WHATEVER HAPPENED TO SITE-SPECIFIC, GOAL-ORIENTED SILVICULTURAL PRESCRIPTIONS?[1]

Leon S. Minckler[2]

Abstract.--Professional foresters should manage the total forest resource, including the soil, for the goals of the owners, whether it's to maximize a dominant value or strive for a combination of values.

Primary goals in hardwood regions could include (a) integrated multiple use where both timber and environmental values are combined on the same forest, (b) timber dominant use, and (c) strictly non-timber uses such as wilderness, special areas, or unsuitable sites. In central hardwood forests these decisions must be made in greatly diversified forest ecosystems, which are further complicated by past treatments.

Professional prescriptions require a clear understanding of forest ecology, site productivity, stand history, plus economic and marketing relationships. Goals of management, long-term costs, investment returns, and protection of the forest, soil, and water must be considered. This cannot be done without public confidence in our knowledge and abilities.

Clearcutting in mixed hardwoods for the sake of low initial management costs and more favorable timber profits would be inappropriate without ascertaining the owner's needs and providing council for the long-term. Foresters must strive to conduct themselves as forest resource professionals.

Keywords: land ethics, non-timber use

INTRODUCTION

Central hardwoods have frequently been managed according to the following guidelines: (1) emphasis on timber profits while minimizing the values of the forest as an environment, (2) short-term financial profits in place of long term values, (3) use of heavy, "efficient" timber harvesting machinery, (4) failure to recognize the great diversity of forests and sites within small areas, (5) misjudgment of ecological requirements for regeneration and early growth, (6) failure to determine the goals of management, especially in public forestry, and (7) some misunderstanding of the responsibilities of professional forestry.

It seems readily possible to distinguish between agri-forestry and eco-forestry. On suitable sites and with correct protective measures, agri-forestry can emphasize timber goals. But eco-forestry for the great diversity of central hardwood forests demands management of the entire ecosystem, including the soil and water, for long-term benefits, rather than short-term profits. Are we doing an adequate job now on public hardwood forests in the East?

NATURE OF CENTRAL HARDWOOD FORESTS

The hardwood forest ecosystems in eastern North America are quite complex and diversified. Consider site variability acre by acre, number of species, species composition, topography, age and diameter distributions, and the vast differences

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[2] Leon S. Minckler, Ph.D., a forest consultant, lives at 623 Bogie Lane, Route 4, Country Club Estates, Blacksburg, VA 24060

in land use and abuse. Sites vary by aspect, often within a few chains along the slope, and by slope steepness. Topography and soil types vary from coves, northerly and southerly slopes, ridge tops, and by steepness.

The Kaskaskia Experimental Forest in southern Illinois, an eastern extension of the Ozarks, is an example. Species composition was correlated with topography, so management compartments of "mixed hardwoods" (coves and lower northerly slopes) and "oak-hickory" (ridge tops and southerly slopes) were recognized. These compartments, though intimately intermixed and appearing unorganized on a map, varied by 100% or more between compartments. Mixed hardwoods contained a large variety of species including yellow-poplar, which often occurred in small groups. Oak-hickory was mostly mixed oaks. It becomes increasingly difficult to superimpose past cutting practices on this already great natural complexity of ecosystems. Let's look at the possibilities that can and do occur.

The historical concept of "high grading" is well-known to foresters. However the term can be a gross oversimplification. There were all kinds and degrees of high grading, usually combined with different diameter limit cutting. It has created decadent stands where clearcutting is the logical solution if timber is the main objective. Yet in many cases, especially before there was a market for hardwood pulpwood, cutting was confined to the better trees greater than 16 inches in diameter. The large unwanted trees, the poles and small sawtimber, and the new regeneration in small openings created by the cutting grew and developed into typical reverse J-shaped diameter distributions that tended to have three or four age groups. I have seen many examples of this. Conversely, acid-wood operations, charcoal operations, or in cases where even-aged stands were mature at the time of harvest, clearcutting in mixed hardwoods was practiced, but such incidences were relatively uncommon compared to high grading for sawlogs. Therefore, the net effect of high grading was exceedingly complex and resulted in diverse stands after 60-80 years of growth.

Another variable was the changing marketability of different species. I can remember when large hickories were killed in timber stand improvement work because stumpage values were low. Shortly after that hickory was in great demand for panelling, but much of the good hickory had already been killed. Species marketability has changed, and foresters and economists must remember this.

These factors have had a profound influence on the nature and variability of a 5-acre demonstration area on the Jefferson National Forest. In 1986 the ages of upper canopy trees were 60-70 years for yellow-poplar, 60-120 for white oak, 65-125 for red oaks, 100 plus for chestnut oak, and 150 or more for hickory. There were 406 trees 5-10 inches in diameter, 308 trees 11-18 inches in diameter, and 41 trees with diameters greater than 19 inches. The area contained 51,000 board feet in sawtimber in trees greater than 11 inches in diameter. This area had been high graded early in the century, perhaps twice, when large, high quality trees were cut. It has now been designated for clearcutting. Similarly on the Kaskaskia experimental Forest, out of 60 widely scattered, one-half acre experimental plots in fully stocked sawtimber stands only two were even-aged. In the others poles and small sawtimber left from previous cuts had grown to near maturity while reproduction which had become established in the openings had grown to large poles. There frequently were a few large, undesirable remnants present--some good den trees. In other places I have seen decadent stands that resulted from heavy high grading where the diameter limit was quite low.

All this brings up a very important point. I frequently hear that block clearcutting of 20 to 30 acres or more is needed to regenerate the intolerant and intermediate tolerant species like oaks and yellow-poplar. This is just not so. Those species will regenerate and grow in openings as small as one-fifth acre. Is it good stewardship to sacrifice hundreds of immature, good quality poles and small sawtimber just to get those block clearcuts and reproduction of multiple-stemmed stump sprouts from the many small trees cut? There must be good conditions for regeneration, but clearcutting is not usually the only or the best way of doing it. We need to appraise advanced oak regeneration and scarify the forest floor on good yellow-poplar sites when seed trees are present.

It should be apparent that we should not prescribe dominant clearcutting of mixed hardwoods as a preconceived decision for the sake of low initial management costs and high initial timber profits. There are too many other important variables. It is against the law on National Forests which constitute six percent of all eastern forests, unless clearcutting is the optimum method; multiple use is the stated goal of National Forests. Who has proved that clearcutting is optimum most of the time in the long run? Isn't the profession supposed to have honest, basic, scientific inputs? First we must examine the forest, learn the owner's wishes, including public interests and environmental protection, and give advice for the long term. That is our job in the best traditions of Aldo Leopold, Bob Marshall, and Gifford Pinchot.

WHAT SHOULD WE DO?

First we determine the goals of forest management of a particular area, then decide how it should be done without diminishing the

environment and its productivity. That is the true essence of our profession.

But goals can be very complex, controversial, and not necessarily mutually exclusive. I am speaking primarily of public forests and of nonindustrial private ownerships. Industrial forestry with dominant timber objectives ideally should be practiced on moderately fertile, relatively level, and non-fragile land. It can be truly agri-forestry.

Probably the most important overall goal is integrated multiple use seeking synergetic effects wherever possible. This would include timber harvesting combined with wildlife habitat, recreation, watershed protection and pure water, percolation to the water table, aesthetics, site and soil protection, sustained diversity, integrity of the ecosystem, and areas of natural wilderness. Some emphasis can be placed on one or more of these with the exception of wilderness without undue disruption of others. After all, the National Forests were established primarily for watershed protection.

The difficulty with this is found in defining value priorities which must include more than profits. We have yet to learn the long term values of environmental benefits. We still defend our own self interests, not environmental interests and the quality of life. Shouldn't foresters be cognizant of environments and ecosystems and such?

I have found that the use of simple tree classes is a good way of determining what should be done in a management unit. These classes are:

1. Good growing stock, immature trees qualified for rotation size
2. Economically mature crop trees
3. Sound, low quality trees
4. High risk trees
5. Cull trees, except for firewood
6. Wildlife and aesthetic trees

This requires an inventory of stocking, tree size, and species. All except the immature "good growers" and the special wildlife and aesthetic trees are cut or killed, usually with special efforts to create openings for regeneration.

For some reason regulation of group selection silviculture has been a problem for many foresters. Some have even thought they had to regulate each small opening individually. The truth is that regulation is like any selection system. The whole management unit is regulated by volume and diameter distribution with cutting cycles scheduled accordingly.

For example, in the demonstration area on the Jefferson National Forest, there were 400 immature good growers (25,000 board feet), 28 economically mature, 103 high risk or low quality, and 180 non-growing stock trees 6-10 inches in diameter marked for firewood or pulpwood. The 28 mature and 103 high risk and low quality trees were cut for logs or firewood. About 40 percent of the basal area was removed leaving 60 percent in good growers interspersed with openings large enough for regeneration. This is group selection harvest cutting combined with improvement cutting. The forest is intact, diversified, putting on valuable growth, and regenerating. The adjacent areas which were clearcut a few years prior are mostly sprout clumps with soil erosion clearly evident on the slopes where skidders were used.

HARVESTING PRACTICES COORDINATED WITH SILVICULTURAL PRESCRIPTIONS

Site-specific, goal-oriented prescriptions require appropriate harvesting methods. The forest management job is not finished until the timber crop has been harvested. The silviculturist must not grow and mark the trees and then walk away.

Research to match harvesting methods to the silvicultural practices is needed. Clearcutting with heavy machinery even on moderate slopes will not do the job of managing the total forest resource. On the Kaskaskia we skidded with a D-4 tractor using a winch, cables and a two wheeled skidder that lifted the front of the logs off the ground. We had motivated, skilled crews and very little damage to residual trees. The Goodman Lumber Co. in Wisconsin used D-2 Caterpillars and I have seen even smaller machinery used in demonstrations. The point is that it can be done. All that remains, perhaps, is to decide if we want quick, short-term profits from timber or long-term profits from timber or long-term multiple forest values and environmental protection.

I remember vividly a chipper harvesting demonstration at a meeting a few years ago. The hardwoods, some to 16 inch diameters, along a ridge and on a 20-30 percent slope were all cut with tree shears and moved to the chipper with rubber-tired skidders. The forest soil was literally "plowed". They got the job done efficiently while dozens of foresters looked on with few apparent questions or comments to the operators. When I asked about erosion and the stream at the bottom of the slope, I was told that new growth would stabilize the soil. But what if there was a 2-inch rain before new vegetation became well established?

PUBLIC RELATIONS

Too much timber cutting at a loss, too much clearcutting under the wrong conditions, and too many forest roads are not helping the public

understanding of the forestry profession. Surely they must believe that timber production is the chief goal in hardwood management and that environmental long-term values are secondary? People interested in conservation are usually well-informed. They know that computer modeling data are tentative, often estimated, and sometimes just plain wrong. Consequently, 50-year forest plan models do not inspire confidence.

Foresters have disdained the term "selective cutting", and with good reason because it too often means high grading. However, the term is still used widely in the press, on radio and TV and by public speakers. Why don't we, by our practice, make it mean true selection cutting, often combined with improvement cutting. Loggers and some foresters after misusing the selection system have decided that clearcutting was the only alternative in forest management situations. We must make it clear that group selection or shelterwood, not single tree selection, is required for regeneration of most central hardwoods, and we must learn how to use them effectively.

Our image has also been damaged by our continual use of "wise use" as a definition of conservation. Wise by whose ideas and interests? Wise to a logger or timber user may be quite different than wise to a person interested in long term integrity of a forest ecosystem. "Wise" is a subjective word meaning different things to different people. A better definition might be "use without abuse!"

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