

INDIAN USE OF FIRE AND LAND CLEARANCE IN THE SOUTHERN APPALACHIANS

Michael S. DeVivo¹

Abstract—The myth of an unbroken primeval forest, extending across eastern North America at the dawn of European settlement, has been perpetuated in the writings of both laymen and scholars throughout the present century. Accounts of sixteenth, seventeenth, and eighteenth century explorers, however, document vast amounts of cleared land held by aboriginal inhabitants, who likely populated the continent in much higher numbers than have been traditionally accepted. Fire was the principal tool used by the Indians to clear vegetation. Despite frequent historical reference to the Indian use of fire and the documentation of Indian old fields, the role of fire has been largely underplayed. Fire was implemented for forest management, driving game, and preparing land for agriculture. This paper examines the impact of fire and related anthropogenic disturbances on the southern Appalachian landscape before white settlement.

INTRODUCTION

Man's role as an agent of landscape change has long been a theme of research in historical geography (Nwcomb 1969). However, the influence of eastern North America's aboriginal inhabitants on the physical environment before European settlement has not been studied adequately. This paper offers an overview of anthropogenic disturbances in the southern Appalachians during an era of aboriginal habitation, with especial reference to population, fire, land use, and land clearance.

ACCOUNTS BY EARLY EUROPEAN EXPLORERS

Permanent European settlement of the eastern United States did not occur until more than a century after the Columbus landfall in 1492, despite explorers' ventures along the coast, and subsequently into the interior of the continent, in pursuit of geographic knowledge during the sixteenth century (Brown 1948). Journals often contain comments as to the apparent presence or absence of forest, but other landscape traits were documented as well, such as aboriginal population and land use. In any event, the early explorers have provided documentation that refutes the popular notion of an unbroken virgin forest extending across eastern North America. Of particular significance were the travels of Giovanni Verrazano in 1524, Jacques Cartier a decade later, and Samuel de Champlain in the early 1600s (Sauer 1971, 1980), but their accounts depict extensive areas of cleared land prior to European settlement only along the Atlantic coast and adjacent navigable waterways. Very few reports documenting conditions of the southeastern interior were provided by explorers. Narratives of the expedition led by Hernando de Soto between the years 1538 and 1543, however, offer illustrations of extensive maize fields, canebrakes, and open land on the southeastern coastal plain and in the southern mountains (Boume 1904; Hakluyt 1611; Rostlund 1957; U.S. 1939).

ABORIGINAL POPULATION AND DEPOPULATION

Supplementing explorers' accounts is a body of literature in which students have sought to determine the pre-contact aboriginal population of the Americas. These studies suggest that the aboriginal population of the southern Appalachians was much greater than heretofore accepted, and that it declined rapidly, largely because of disease transmitted by the Europeans following the Columbus landfall in 1492. Furthermore, aboriginal inhabitants were numerous enough and sufficiently advanced to significantly alter the region's vegetation.

Humans have occupied the southern Appalachians for over 12,000 years (Dickens 1976; Frizzell 1987). It is widely accepted that the Cherokees occupied the region at least since the protohistoric period; their settlement core was restricted to western North Carolina, east Tennessee, north Georgia, and northwestern South Carolina, but claimed lands extending north to West Virginia and Kentucky (Dickens 1987; Frizzell 1987; Goodwin 1977). Mooney estimated the Cherokee population at no more than 22,000, a figure accepted and advanced by Kroeber (Denevan 1976; Goodwin 1977; Kroeber 1939; Swanton 1946).

Denevan, however, has indicated that the "authority of Kroeber has impeded serious consideration of North American aboriginal populations" and that "it is time for a reconsideration" (Denevan 1976). Unfortunately, one of the principal problems in estimating North American aboriginal populations, especially in the southeastern interior, is the lack of historical evidence. Historical documentation regarding Indian populations is more widely available for Latin American regions than for Anglo-America, largely because the former have a longer history of direct European contact and settlement. Because "estimates of aboriginal American populations have yielded a picture of small scale precontact human population in the Western Hemisphere" (Dobyns 1966; Denevan 1976), anthropologist Henry Dobyns has proposed the use of depopulation ratios for calculating pre-Columbian

¹Assistant Professor of Geography and History, Oregon Institute of Technology, Klamath Falls, OR.

populations. His estimates contrast rather sharply with Kroeber's; for example, Kroeber estimated a hemispheric total of 8.40 million, whereas Dobyns estimates 90.04-112.55 million (Denevan 1976), and Geographer Michael Williams has noted:

There is the strong possibility that in the late fifteenth century the Western Hemisphere may have had a greater total population than western Europe. The implications of these figures for forest disturbance and destruction are enormous (Williams 1989).

Today, Kroeber's estimates are considered much too low (Denevan 1976), and Dobyns' method offers an alternative, probably more realistic estimate. Dobyns' scheme employs a depopulation ratio, that is "the ratio of degree of decline from the time of contact to the population nadir" (Denevan 1976). Dobyns determined the depopulation ratios for aboriginal tribes and regions for which relatively reliable information is available and derived an average of 20:1 (a population decline of 95%). Borah further supports high figures; he estimated pre-contact New World native population at about 100 million, which suggests a depopulation ratio of up to 25:1 (Borah 1964; Denevan 1976; Dobyns 1966).

The application of depopulation ratios is a viable means of estimating the pre-contact aboriginal population of the southern Appalachians. Archaeological evidence and travel accounts indicate rapid population decline during the sixteenth century, and the southeastern interior was not subject to exploration, description and interpretation, and settlement by Europeans until long after contact had been made on the East and Gulf coasts, as well as in the Southwest (Denevan 1976).

Figures of 7,400-10,000 are assumed to be rather reliable estimates for the Cherokees' nadir population during the early to mid-eighteenth century (Goodwin 1977), and application of a 20:1 or 25:1 depopulation ratio indicates that the pre-contact population would have been between 150,000 and 250,000. The difference between these estimates and Kroeber's estimate of 22,000 is highly significant. A quarter of a million inhabitants would have had a larger impact on the region's physical landscape than a comparatively scant population of 22,000 people. Obviously, the likelihood of extensive forest clearance would have been much greater.

The aboriginal inhabitants had been important components in the region's ecosystem. When disease, a major perturbation, decreased their numbers or eliminated them from some areas entirely, a major ecological change took place. Geographer Erhard Rostlund (1960) determined that buffalo (Bison *bison*) had not entered the Southeast by A.D. 1500, but migrated into the region after the middle of the sixteenth century, extending their habitat to the Atlantic and Gulf coasts. Historian Alfred Crosby suggests that the dramatic decrease in numbers of Amerindians opened up an econiche for the buffalo.

Something had kept these animals out of the expanses of parklike clearings in the forest that periodic Amerindian use of fire and hoe had created. That something declined or disappeared after 1540. That something was, in all likelihood, the Amerindians themselves, who naturally would have killed the buffalo for food and to protect their crops (Crosby 1986).

ABORIGINAL SETTLEMENT FEATURES AND THE USE OF FIRE

Topography was probably the determining factor in the distribution of Indian settlements (Dickens 1976). Virtually all sites occurred along relatively extensive floodplains. A nucleated village of two or three acres appears to have been the predominant type of settlement, although sites could have been as small as a quarter of an acre, or as large as six acres (Dickens 1976). Villages ranged in size from a few houses to perhaps as many as fifty houses surrounded by log palisades. Large areas of bottomland adjacent to the villages were probably maintained for agricultural activity (Dickens 1976). Fire was the principal tool used by Indians to clear vegetation. Despite frequent historical reference to fire, and the documentation of "Indian old fields," Indian use of fire in North America has been greatly underestimated (Brown 1948; Day 1953; Gersmehl 1970; Goodwin 1977; Johannessen and others 1971; Martin 1973a, 1973b; Maxwell 1910; Thompson and Smith 1970). Fire was useful in driving game and opening the forest "to increase visibility, improve forage, expose the mast, and help keep down the weeds" (Gersmehl 1970). In the Great Smoky Mountains, fires were set at frequent intervals to encourage the growth of certain plant species, such as blueberries (*Vaccinium vacillans*), which were useful for human consumption as well as wildlife habitat (Lindsay 1976).

The Cherokees, perhaps inadvertently, used fire for forest management. Plants having relatively little value, such as white pine, hemlock, birch, maple, and weeds were burned in order to encourage the growth of more valuable species. The Indians also burned the areas surrounding their villages to prevent catastrophic fires (Goodwin 1977).

Eastern Woodland Indians set fire periodically to burn accumulated litter and undergrowth and to encourage grassland (Thompson and Smith 1970). Periodic fire was especially important for the maintenance of prairies and canebrakes. Sondley has documented the existence of expansive grassland communities in the Asheville Basin at the dawn of white settlement.

Most of the lands on and near the French Broad River ... were in prairies.... At the mouths of the smaller streams in that region tributary to the French Broad River were large canebrakes extending for miles up those tributaries (Sondley 1930).

Ralph Hughes determined that under continuous protection from fire, cane stands “lose vigor, thin out and die” (1966). Moreover, canebrake deterioration can be prevented with periodic fire. Thus, because canebrakes were present in the Asheville Basin at the onset of pioneer settlement and because their maintenance requires frequent fire, it seems likely that the Cherokees set fire to the Asheville Basin at regular intervals in order to clear the land of brush and trees. Following pioneer settlement, a combination of fire suppression (or a decrease in burning), uncontrolled grazing, and cultivation of floodplains was probably responsible for the decline of the extensive canebrakes.

Perhaps the most widespread use of fire by the Indians was in the preparation of land for agriculture. After undergrowth was burned, larger trees were killed by girdling. Planting began when sunlight passed through the dead branches; maize, beans, and squash were usually planted in the same field (Brown 1948). Maize (*Zea mays*) was the most important staple in the Indians’ diet, and may have been cultivated as early as 100 B.C. It was planted extensively on the floodplains of major streams and rivers. Corn was harvested in the late summer and early fall and was often processed into several different items. These most often included various flours and cakes such as succotash, samp, hominy, hoecake, and ash-cake. Corn was also a principal ingredient in soups and stews. Beans (*Phaseolus*), probably introduced at about 800 A.D., were next in importance as a cultivated crop, (Yamell 1976) and were usually planted alongside corn. In fact, cornstalks were often used as beanpoles. The use of beans and corn in combination implied “complementation” in the natives’ diet and as a result provided high nutrition. Squashes (*Cucurbitaceae*) including pumpkins, gourds, and summer crookneck, were also an important staple. Certain squash varieties had been cultivated as early as 2300 B.C. The Cherokees planted squashes beside beans and maize. The sunflower (*Helianthus annuus*) was probably domesticated during the second or third millennium B.C. (Yamell 1976) and had a multitude of uses. For example, its seeds yielded an edible table oil and flour that could be made into bread (Goodwin 1977).

Some wild edibles, such as spinach-like pigweed (*Amaranthus*) and goosefoot (*Chenopodium album*), grew along wet ditches and streams. Blackberries (*Rubus argutus*), raspberries (*Rubus odoratus*), and blueberries (*Vaccinium vacillans*) were used. Nut-bearing trees provided the Indians with acorns, chestnuts, and walnuts, and sap from some trees provided sweetening agents such as maple syrup. Because Indians were strongly dependent on food from “wild” vegetation, some authorities believe that the Indians themselves were responsible for the wide distribution of certain trees, such as mockernut hickory (*Carya cordiformis*) and black walnut (*Juglans nigra*) (Goodwin 1977; Maxwell 1910).

The Cherokees obtained a number of fruits through contact with the Europeans in the sixteenth, seventeenth, and eighteenth centuries. These introduced fruits included watermelon (*Citrullus vulgaris*), peach (*Prunus persica*), apple (*Malus pumila*), and pear (*Pyrus communis*). Orchards were generally confined to moist, sandy soils at elevations below 3,000 feet; however, isolated stands of apple trees are at elevations up to 5,000 feet.

The Indians undoubtedly depended heavily on wild plants and animals for food, and they nurtured some forestland as a source of such foods. They also cleared large areas of settlements to provide fuelwood, and cleared extensive areas for agriculture.

Accounts of travelers document the abundance of cultivated fields and expansive grasslands throughout the Cherokee country. De Soto, in 1540, marched for a day through cultivated fields in southwestern North Carolina; subsequent explorers include De Luna in 1559-1561, Pardo in 1566-1568, Batt in 1667, Lederer in 1670, Needham and Arthur in 1673, Cuming in 1730, and Timberlake in 1762 (Boume 1904; Hudson and others 1985; Hudson 1987; Sondley 1977; Williams 1927, 1928). Perhaps Bartram’s account of his travels of 1775 are the most informative. The botanist reported extensive open prairies and fields of corn along the Little Tennessee River Valley (Harper 1958).

Virtually all permanent native settlements were limited to the floodplains of major streams and rivers for good reason. Their economy was based principally on agriculture, and it was impractical, if not impossible, to farm on steeply sloping terrain or at high elevations where erosion and microclimatic conditions were unfavorable. In southwestern North Carolina, the 3,000-foot contour follows the boundary between lands that are relatively suitable for agriculture and those that are not; the same is likely true for much of the southern Appalachians. Slopes are typically gentle below 3,000 feet and are typically much steeper at higher elevations.

Indians used fire to clear land for agriculture, and it is likely that some fires burned larger areas than intended. On shallow soils serotinous needleleaf conifers tended to dominate following a burn. On deep soils and open slopes hardwoods persisted or invaded after a fire. Deep-soiled, sheltered mesic sites were probably less susceptible to burning.

Rostlund suggested that in the pre-contact southeastern United States, the aboriginal inhabitants’ burning of vegetation resulted in maximum land clearance. After their depopulation and the concomitant reduction in frequent burning, the area of cleared land decreased and the proportion of forestland increased (Rostlund 1957). Silvical characteristics of some forested areas in the southern Appalachians seem to support

Rostlund's hypothesis. For example, in the contemporary Joyce Kilmer Memorial Forest in southwestern North Carolina, a high proportion of old-growth yellow-poplar dominates some **mesic** sites. Yellow-poplar is an aggressive pioneer species on fertile sites following drastic disturbance (McCracken 1978), and in examining the forest, Lorimer has determined that "disturbances as far back as 1550 are almost certainly indicated by substantial numbers of the intolerant tulip tree in corresponding age classes" (Lorimer 1980). Possibly a **fifteenth**- to sixteenth-century Indian settlement that was located at sites now dominated by yellow-poplar (*Liriodendron tulipifera*) was a source of major disturbance. Perhaps after the European introduction and the subsequent diffusion of epidemic disease during the mid-fifteenth century, the settlement was largely depopulated, and pioneer species, such as yellow-poplar, invaded previously cleared areas.

CONCLUSION

The ability of aboriginal inhabitants to clear forest has **often** been grossly underestimated. In fact, anthropogenic perturbations over the last one or two millennia have accounted for much of the Southeast's forest composition, which is dominated by disturbance-initiated species (Buckner 1989). In the southern Appalachians, the Indians' livelihood depended on the use of **fire** to clear land and on the cultivation of crops along the floodplains of major rivers and their tributaries. Before contact with Europeans, the Cherokees and their ancestors probably cleared all bottomland in the region at one time or another. Moreover, the Cherokees' pre-Columbian ancestors may at one time have been numerous enough to clear all land below the **3,000**-foot contour.

LITERATURE CITED

- Borah, W. 1964. America as model: The demographic impact of European expansion upon the non-European world, 35th Congreso Internacional de Americanistas, Mexico: **Actas y Memorias** 3:379-387.
- Boume, E.G., **ed.** 1904. Narratives of the Career of Hemando de **Soto**. New York: Allerton Book Co.
- Brown, R.H. 1948. Historical Geography of the United States. New York: Harcourt, Brace & World, Inc.
- Buckner, E.R. 1989. Evolution of forest types in the Southeast. In Proceedings of Pine-Hardwood Mixtures: A Symposium on Management and Ecology of the Type, **ed.** T.A. Waldrop, pp. 27-33. Asheville, North Carolina: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station.
- Crosby, **A.W.** 1986. Ecological Imperialism: The Biological Expansion of Europe, 900-1900. New York: Cambridge University Press.
- Day, G.M. 1953. The Indian as an ecological factor in the northeastern forest. *Ecology* 34:329-346.
- Denevan, W.M. 1976. The Native Population of the Americas in 1492. Madison: University of Wisconsin Press,
- Dickens, R.S. 1976. Cherokee Prehistory. Knoxville: University of Tennessee Press.
- Dobyns, H.F. 1966. Estimating aboriginal American population, an appraisal of techniques with a new hemispheric estimate. *Current Anthropology* 7:385-416.
- Frizzell, G.E. 1987. The Native American experience. In The History of Jackson County, **ed.** M.R. Williams, pp. 33-66. Sylva, North Carolina: Jackson County Historical Association.
- Gersmehl, P.J. 1970. Factors leading to mountaintop grazing in the southern Appalachians. *Southeastern Geographer* 10(1):67-72.
- Goodwin, G.C. 1977. Cherokees in Transition: A Study of Changing Culture and Environment Prior to 1775. Chicago: University of Chicago Department of Geography Research Paper No. 18 1.
- Hakluyt, **R.**, transl. 1611. The Discovery and Conquest of Terra Florida by Don **Ferdinando De Soto** and Six Hundred Spaniards His Followers. New York: originally published by the Hakluyt Society, London, reprinted by Burt Franklin.

- Harper, F. 1958. The Travels of William Bartram: Naturalist's Edition. New Haven: Yale University Press.
- Hudson, C. 1987. Juan Pardo's excursion beyond Chiaha. *Tennessee Anthropologist* 12(1):74-87.
- Hudson, C.; Smith, M.; Hally, D.; Polhemus, R.; and DePratter, C. 1985. Coosa: A chiefdom in the sixteenth-century southeastern United States. *American Antiquity* 50(4):723-737.
- Hughes, R.H. 1966. Fire ecology of canebrakes. *Proceedings, Tall Timbers Fire Ecology Conference*: 149-158.
- Johannessen, C.L.; Davenport, W.A.; Millet, A.; and McWilliams, S. 1971. The vegetation of the Willamette Valley. *Annals of the Association of American Geographers* 61(2):286-302.
- Kroeber, A.L. 1939. Cultural and natural areas of native North America. *University of California Publications in American Archaeology and Ethnology* 38: 1-242.
- Lindsay, M. 1976. History of the grassy balds in Great Smoky Mountains National Park. U.S. Department of Interior National Park Service Research/Resource Management Report No. 4.
- Lorimer, C.C. 1980. Age structure and disturbance history of a southern Appalachian virgin forest. *Ecology* 61(5):1169-1184.
- Martin, C. 1973a. Fire and forest structure in the aboriginal eastern forest. *Indian Historian* 6(3):23-26.
- Martin, C. 1973b. Fire and forest structure in the aboriginal eastern forest. *Indian Historian* 6(4):38-42, 54.
- Maxwell, H. 1910. The use and abuse of forests by the Virginia Indians. *William and Mary College Quarterly Historical Magazine* 19(2):73-103.
- McCracken, W.H. 1978. Comparison of Forest Cover Prior to and Following Disturbance in Two Areas of the Great Smoky Mountains National Park. Unpublished M.S. Thesis, University of Tennessee, Knoxville.
- Newcomb, R.M. 1969. Twelve working approaches to historical geography. *Association of Pacific Coast Geographers Yearbook* 31:27-50.
- Rostlund, E. 1957. The myth of a natural prairie belt in Alabama: An interpretation of historical records. *Annals of the Association of American Geographers* 47(4):392-411.
- Sauer, C.O. 1971. *Sixteenth Century North America*. Berkeley: University of California.
- Sauer, C.O. 1980. *Seventeenth Century North America*. Berkeley: Turtle Island.
- Sondley, F.A. 1930. *Asheville and Buncombe County*. Asheville: The Citizen Co.
- Swanton, J.R. 1946. The Indians of the Southeastern United States. *Smithsonian Institution Bureau of American Ethnology Bulletin* 137.
- Thompson, D.Q. and Smith, R.H. 1970. The forest primeval in the Northeast - a great myth? *Proceedings, Tall Timbers Fire Ecology Conference* 10:255-265.
- U.S. Final Report of the U.S. DeSoto Expedition. 1939. 76th Congress, 1st Session, House Doc. 71, 17.
- Williams, M. 1989. *Americans and Their Forests: A Historical Geography*. Cambridge: Cambridge University Press.
- Williams, S.C. 1927. *Lieut. Henry Timberlake's Memoirs 1756-1765*. Johnson City, Tennessee: Watauga Press.
- Williams, S.C. 1928. *Early Travels in the Tennessee Country 1540-1800*. Johnson City, Tennessee: Watauga Press.
- Yamell, R.A. 1976. Early plant husbandry in eastern North America. In *Cultural Change and Continuity, Essays in Honor of James Bennett Griffin*, ed. C.E. Cleland, pp. 265-273. New York: Academic Press.