenways programs; environmental joint powers agreements; Geographic Information Systems and planning activities; and future actions that may be initiated to contain urban sprawl.

The board should be activated no later than July 1, 1999 and given the goal of completing a draft Massachusetts forest vision by October 1. Thereafter, on behalf of the board, the Secretary should request the Special Commission on Forest Management Practices to conduct public hearings on the proposed vision prior to submission of the board's final report and recommendations to the secretary on or before December 31, 1999.

The Comprehensive Plan

Concurrent with the preparation of the vision, the Secretary would be expected to establish a Department of Environmental Management/Bureau of Forest Development-led interagency task force to prepare a comprehensive plan for implementation of the proposed forest vision. Given the recently-completed state forest inventory update by the U.S. Forest Service, the re-measurement of continuous inventory plots on state forest lands, and the evaluation of state forestry programs currently underway, the undertaking of a state-wide, comprehensive, forest plan would be most timely.

Unlike the earlier visioning process, the state plan should be the responsibility of those most

knowledgeable of the nature and potential of the Massachusetts forest. Thus, it should be prepared by foresters, ecologists, and conservationists with the help of planners — not the reverse — and involve those who are the most likely to be charged with the plan's implementation. A special allocation of federal funds should be sought to assist with the project. Among the broad areas of inquiry should be those relating to management and conservation, utilization, ownership, and public education. In addition, the task force should address the institutional adequacy of forestry programs and services. Areas and specific topics that may be addressed are given below from examples that emerged from class papers.

Management and conservation. The management of state forestlands currently suffers from an acute lack of personnel, program support, and broad-scale vision. The comprehensive management of private and municipal forests is virtually non-existent. The Commonwealth's small complement of public foresters, there to provide services to forest landowners, are currently preoccupied with the administration of state forest cutting practices regulations and the oversight of certifications under Chapter 61, the forest land use classification act. Thus, forest management in Massachusetts has become largely cutting management. At least two remedial initiatives seem worthy of serious exploration. The first would be a determination of priority areas where forest protection and management could be undertaken on a region-wide rather than ownership basis, including provisions for joint public/private action. The case study of the North Quabbin region (see below) is a vivid example of that approach in practice. The second initiative to be considered would be some form of intervention to secure those prime forestlands for the future. Use of timber rights purchases or timber banking approaches would be among the possible options. The state's successful farmland preservation (APR) program could be a useful model here.

Utilization. While we applaud the current efforts to find outlets for underutilized materials, develop and apply new technologies, and create new markets, the potential for applying "green certification" programs more widely in

Massachusetts also seems quite promising. One possibility is a "chain of custody" approach that would enable a consumer to track a forest product back to an ecologically responsible set of management and harvesting practices. A special *Masswood* label, attached to any such products and available to the buyer at a slight product premium, would provide a tangible degree of assurance and represent a significant source of supplementary revenue. In addition, there is a need to examine the economic potential of other products and uses of the forest. The values of water yields and wildlife habitat are already well-known, but associated activities such as the gathering of mushrooms, cones, berries, "greens," and other plant materials, ecological services such as carbon offsets, outdoor recreation, and ecotourism may have significant and undeveloped economic potential for Massachusetts.

Ownership. The response of landowners to Chapter 61's tax deferral provisions is encouraging, but far from realizing the potential for this program. Approximately, one-quarter million acres of Massachusetts's forestland have been so certified. However, less than 10% of eligible landowners are currently enrolled (D. Kittredge, pers. comm.), growth in enrollments has slowed recently, and many of the current ownerships are beginning to change hands. The latter point highlights one of the hidden benefits of the Chapter 61 program: Towns have the right of first refusal to acquire or protect land when it changes hands and thus the program could serve as a major safeguard in the maintenance of open space. Reforms are needed in the present Chapter 61 regulations, and the future of the already certified tracts, especially those on urban fringes, warrants priority attention. Tragically, many of these long-term, managed forests have been lost by having to meet counterproductive state and federal estate tax requirements. In our opinion, forestry interests need to forge new alliances with the state's influential land trust and conservation commission communities, contributing their management competence in return for a more active role in open space protection. The forest planning task force also needs to find ways to extend societal recognition of good stewardship beyond such systems as the

present "Tree Farm" designation. Ways to revitalize the largely moribund town forest system should be an early order of business, too.

Education. Fundamental to all of these areas of concern is the appalling lack of awareness and understanding of forests by the general public. It reminds us of a similar ignorance of the role of watersheds and river basins in the late 1950s, and the remarkable study initiative of the League of Women Voters that helped bring these matters to the attention of ordinary citizens. The development of a state-wide, science-based environmental curriculum for grades K-12 is long overdue in Massachusetts, and this need should be brought directly to the attention of the Secretary of Environmental Affairs' Special Advisory Group on Environmental Education (SAGEE). But for forests and forestry, we particularly favor place-based educational programs based in locally accessible forests where school and community groups can see firsthand how these remarkable environments function and contribute. Such a system of demonstration forests is urgently needed in Massachusetts, especially in urban and suburban areas. The aforementioned Chapter 61 tracts, portions of the metropolitan park system, and some of the smaller state and municipal forests, could fulfill these functions nicely, although the expertise needed to interpret and convey the importance of these lands to students will require development. Consideration should also be given to calling a special state-wide conference on Massachusetts forests. The model might be the Seventh American Forest Congress, convened in Washington under private auspices in February 1996, during which national and regional forest policies were presented and debated. Completion of the visioning and comprehensive planning projects would provide a good reason for such a congress in Massachusetts. From that event could arise the broad-based coalition of interests needed to implement a revitalized statewide forestry program.

Programs and services. Regardless of the particular area of interest, the planning task force needs to keep in mind two cross-cutting issues: the institutional adequacy of present agencies and services, and the funds required to support them. For example, in contrast to the early days

of the Commonwealth, the state's forestry programs are now buried deep within the environmental bureaucracy. No longer can such important issues come readily to the surface. We would urge the Commissioner of the Department of Environmental Management, and the Secretary of the Executive Office of Environmental Affairs, to examine carefully the adequacy and the placement of these functions.

As for funding, there is an urgent need to explore supplemental revenue sources to support and expand forestry services and related conservation activities. At present, the Commonwealth is substantially dependent upon the availability of federal funds for its initiatives. As examples, the present arrangements for the disposition of timber sales revenues should be reviewed. There may be significant disincentives for their development and use. "Green product" certification, as mentioned earlier, may offer significant opportunities for revenue enhancement. In some states (e.g., Alabama), a special license plate has been used to generate funds for forestry education. In some countries (e.g., Japan's "green owner" program) citizens and corporations can buy individual shares in the national forests, an investment that heightens their sense of stewardship and makes them feel closer to their forests.

At the very least, a detailed study should be made of the disposition of the revenues already being generated by the taxation of forest products and industries, the largest portion of which is the sales tax revenue derived from retail sales of lumber and wood products manufactured elsewhere. The promotion of locally produced materials to meet local needs could give Massachusetts wood producers a significant and sizable new market as well as providing new revenues to help with implementation.

Consider for example the prospect of a state self-sufficiency policy for forest and wood products. Such a policy could trigger innovative approaches — cooperatives, wood products exchanges and clearinghouses. It could also stimulate long-term silvicultural practices leading to higher quality products. Far-fetched, you might say, but who would have expected Massachusetts cities and towns to be recycling 40–50 percent of their solid wastes annually as they are now? A

statewide goal of 30 percent wood self-sufficiency for communities outside the metropolitan areas would be a challenging prospect. At the very least, a few towns or regions in the state should be invited to serve as self-sufficiency pilot projects.

IMPLEMENTING THE COMPREHENSIVE PLAN

Private Sector Initiatives

Each of the comprehensive plan elements will be expected to carry its own set of recommendations for implementation. However, using the lessons of the past as prologue, no such program will be successful without active and influential private leadership. Lacking any well-established, recognized, forest environment organization, Massachusetts needs to develop and exert a collective form of leadership, a process certain to be stimulated by the visioning process described earlier, but the advocacy for forestry heard in executive, legislative, and public arenas must still remain clear and forceful. In today's climate of public participation, even governmental actions must be preceded by thoughtful citizen involvement and backed by an informed and supportive public constituency. Thus, of all the implementing actions contemplated, the reconnection of forests to people should command the highest priority.

As one such example, most Massachusetts forests today are simply woods. They have little or no identity. Where they do, they are known principally by ownership (e.g., the Swann Forest), by feature (e.g., the Willard Brook State Forest), or by location (e.g., the Erving State Forest). A program to personalize forests through an improved understanding of their origins and history could be rewarding in many ways. For example, a "broad arrow" forest could designate a site that once produced mast trees for the British navy, a "pauwau forest" to reflect the swamp abodes where native American conjurers might once have gathered to seek divine intervention. Or the appellations chosen might be contemporary in meaning — a "witness" forest to mark an important boundary, or a "mill forest" where a saw or gristmill once existed. The detective work

required to come up with appropriate names would be challenging to citizens, intriguing to schoolchildren, and contribute to education in general. A "name the forest" campaign could lead naturally to an "adopt a forest" program with an eventual state-wide constituency of knowledgeable and committed citizens, and a network of productive and prized forest places.

Private leadership should also be used to underscore the importance of forests and forest products to society as a whole. Consider that an audience of citizens opposed to tree cutting, for example, is apt to be sitting on wooden seats, often behind wooden school desks, in a timber-frame construction building. In addition, the announcement of the meeting, and its results, undoubtedly appear in correspondence, newsprint and other paper-dependent channels. Correcting this anomaly may simply require greater exposure of people to forests and their renewable products through group field trips, study tours, educational materials, and positive personal and family experiences associated with forests. The current disconnect with urban people is particularly egregious. For that reason, non-profit organizations such as the Massachusetts Community Forestry Council have an opportunity for really significant private leadership.

Academic Research and Measurement

In a state marked by such a concentration of higher education, research, and education facilities, it is simply astonishing that so little is being done to harness science and technology for the benefit of the forest and to monitor land-use change and the loss of forests on a timely basis. In an era of satellite imagery there is little excuse for an affluent and densely populated state that relies extensively on high tech businesses not to provide comprehensive records of land-use activity in relationship to changing cultural, biological and physical factors. Outside of the periodic (every fifteen years) Forest Service inventories, there is no systematic, state-wide assessment of the resource on a meaningful scale, nor any attempt to develop an orderly approach to address issues and problems that may arise. Relationships are cordial among the few research institutions con-

cerned with the forest, and between them and the governmental forest administrators, but there is no strategic plan for ongoing measurement and research, nor even a regular, annual occasion at which research results and research needs are exposed to critical review. The recent history of the Massachusetts forest, *Stepping Back to Look Forward*, summarized the situation correctly when it observed that in any other billion dollar resource industry, the ineffectuality of the research and development program would be regarded as a scandal.

Those seeking improvements through the comprehensive forest plan should look first at what seems to be standing in the way — for example, lack of personnel, lack of resources, impediments in the current institutional and procedural systems, perhaps even a fundamental skepticism about the value of research. Rather than a highly structured research and monitoring program, a simple set of opportunities and incentives might be able to trigger naturally the necessary responses. On the other hand, perhaps some of the problems are more endemic — for example, the inability of science-trained individuals to qualify for positions in forestry organizations and agencies, procurement policies that require competitive bidding and set-asides, the inability to enter into long-term contracts for long-term research, and the absence of an advocate for science and technology in an increasingly regulatory public bureaucracy. The creation of Mount Wachusett Community College's Forest and Wood Products Education and Development Center promises to fill an important gap in the marketing and product development phases of forestry, but there are no such centers at present to provide consolidated sets of spatial and ecological data, nor to stimulate and coordinate research. Given our later recommendation for the designation of high-priority forest regions, perhaps the bulk of these capacities should be decentralized to make them more readily available to users and managers. At the very least, urgent attention should be paid to finding a dependable source of funding for research and measurement, and devising an equitable mechanism for allocating and evaluating such investments using recognized peer review and other procedures.

A New Role for Cities and Towns

The retrospective lens of history reveals that we have strayed far from the original concept of Massachusetts forestry. For example, in his 1907 annual report, State Forester Frank Rane made much of the newly authorized local forest wardens as ones "who can intelligently handle forest fires and other forestry matters of vital concern." Indeed, the state forester would later be authorized to conduct inventory, management, and even regulatory activity on a town by town basis using the network of state-approved local forest wardens, a provision that remains on the statute books to this very day.

The encouragement of forestry at local levels was further strengthened by legislative action in 1913 permitting municipalities to own and manage forestlands independent of the Commonwealth. As of 1949, 127 of Massachusetts's 351 cities and towns had established official municipal forests. But regrettably, the promising town system never fulfilled its much heralded potential. In most instances, with the state's active consent, the office of forest warden was allocated to the local fire chief, limiting the activities to the single forestry function of suppressing fires.

Since then, the concept of town-based forestry has fallen into further disrepair — even disrepute — to be replaced by largely state-based concepts of management and regulation, and ownership-based programs and services. At the local level, town forests have literally been "lost"; many exist but few are still administered by formal town forest committees or even acknowledged by citizens and local government. The modern managers, where there are any, tend to be conservation commissions. The modern objectives are generally limited to recreation and open space. The natural, historic connection between communities and forests — what town forest expert Robert L. McCullough characterizes as the dual traditions of culture and stewardship — remains to be rediscovered. The new mandate may well have to be a reawakening through education of the fundamental relationship between humans and nature.

One is tempted to simply dust off the existing

state-local machinery and, by executive action, institute a companion system of local forestry officials. The tools are there if the will could be revived. But what the comprehensive forestry planners must do first is to examine inter-jurisdictional responsibilities with fresh eyes, considering perhaps the delivery of state services through municipal means and even the use of local entities to carry out some regulatory functions. The state's new environmental joint powers agreement enabling act (Chapter 491, Acts of 1996) now permits cross-jurisdictional arrangements of this sort on an area-wide basis. In addition, as towns develop open-space plans, which are required by the Executive Office of Environmental Affairs in order to be eligible for self-help open space acquisition funding, they should be encouraged to recognize the importance of forests at a local and regional level.

Once a prospective, revised role for cities and towns has been defined, a state-wide town forest conference should be called — the first in more than fifty years — to review and approve the policy changes and help reinvigorate the Massachusetts town forest movement. The benefits to be gained can be expected to occur on several levels. A town-based forest advisory capability should be in high demand by local citizens and landowners alike, effectively preconditioning the public for further education, program, and consulting services. But the largest benefit is likely to accrue at the state level. For the first time in its history, an interconnected state/local forestry network would give forestry an organized and influential, grassroots, constituency base.

State Agency Actions

Charged generally with the "perpetuation, extension, and proper management of forest lands within the Commonwealth, both public and private," the state forester has both the obligation and the responsibility to design and carry out programs for this major resource. Thus, the Department of Environmental Management (DEM) is assigned the primary task of preparing the comprehensive plan. Unlike previous plans, we expect this one to concentrate less exclusively on DEM and other state lands, and also to con-

sider the private forests that represent 85 percent of the ownerships in Massachusetts. However, the responsibility for implementing the plan is still expected to fall heaviest on the DEM and its component agencies.

A first step for the comprehensive plan team should be to review and consolidate the various statutory authorities relating to forestry. Reflecting varying periods in history, they are literally scattered throughout the General Laws of the Commonwealth. Many overlap, some are redundant, and most are outdated. A thorough re-codification, tied to a modernized and streamlined vision of the forest, is long overdue.

Much of what may be recommended in the way of changes is likely to be an adjustment of existing programs. For example, the retrospective look now underway at the experience of Chapter 61 may reveal a need for improved base data, more extensive management actions, and even some statutory changes. At the very least, the state needs to regard these tracts not just as managed forests, but as key units of potential open space in a rapidly urbanizing environment. As it stands now, state foresters are engaged actively during the planning and certification stages of the Chapter 61 forests, but tend to become detached until a change in status becomes imminent. By then, it may be too late. Chapter 61 owners should be made to feel that they are a distinct "family" from the time of certification on. They may even need an organization of their own.

Similarly, the provisions of the forest cutting practices act (Chapter 132) serve to moderate the effects of harvests. Their existence is what makes the present cycle of utilization different than its predecessors. The submissions generate an extraordinary amount of useful data on how extensively Massachusetts is actually using its forest resource. However, through the review of cutting applications, there may be a need to be more proactive about encouraging silvicultural practices and achieving sustainable management over the long-term, rather than simply accommodating short-term profit-taking. At present, the information from the approximately 800 annual filings remains largely unanalyzed and thus underutilized. For example, the fact that proposals for harvest occur largely on non-Chapter 61

forests makes one wonder whether certification is actually a deterrent to active management. The case of the North Quabbin region attests to the ways this material could and should be used to help inform policy.

Perhaps the most interesting question for the state is whether it should intervene further in the forest enterprise system. During the early 1900s, in the aftermath of devastation from overcutting and fire, the legislature enacted special acts to permit private lands to be temporarily acquired and reforested. With much of the Massachusetts forest now halfway through its current growth cycle, a new form of public action may be needed to ensure that the forest reaches full economic maturity and, in some instances, biological maturity (old growth). By acquiring timber rights to its best growing forests, the Commonwealth could offer current landowners a measure of the income they seek while, at the same time, assuring the state a future source of high quality and high value products on a sustainable basis. "Timber banking" is currently attracting interest in many parts of the country, and Massachusetts would be well advised to consider it seriously.

Federal Agency Involvement and Support

A heartening feature of Massachusetts forestry programs, past and present, has been the support received from the U.S. Forest Service and other federal agencies. According to the most recent survey of America's nonfederal forests (National Research Council, 1997), funds flow to the state through two primary forms of assistance and incentives: cooperative forestry and transfer programs. Cooperative forestry, for example, is the primary source of funds for the state's fourteen service foresters, the heart of its technical assistance capability. As for transfer programs, seven separate categorical federal programs currently offer cost-share assistance to forest landowners. In other instances (e.g., Forest Legacy, forest inventory), funds or services are made available directly to the state. At present, approximately one-third of the Massachusetts Bureau of Forest Development's \$5 million annual budget is supplied by the U.S. Forest Service. While the state is

to be congratulated on making effective use of federal dollars, the degree of dependence upon them is matter of some concern. In a state as heavily forested as Massachusetts, it seems incongruous that its own investments in its own resource are so limited. The reliance on external funds has meant that methods of inventorying and monitoring, for example, are determined largely by others, and that information is absent at appropriate time and area scales. Many of the state's special forestry initiatives (e.g., the timber bridge initiative) are triggered simply by the availability of federal funds.

It is not that special funds for state forestry support are unavailable; they remain largely unidentified and undeveloped. For example, the forest products manufacturing and sales sector in Massachusetts is one of the largest industrial configurations in the state. Although most of the raw materials are derived from elsewhere, we do know that the harvest from Massachusetts forests alone reached 70 million board feet in 1998 (perhaps one-quarter billion dollars in ultimate product value), and the total continues to grow. Even where a portion of the forest-derived revenues are recaptured, such as those allocated to the Forest Products Trust Fund, the use and distribution of these revenues needs to be examined carefully in light of future needs.

Thus, Massachusetts should continue to be alert to the opportunities for federal support, but not to the point of neglecting its own needs. For example, supplemental federal grants and/or in-kind assistance should be sought as Massachusetts develops its own comprehensive plan. The Massachusetts forest plan, conceived as a broad framework for forest environment initiatives and actions in general, could well attract support for implementation from other federal quarters, such as the Environmental Protection Agency's recently announced campaign against urban sprawl. And the increasing popular concern for human and environmental health, as manifest in climate effects, non-point source runoff, biodiversity, water supply, and quality of life within urbanizing environments, all signal new and important roles and opportunities for a well-planned and managed forest under active Massachusetts leadership.

Legislative Action

Massachusetts is fortunate to have in place a *Special Commission on Forest Management Practices*. The creation in 1995 of former Senator Robert D. Wetmore, a Worcester County forest landowner and widely-respected legislator, the Commission consists of three members each of the House and Senate, and eight public and/or official representatives. Senator Stephen M. Brewer (Barre) is the current chairman. The presence of the commission provides a singular opportunity for special investigations, public input and, ultimately, review and implementation of the comprehensive plan recommendations.

As examples of subjects warranting special study, the matter of green certification, and accompanying product identification, would relate well to the commission's concern for improved utilization and market development. So too would ecotourism and "wild crafting", the economic opportunities related to non-timber products and services obtainable from the Massachusetts forest. The commission might also sponsor a comparative study of the initiatives in other states, such as the creation of landowner management and marketing cooperatives and timber banking, and the parallel planning and "visioning" projects in states like New Hampshire, Missouri, and Vermont. Another area warranting special commission attention would be the incentives, programs, and services needed to have Commonwealth forests yield a higher proportion of the materials in demand at community and consumer levels. In many respects, the least-tapped market for materials may turn out to be Massachusetts's own.

Two particular activities are suggested for the commission. The first would be to receive and open to public comment the "vision" of the Massachusetts forest drafted by the Secretary's Program Review Board. Visualized are a series of public hearings, held at strategic points throughout the Commonwealth, where additional citizen views could be obtained. The board would incorporate comments from the special commission in the modified, final "vision" submitted to the Secretary by the end of 1999.

Similarly, the commission should be the pri-

mary legislative review agent for any message from the Governor in 2000 relating to forestry that would implement the DEM/EOEA forest plan. In its discretion, the commission should recommend and advance implementing actions either as individual legislative or budgetary initiatives, or as a comprehensive package. Serious consideration should be given to an entirely new Massachusetts forest protection, management, and utilization statute that would conform to prior authorities and contain the new authorizations required.

In anticipation of these important responsibilities, we would respectfully suggest several modifications in the current commission status. First, in order to accomplish the tasks suggested above, it would need to have assured existence at least through June 2001 rather than being activated on an annual basis. Second, in the interest of creating a body with full forest environment representation, the commission's composition may need to be modified. For example, representation should be considered from the recreation, scientific, watershed, biodiversity, local governmental and open space (land trust) communities. The ratio of timber and non-timber interests on the commission should be kept roughly in balance.

MASSACHUSETTS LEGACY FORESTS

To help carry out this modern view of the Massachusetts forest, we recommend a focus on how the forest occurs naturally — as distinct associations, soil and vegetation types, ecosystems and, ultimately entire landscapes — and a pervasive sense of heritage that we call “forest legacy.” This approach does not preclude the authorization and conduct of statewide programs. It simply highlights the fact that the Massachusetts forest is not one but many forests that occur without regard to conventional ownership boundaries. It also promises a more intimate relationship between Massachusetts citizens and their forests, a centerpiece of our earlier recommendations.

We illustrate this concept first with the case of the *North Quabbin Region Landscape Partnership*. This growing initiative provides a quiet though remarkably successful experiment in land conser-

vation and forest stewardship, and an informative history of how vision, information, collaboration, and a historical perspective can blend together to assist in both the protection and active use of forests within a larger open space context. This section ends with a discussion of how the legacy approach might be extended more generally to help implement the state's forthcoming forest environment vision and comprehensive plan.

North Quabbin Regional Landscape Partnership

Stretching east from the Connecticut valley to Mount Wachusett, and south from the New Hampshire border to include the Quabbin Reservation, the 1800 square mile North Quabbin region presents a landscape of rolling forested hills, small hill towns and larger old mill towns, wetlands, winding streams, and river valleys. The region is fortunate in hosting a number of important constituencies, including numerous governmental agencies plus conservation and educational organizations with wide expertise in forest ecosystems and land management. However, this diversity also brings the potential for lack of coordination and even conflict.

The impetus for development of a broad perspective and cooperative approach came from the private Mount Grace Land Conservation Trust. Incorporated in 1986, the Trust within its first decade has protected more than 10,000 acres in 75 parcels by promoting the use of conservation restrictions, bargain sales, and gifts of land. Importantly, the Trust has taken a broad perspective of its land stewardship responsibilities, including both active forest management and simple preservation in its activities. However, as the Trust moved to prioritize its land protection efforts and coordinate more effectively with other organizations, a series of meetings revealed a number of problems. First, there were many land management and conservation organizations operative within the region but little information exchanged between them. Second, there was no comprehensive open space plan for the area as a whole. Third, the objectives of the numerous organizations were ill defined, poorly understood, and lacking in coordination.

In 1993, Hampshire College student Alisa

Golodetz, in collaboration with the Harvard Forest's David Foster, undertook an undergraduate thesis that sought to improve the informational and decision-making bases for conservation in the region. Golodetz began by developing a regional Geographic Information System of protected lands that included physical, cultural, and biological overlays, and a database of ownership. With this spatially explicit data she was able to assess the history and pattern of land conservation in relation to numerous landscape and cultural features, the organizations involved, and the methods of protection employed. She then was able to assess how the spatial pattern of protected lands reflected the physical, biological, and cultural features of the landscape, and to offer guidance for using this historical and regional perspective as a basis for future planning and land protection. Conclusions from the study were quite revealing.

For example, a surprising 37 percent of the North Quabbin region was already found to be in a protected state, but this land area consisted of a very heterogeneous mixture of parcels, sizes, and management approaches established by twenty-five different federal, state, and municipal agencies in addition to private groups. Motivations for land acquisition and protection were extremely varied, and there was a nearly complete absence of coordination in acquisition, land management, and information sharing among the groups. Equally important, it was recognized that the existing biological, timber, and management databases were completely inadequate to assess the regional attributes and conservation values of the land base, or to serve as an effective basis for future planning. The large extent of protected land suggested that future conservation priorities should include: habitat for species requiring broad, intact areas of forest and wetland; the maintenance of broad-scale ecological processes; the creation of connections with other regional systems in the Connecticut valley and northern New England; the provision of extensive recreation; and the development of an extensive, coordinated approach to forest and land management.

The study coincided with three other major assessments and planning activities underway at the time. First, in the fall of 1991, a state-wide

committee had been convened to develop proposals for the U.S. Forest Service's new "Forest Legacy Program," which offered federal funds for the purchase of conservation easements to protect key private forest ownerships from conversion and fragmentation. By early 1992, the committee had nominated the so-called North Quabbin Corridor for consideration. Second, early in 1997, the Massachusetts Department of Environmental Management completed a review of state forests and parks in the northeastern portion of the Connecticut valley, an area that significantly overlapped the North Quabbin region. This effort represented the first time that such a review was based on an entire region rather than individual forests and parks. The resulting guideline plan for operations and stewardship (GOALS) stressed many of the same broad-scale management themes of the Golodetz and Foster study, specifically its emphasis on regional planning, its concern over lack of interaction among agencies and groups, and its call for a regional open space council. Third, the Mount Grace Land Conservation Trust moved to develop its "Plan for the Second Decade," which underlined the importance of a cooperative and collaborative approach to successful land protection.

The recognized need for information sharing and collaboration led to the formation in 1997 of the *North Quabbin Regional Landscape Partnership*, an informal coalition of conservation groups and land management agencies with a mission to "identify, protect, and enhance strategic ecological, cultural, and historic open space within the landscape of the North Quabbin region." The partnership steering committee, consisting of representatives of private, municipal, regional, state, and federal organizations, now meets regularly to provide communication, coordination, and advocacy for land conservation and to select and further specific collaborative projects. Projects are identified on the basis of major conservation criteria, including the need to synergistically link protected lands and to preserve significant natural or cultural resources.

As examples, the protection of Tully Mountain was the first project endorsed by the Partnership. A second project is a seventeen mile loop trail connecting the mountain with numer-

ous other protected lands to the north, east, and west across a variety of federal, state, conservation, and private ownerships. Logistical and financial support are provided by the Mount Grace Land Conservation Trust, the Harvard Forest, the Trustees of Reservations, the National Park Service's rivers and trails program, the Commonwealth, and private philanthropy. Additional projects currently under review include the expansion of conservation lands around Lake Rohunta in Athol and the Thousand Acre Swamp in Phillipston.

In addition, the Golodetz database has been expanded in significant ways. As one such example, scientists at the Harvard Forest have overlain information obtained from Massachusetts Forest Cutting Practices Act filings showing the location and extent of forestry operations in the region. The results indicate graphically that the forest is being cut substantially and at an increasing pace.

Lessons from North Quabbin

What can be learned from this encouraging account of the North Quabbin Region Landscape Partnership? We suggest several important lessons.

The first is the crucial role of non-governmental leadership and participation in any Massachusetts forest environment initiative. The private sector not only represents a traditional source of ideas, enthusiasm, and resources but, in light of Massachusetts's dominant private form of ownership, its commitment is absolutely essential. The second is the desirability of letting initiatives grow from the bottom when they are ready, rather than being imposed from the top. The third is that mutual cooperation can work only if it receives sufficient encouragement and support from others. These lessons suggest that government must provide a measure of assistance if the North Quabbin approach is to play a useful role in the implementation of the Commonwealth's comprehensive forest plan.

For example, careful thought needs to be given as to what might constitute the guidelines for a candidate to be designated a legacy forest region. Are such areas to be based simply upon the extent of existing forests or, taking the long

view, designed for a desired future condition? If the latter, data will have to be developed validating the sites best suited for growing and maintaining forests, the representation of species and types needed, and the preferred distribution of such forests throughout the Commonwealth.

The scale of legacy forests also needs to be determined thoughtfully. Given the varying natures of the host regions, some forests are certain to be larger than others. Legacy forests should be sized and bounded according to principles of ecological integrity, but also be sensitive to social, economic, and political realities. To the extent possible, they should encompass whole jurisdictions.

Legacy forests are envisioned as permanent areas of mixed ownership — both public and private. They are not intended as targets for outright governmental acquisition. Yet, without intruding unduly on the individuality of private ownership, cooperation and collaboration should be encouraged and enabled, and arrangements made for the retention of the land in forest when ownership changes hands.

The purposes and uses of legacy forests should be defined carefully and revisited at regular intervals. For example, not all need be wood-producing areas. Some may end up being used more intensively than others. But all should be more than fallow open space and be managed carefully and professionally to yield the desired values.

Comprehensive databases should be assembled for each forest, and any new information collected should conform to and expand upon those bases. Through arrangements with nearby institutions, each legacy forest should be given ready access to analytical, scientific, research, and educational capabilities.

Finally, the administrative arrangements for establishing and operating such areas could well be crucial. We visualize a potential system of legacy forests first identified by the Department of Environmental Management according to the criteria expressed above. Interested parties would then be invited to petition for their designation. As environmental joint powers agreement entities provided for in Chapter 491, Acts of 1996, they would be formally chartered by the Secretary of

Environmental Affairs after public hearings had been held in the areas affected and agreement had been reached on their objectives, responsibilities, methods of operation, and forms of governance. Once chartered, the partnerships would operate independently, but the state would have the option of channeling services and programs of its own through the regional entity.

What is likely to be gained through a Massachusetts legacy forest initiative? Much as at North Quabbin, there will be enhanced opportunity for group interaction in the interest of the forest environment as a whole. Planning and informational capacities will be proximate to those who require them. Forest landowners will enjoy priority access to advisory and program services. Host communities and their citizens will have a heightened understanding of the values, uses, and products of the forest. Most important of all, the Commonwealth will be assured of a permanent forest resource base, varied in composition, ownership, and distribution, which will be managed ecologically and sustainably for all time.

EPILOGUE

The completion of this paper brings to an end our three-year odyssey through the Massachusetts forest. The experience has been alternately enlightening and challenging. It all began with a meeting in October 1995 to discuss the compilation of the first history of forests and forestry ever assembled for the Commonwealth as a whole. Within a year, nine knowledgeable forest environment specialists had volunteered their services and completed a draft account, which was then reviewed at a state-wide Massachusetts forest history conference held at the University of Massachusetts (Amherst) in October 1996. By the end of 1997, a book-length manuscript was complete. In May 1998, the Harvard Forest published *Stepping Back to Look Forward*, a book now among the holdings of every city and town library in the Commonwealth. The critical review of the Massachusetts forest at Harvard University's John F. Kennedy School of Government, upon which this paper is based, has completed our analysis. In the course of this extended walk through the

Massachusetts woods, we have learned much about the state's forest environment, but even more about the process that will ultimately determine its future.

New England-trained forester-environmentalist Aldo Leopold, in his much-celebrated essay "Good Oak" in *A Sand County Almanac* (1949), reflects upon the history of forests and land use as his saw bites steadily through the concentric rings of a mature oak. Even earlier, Henry David Thoreau had observed that the history of a woodlot is often, a history of cross-purposes: ". . . of steady and consistent endeavor on the part of Nature, of interference and blundering with a glimmering of intelligence at the eleventh hour on the part of the proprietor." (*Journals*, October 16, 1860).

While we do not claim to be counterparts of these historic figures, our view of the Massachusetts forest has been similarly influenced by the stream of time that brought the forest to its present condition and the need again for a clear application of intelligence, purpose, and direction. Thus, we close this account with one concluding observation: The final chapter of the Massachusetts forest story is yet to be written. We urge those concerned with the forest — in a real sense, its proprietors — to put our recommendations to work promptly. To do so will not only be an initiative of enduring value to Massachusetts, but an example worthy of emulation by the nation as a whole.

APPENDIX A: CLASS PROFILE

MARY BERLIK (Netherlands) is a senior concentrator in environmental science and public policy at Harvard College. She has two summer's experience in the environmental consulting industry, focused on minimizing the environmental impacts of pipeline projects. Ms. Berlik completed an undergraduate thesis that examined the potential for reducing global environmental degradation through enhanced use of forest resources in developed regions such as the Commonwealth.

JILL BLOCKHUS (Minnesota) is a Ph.D. candidate in environmental policy at MIT. She has a bachelor's degree from Luther College, an M.B.A. from Norges Handelshoyskole, and has just completed the two year MPA program at the Kennedy School. During her six years as programme officer for the Forest Conservation Program of IUCN-The World Conservation Union, she was responsible for following global forest conservation policy issues internationally, and designing and monitoring conservation and development projects in the Philippines, Laos, Vietnam, and Sri Lanka. While at the Centre for International Forestry Research in Bogor, Indonesia, she collaborated on a research project on local uses of non-timber forest products. Ms. Blockhus has lectured on tree and land tenure issues at Kaesart University in Bangkok, Thailand, and the University of Peradeniya (Kandy, Sri Lanka).

YOSHIHITO ENOMOTO (Japan) received his master's degree in law from the University of Tokyo in March 1994 and has worked for the Ministry of Health and Welfare of Japan for four years dealing with water supply and waste management issues and international affairs related to international organizations such as OECD. Mr. Enomoto is currently pursuing a master's degree in public administration at the Kennedy School.

EDGAR FEINBERG (Louisiana) is a practicing physician whose primary interest is in healthcare policy but, in partnership with his wife, has an interest in the use of forestry and wetland mitigation as an unconventional, conservative means to reach retirement goals.

PRISCILLA FEINBERG, (Louisiana) is a graduate of Duke University in political science. She spent time as a legislative assistant in the office of Senator J. Bennett Johnston (D-Louisiana) in the 1980s doing research on energy policy. She later worked as a legislative assistant to the Louisiana State Legislative Council on nuclear energy policy.

KAREN E. FILIPOVICH (Oregon) is a 1994 graduate of Willamette University and has worked for the Montana Conservation Corps of Americorps, the American Wildlands' Yellowstone to Yukon biodiversity strategy, and is currently a research fellow/coordinator for ENRP's project in greenhouse gas reduction in Russia. Her master's project in public policy involves improving land management strategies for the Yakama Indian Reservation and Nation.

THOMAS FULLUM (Montana) holds a B.A. from Prescott College. A longtime forest advocate, he has worked in various positions at the Ecology Center, Native Forest Network, Taiga Rescue Network (Sweden), Great Gila Biodiversity Project, and Montana Coalition for Health, Environmental and Economic Rights. Currently, he is the forestry chair for the Massachusetts chapter of the Sierra Club and a public service fellow in the master's of public policy program at the Kennedy School.

KEITH FURUKAWA (Japan) is a graduate of Sophia University (Tokyo). He has worked for the ITOCHU Corporation as the manager for log/lumber export from Canada, as the assistant manager and manager for log/lumber sales based in its Tokyo office and, most recently, as the company's overseas development/project researcher.

STACY GREENDLINGER (New York) received her B.A. from Wellesley College and is currently a master's of public administration candidate at the Kennedy School. She has worked for the U.S. Environmental Protection Agency for the last seven and a half years at the Chicago regional office and the headquarters in Washington, D.C. Her work for E.P.A. has included extensive interaction with state and business representatives, and community advocates concerning national and local environmental policy issues.

WILLIAM HANEY (Massachusetts) is a graduate of Harvard College in history and science and currently serves as a visiting fellow in the Kennedy School's environment and natural resources program. A specialist in the commercialization of revolutionary environmental technology, Mr. Haney has founded and operated companies in fuel technology, energy biosystems, and molten metal technology. Among his many advisory roles, he is a board member of the World Resources Institute and the Natural Resources Defense Council.

ROBB JOHNSON (Nebraska) holds a master's in public

health from the University of Michigan and is a public service fellow enrolled in the master's in public administration program at the Kennedy School. He is studying matters of land use, open space conservation, and transportation planning. Mr. Johnson has worked in Boston for the past ten years in health and human service programs, principally involving violence, AIDS, and substance abuse. He is currently the co-chairperson of Friends of Magazine Beach, a member of the Community Development Department's neighborhood development study committee and, an amateur arborist, and he was involved in the early development of the Cambridge Tree Project, an urban forestry initiative.

JAMES LEVITT (Massachusetts) has a B.A. and master's degree in public and private management from Yale University and is currently a fellow at the Kennedy School's Taubman Center for State and Local Government. He is writing a paper and organizing a conference on "The Internet and Conservation: Threats and Opportunities." Previously, he served as a principal at Geopartners Research, Inc., working on corporate strategy assignments in the information technology field. Mr. Levitt also serves as a board member of the Massachusetts Audubon Society and the Quebec-Labrador Foundation.

VERONICA LOEWE (Chile), is a master's in public administration (mid-career) degree candidate at the Kennedy School and is a trained forest engineer. She spent four years at Bologna University in Italy working in and studying high value timber production, an area she later developed in Chile. Since 1991, Ms. Loewe has been working for the Chilean Forestry Institute (INFOR) as project leader, business manager, executive vice-director, and director of the Institute.

KAORI NAKAMURA (Japan received her B.A. from the University of Tokyo and entered the Ministry of Labour where she serves as planning section chief of the Employment Promotion Division. She is in charge of employment security in various industrial sectors, including timber and other elements of the wood materials industry. She entered the Kennedy School's master's in public administration program through the Japanese government's Longterm Fellowship Program.

BRENT PLATER received a B.S. from the University of Michigan's School of Natural Resources. After working as an intern in Washington, D.C. for a non-profit organization, Mr. Plater entered a joint degree program with the Kennedy School of Government and the Boalt Hall School of Law, University of California, Berkeley.

APPENDIX B: VISITING LECTURERS

Massachusetts Forest History:

Contributors to *Stepping Back to Look Forward*

- Dr. John F. O'Keefe, coordinator, Fisher Museum, Harvard Forest
- Dr. Nancy M. Gordon, consulting historian and economist, Amherst, Massachusetts
- Dr. Robert S. Bond, research economist and educator, Mashpee, Massachusetts
- William H. Rivers, state-wide management forester, Mass. Department of Environmental Management
- William A. King, president, New England Forestry Foundation
- Dr. Robert L. McCullough, community forest historian, Montpelier, Vermont
- Dr. Stephen Fox, social historian, writer, and independent scholar
- Dr. Alice E. Ingerson, Institute for Cultural Landscape Studies, Arnold Arboretum

Massachusetts Forest Policy: State and Private

- Dr. Warren E. Archey, chief forester, Massachusetts Department of Environmental Management
- Dr. David A. Kittredge, Jr., Massachusetts extension forester and professor, University of Massachusetts
- James A. Gomes, president, Environment League of Massachusetts
- Robert T. Perschel, regional director, The Wilderness Society
- Gregory Cox, executive director, Massachusetts Forestry Association

Massachusetts Forest Policy: Legislative

- Stephen M. Brewer, state senator and chairman, Special Commission on Forest Management Practices
- Robert D. Wetmore, former state representative and senator, chairman, advisory board, Forest and Wood Products Education and Development Center, Mount Wachusett Community College

Symposium Speakers:

Using History to Inform Policy

- Dr. Susan L. Flader, Department of History, University of Missouri
- Dr. Nancy Langston, Institute for Environmental Studies, University of Wisconsin
- Edgar B. Brannon, Jr., director, Pinchot Institute for Conservation, U.S. Forest Service
- Dr. Steven Anderson, president, Forest History Society

APPENDIX C: PUBLICATIONS

STUDENT WORKING PAPERS

- Berlik, M. 1998. "Fostering a timber ethic in a cosmopolitan state: the case for developing local markets in Massachusetts."
- Blockhus, J. 1998. "Community forest management: case examples."
- Enomoto, Y. 1998. "Watershed management in Japan."
- Feinberg, E. 1998. "The role of evolutionary psychology in the new millennium of forestry."
- Feinberg, P. 1998. "A management plan for Oxbeaux Hills and farm, St. Landry Parish, Louisiana."
- Fullum, T. 1998. "The national forests and timber subsidies."
- Furukawa, K. 1998. "Forestry in the province of British Columbia."
- Greendlinger, S. 1998. "Sustainable forestry certification."
- Johnson, R. 1998. "Town responses to suburban development and forest loss in eastern Massachusetts."
- Loewe, V. 1998. "Forestry research policy in Chile: ideas for improvement looking at the U.S. funding R & D system."
- Nakamura, K. 1998. "Forestry policy in Hokkaido, Japan."
- Plater, B. 1998. "The Act to save America's forests: a lesson in forest policy."

STUDENT TEAM REPORTS

Analytical

- Berlik, M., Enomoto, Y., Loewe, V. and S. Greendlinger. "State forestry recommendations."
- Blockhus, J., Feinberg, E., and K. Nakamura. "Economic uses of Massachusetts forests."
- Feinberg, P., Furukawa, K., Johnson, R., and W. Haney. "Policy recommendations for private and community forestry in Massachusetts."
- Filipovich, K., F. T., Levitt, J., and B. Plater. "Policy considerations and recommendations regarding forest ecology and land use in Massachusetts."

Implementation

- Berlik, M., Enomoto, Y., Feinberg, P., and T. Fullum. "Legislative priorities for Massachusetts forests."
- Blockhus, J., Feinberg, E., Furukawa, K., Johnson, R., and B. Plater. "The role of the non-governmental sector in the implementation of recommended actions for the Massachusetts forest."
- Filipovich, K., Greendlinger, S., Loewe, V., and K. Nakamura. "Governmental implementation recommendations."

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