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Book Review

Bonnicksen, T. M. 2000. *America's Ancient Forests: From the Ice Age to the Age of Discovery*. Wiley, New York.

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Throughout the late Quaternary, North American forests have been in a state of continuous flux. Plant associations have formed and fallen away as plant species responded independently to the complex climatic changes that occurred during the last deglaciation. Biotic processes operating on shorter time scales and moderated by long-term changes in the physical environment (e.g., dispersal and colonization of deglaciated areas, competition for resources among plant species, successional responses to disturbances, and plant-animal interactions) directly governed the structure and composition of late-Quaternary ecosystems.

To these physical and biotic drivers, an anthropogenic factor was introduced with the arrival of humans in the New World an estimated 15,000 years ago. The arrival of Europeans, therefore, is only the most recent chapter in a long history of human interactions with the biota of North America, albeit the most extreme. The drastic effects of European settlement on North American ecosystems have caused many ecologists to overlook the role that Native Americans once played in shaping the landscape prior to European arrival. For this reason, the presettlement forests of North America are often assumed to have been primeval wildernesses, whose structure and composition were determined solely by physical and biotic forces.

In the first part of *America's Ancient Forests: From the Ice Age to the Age of Discovery*, Bonnicksen (2000) attempts to correct this overly simple perspective by describing the climatic events and cultural practices that shaped the development of North American forests from the last glacial maximum (21,000 years ago) to the moment prior to European settlement. An explicit theme running through the book is that American forests prior to European settlement were not pristine wildernesses, but rather the product of millennia of usage and management by Native Americans. Or, as Bonnicksen states on page 142, "... there can be no doubt that North America would have been a different place when Europeans arrived if American Indians had not lived here." In the second part, Bonnicksen describes the state of the presettlement forests, combining eyewitness accounts from early European explorers, trappers, soldiers, and missionaries with a review of the ecological, paleoecological, and archaeological literature.

Because Bonnicksen, a professor in the Department of Forest Science at Texas A&M University, places such emphasis on the role played by the Paleoindians and their descendants in shaping North American forests, his book is, despite its title, as much a cultural history as an account of forest development. Although Bonnicksen briefly summarizes the main climatic events that took place during the Pleistocene and Holocene and assesses the vegetational responses, the bulk of the first part of the book is devoted to a description of Native American cultural practices and a discussion of their impact on North American ecosystems. These effects included hunting,

small-scale logging, agriculture, and, above all else, fire. Throughout the book, Bonnicksen repeatedly emphasizes the importance of fires set by both lightning and Native Americans in maintaining the openness and patchiness of presettlement forests.

America's Ancient Forests provides persuasive evidence that Native American activities had at least some consequences for North American ecosystems. Perhaps the most dramatic example is the extinction of most large mammal species in North America between 10,800 and 10,000 years ago, which was probably a result of the effective (and perhaps wasteful) hunting practices of Paleoindians, coupled with rapid environmental changes. Fire is another clear example of how Native Americans may have significantly changed forest composition and openness. Bonnicksen documents the intentional setting of fires for hunting, land clearance, warfare, and signaling, as well as the likelihood of accidental fires started from campfires. Other activities, such as hunting, logging, and agriculture, may have had secondary effects on prey populations and local frequencies of disturbance.

However, the crucial question for ecologists is not whether Native Americans modified their environment (they undoubtedly did), but how significant these effects were relative to natural agents such as lightning-induced fires, disease, storms, or climate change. Were these anthropogenic disturbances confined primarily to local areas next to streams, for example, or did the accumulated impact of small disturbances transform a continent? Despite the detailed picture of Native American practices, Bonnicksen never explicitly evaluates their ecological significance within a larger context. Instead, he emphasizes the importance of fire regime in determining the composition of modern forests and argues that any anthropogenically induced increase in fire frequencies must therefore have had a significant impact. Although the arrival of Paleoindians probably led to increased fire frequencies, it is more difficult to establish the extent of this impact, whether the anthropogenic alteration in fire regimes significantly affected the vegetation, and whether the effect operated primarily on local or regional scales. In the face of these unanswered questions, Bonnicksen at times simply asserts that anthropogenic changes in fire regime could explain past events such as the early Holocene spread of alder into Alaska or the rapid decline of spruce in Minnesota at the end of the Pleistocene. In contrast, other paleoecologists have found that, although Indians did significantly affect fire regime at certain times and places, widespread anthropogenic impacts on the landscape did not begin until European settlement (Vale 1998, Kaye and Swetnam 1999).

The debate over the influence of Native Americans upon the structure of presettlement North American forests has implications for resource managers and conservation ecologists. After all, an implicit goal of many current conservation efforts is to preserve or restore ecosystems to their "natural" presettlement condition, after which active human management should be minimized. This view is expressed in our management decision to set aside some portions of national forests as wildernesses. However, if Bonnicksen is correct in his assertion that Native Americans fundamentally transformed North American ecosystems, then maintaining them in their presettlement appearance will, on the contrary, require continued and active management.

America's Ancient Forests does well to call attention to this debate, but it is too strongly tilted in favor of anthropogenic effects to be read uncritically. The most compelling feature of the book is the numerous and well-integrated eyewitness accounts of the American forests and Native American land-use practices. However, the writing is choppy at times, and the book suffers from a lack of accompanying figures. Although Bonnicksen's enthusiasm for forestry and Native American history shines through, his tendency to overstate the influence of the latter on the former keeps the book from being a definitive history of late-Quaternary ecology in North America. Such a book does not yet exist, although Pielou (1991) provides a good general introduction. Nevertheless, Bonnicksen's attempt to unite human and ecological history is to be applauded and makes this book worth reading for archaeologists and ecologists interested in the interrelations between land use and changes in land cover.

BOOK INFORMATION

Bonnicksen, T. M. 2000. *America's Ancient Forests: From the Ice Age to the Age of Discovery*. Wiley, New York. 608pp., hardcover, US\$ 75.00. ISBN 047-1136220.

RESPONSES TO THIS ARTICLE

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