

MY GRADUATE STUDY AT THE HARVARD FOREST

When I finished my studies for the B. S. degree in forestry at West Virginia University, I took up graduate work at the Harvard Forest. My experiences since that time have been new and challenging, and have led me to thoughts about silviculture that are large and complex. If these thoughts were to be condensed into a single statement, it would be that a rational plan for the nurture and perpetuation of forests must rest upon a far greater understanding than we now possess of their characteristics as natural phenomena.

The Harvard Forest had devoted its first twenty-five years primarily to research in the silvicultural management of white pine. Its work had brought about the development of a broadly naturalistic approach to its research, and by the time of my matriculation the institution had begun to concentrate its efforts on the silviculture of the indigenous hardwoods. I had the opportunity of sharing in this research through the media of personal instruction and study of the Forest's written records. The informal method of subject presentation here was a unique experience. The natural processes involved in the development of forests and their interrelationships, though not entirely unfamiliar to me, had existed previously as mere definitions or textbook descriptions. The overwhelming impact of natural changes in the woods had altered the course of research at the Harvard Forest, and I have felt this influence upon my own development.

A few weeks after the beginning of my graduate study, I was more or less stunned by the great quantity and variety of material with which I had to make myself familiar. My salvation hinged upon the informal method of subject presentation already mentioned, for it gave me time—time to think about the relationships of the materials and ideas placed before me. I soon began to realize that a basis for silviculture much broader than any I had ever conceived was being proposed. It would deal with the basic biological and economic problems concerning the distribution, growth, and reproduction of forests. It would not supersede the silvics and forest management that I had been taught, but would critically examine their foundations and broaden their bases.

The natural phenomena involved are many and varied. Their distribution in time can be thought of as anterior and recent. I learned that the behavior of our existing forests has its roots in the geologic past, and is also the result of the influence of present environmental factors upon the behavior patterns inherent in the species themselves. I learned further that though many external influences may have ceased to be active thousands of years ago, they still can be determining the present behavior of the trees. General geology had introduced to me the orogeny of land forms—their alteration by erosion and deposit to form the various stages of the geographical cycle. The relationships of these anterior causes to the development of vegetation, however, had never been made clear to me.

The modification of land forms by the processes of cryoplanation was to me an entirely new concept. Not only was the concept new, but I had never even heard of the word "cryoplanation" and such related terms as "congeliturbation" and "solifluction." These processes, which are dependent upon the physical effects produced by the intense freezing and thawing of the soil, are actively influencing the arctic and subarctic landscapes. The results

of the same processes appear in fossil frost forms in the glacial and periglacial regions of the temperate zone. Preliminary investigations suggest close relationship with present water table levels and soil genesis.

Paleontological studies bring out the formation and migration of forest types throughout geologic time. The primary implications involve climatic fluctuations and organic evolution. I had never completely appreciated that our forests have had a phylogenetic past, and that the species and types we see today are only stages of development. That the present forests of New England could be the progeny of those that existed on the Appalachian plateaus in Tertiary time had never occurred to me.

The species concept of the geneticist has begun to take on a new meaning. *Pinus strobus* still refers to white pine, but now I recognize the possibility that any species population may be split into numerous ecotypes which are adapted to living in definite ecological niches found within the area of the species as a whole. A species may be tolerant of light in one part of its range and intolerant in another. Qualification must therefore accompany the silvical descriptions of a species before sound applications can be made.

The concept of cataclysmic disturbances of vegetation by windthrow, fire, ice, and snow, has forced me to consider these as ordinary natural occurrences rather than as exceptions. Meteorological data indicate that the forests of southern New England have been subjected not only to three hurricanes during the last three centuries, but also to innumerable localized strong winds. The life span of most of our tree species exceeds the known intervals between these disturbances. The effects of windthrow upon soil genesis can now only be suggested, but one can almost certainly state that it is profound. Meteorological evidence also demonstrates that a crescent-shaped region within the Eastern United States over a period of the last thirty years has experienced a severe glaze storm every three years. The evidence of a glaze storm which occurred in south-central New England in 1921 can still be seen in crown distortion of the forest trees. A lessening of radial growth can also be noted for several seasons after that year. One must wonder whether the concept of a climatic vegetational climax which depends upon a degree of tranquility to achieve its development may actually exist only in its broadest interpretation.

I learned soon after I came to the Harvard Forest that long-range plans for silvicultural management could not be made without a knowledge of recent trends in the natural development of the forests. These in turn could be understood only in terms of the use of the land since colonial times, and could not be separated from the economic and social history of the region. From courses in history I was aware of the opening of the Middle Western agricultural region by the building of the Erie Canal and railroads in the middle part of the last century, and I had heard of the widespread effects of the financial panic of 1837. But that these events could have significance in the making of management plans for southern New England forests was a new and startling idea. That they actually do is clearly shown by land use studies. The results of these studies can be applied to a large part of New England, and the principles involved can be applied anywhere.

The above-mentioned events set the stage for wholesale farm abandonment in southern New England. Approximately 75% of the cleared land of this region reverted to forests

during an amazingly short period starting about 1850. The species which was best able to occupy the open lands provided by these socio-economic circumstances was the white pine. By 1900, it was so abundant and commonplace that this area was considered the white pine region of the Northeastern United States. The concept of ecological plant succession was at the same time just getting its foothold in the Midwest, but it was not until thirty years later that the ecological status of white pine as an early successional stage following land abandonment was fully appreciated. The pine is not being regenerated on most of the upland soils and is followed by hardwoods.

Space will not permit further description of my reactions to what I had previously thought of as abstractions. At any rate, I have come to at least one definite conclusion from my experience of metamorphosis. The development of a well-rounded approach to silviculture requires a philosophical attitude toward all of the natural phenomena and relationships involved; and some basic knowledge in the disciplines from which they are derived.

Source: Earl Stephens, from Harvard Forest 1955-4, Folder 10, Biographical Materials.