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Forgotten grasslands of the South

Forgotten Grasslands of the South: Natural History and Conservation. Reed F. Noss, 2012, Island Press. 320 pp. \$70 (Hardback), \$35 (Paperback) ISBN: 9781610912259 / 9781597264891; <http://islandpress.org>

This book is a major contribution to the argument that open grasslands and savannas, in climates that can support closed forests, are not only of considerable antiquity but are also home to rich floras and faunas of high conservation interest. Reed Noss focuses on the “forgotten” grasslands of the south-eastern USA. With foresters’ bias to trees, the long-leaf pine ecosystems of this area have generally been classified as ‘forests’. Yet it is the understorey that tells the real story—one of shade-intolerant (mostly C4) grasses and other plants and animals living in open, light-rich environments. The conundrum is that the climate is warm enough and wet enough to support forests dominated by trees that cast dense shade. The same conundrum faces the tropical ecologist confronting the vast areas of savannas in seasonally humid climates that also support closed forests. The classic solution, plugged for well over a century, is that the grasslands are ‘cultural artefacts’, created by felling and burning of the forests. Over the last couple of decades, this idea has been challenged by multiple lines of evidence pointing to ancient origins of grasslands and even more ancient origins of vegetation fires that help create and maintain them. Noss’s book is the best case study I have read on the mis-reading of grassy vegetation and its catastrophic consequences for conservation of these highly threatened ecosystems.

Noss’s mission is to promote an appreciation for, and understanding of, these neglected systems. Directed at naturalists, conservation biologists and field biologists, much of the book is written as a personal narrative, including memorable outings with knowledgeable naturalists, with many descriptions of species and special sites that clearly delight the author. But Noss also writes for a more general readership with informed discussion of general ideas of conservation biology, savanna ecology, fire and large-mammal herbivory, patterns of species richness and endemism, geol-

ogy as the foundation for community organisation and more. The net effect is a superb case study, rich in detail but broad in intellectual scope, that places North American grassy ecosystems firmly in the burgeoning world literature on savannas and related grasslands.

Relative to the savannas of the southern hemisphere the pine savannas of the south-eastern USA are unusual in generally lacking a distinct dry season (typically > 5 months). Just why a long dry season favours savannas is not well understood but a favoured hypothesis is that it provides more time for fires to burn, helping promote savannas at the expense of fire-intolerant forests. In the grasslands of the south, however, the lack of a distinct dry season is offset by the very high frequency of lightning and thunder storms (with some areas receiving > 100 thunderstorms per year!). Thus even small areas of vegetation have a high probability of being hit by lightning strikes. Not all grasslands depend on fire (or large mammalian herbivores) for their existence. Noss’s discussion of edaphic savannas is the best I have seen anywhere. The origin of C4 grasses, which dominate the southern grasslands, is now thought to be ~ 30 million years ago. Yet their assembly into a major world biome only occurred some 20 million years later. The author’s description of the diverse soils and geologies where grasses persist in this forested landscape provides a detailed view of the edaphic ghettos in which savanna biotas may have developed, free from lethal shading by forest trees, millions of years before the explosive spread of the savanna biome from the Late Miocene.

Cultural prejudices against grassy ecosystems as natural vegetation types have led to their neglect until recent times. Part of that neglect includes the study of biodiversity. Noss’s analysis of the biotic richness of the southern grasslands was quite stunning to me. The Atlantic and Gulf Coastal Plain Floristic Province, which includes

grasslands of the south, contains some 6170 plant taxa, nearly a third of the flora of North America. A whopping 1748 taxa (28.3 %) are endemic to the coastal plain with 51 endemic or near-endemic plant genera. Nearly 1000 of these endemic plant species are located in the long-leaf pine savannas and its associated communities. The flora includes both palaeo- and neo-endemics, indicating an unusually long history of open habitats perhaps related to the diverse geologies hostile to forest development. The long history of the southern grasslands is supported by fossil and palynological evidence showing an unusually stable climate in the southern part of the Coastal Plain over “tens of thousands to perhaps millions of years” (p. 83). This is in striking contrast to the grasslands of the Great Plains, which were largely cobbled together since the retreat of the ice. Thus the Pleistocene history of the southern grasslands is much closer to those of the tropical savannas of Brazil, Africa and Australia, resulting in comparable species richness. The better-known Prairie region of the Great Plains is a striking contrast to the southern grasslands, with only 87 endemic plant species and infraspecific taxa and no endemic genera. It would be fascinating to explore functional similarities and dissimilarities: both the ancient and young North American grasslands versus the savannas of the southern hemisphere. As one example, frequent fires in tallgrass prairies reduce floristic diversity whereas frequent fires are essential for maintaining the diversity of the southern grasslands and those of southern Africa and Brazil.

The consequences of misunderstanding the origin and antiquity of the southern grasslands have been dire. Conservationists were slow to recognise the significance of the endemic-rich open-habitat biota in a system supposedly created by Indian burning and described as a ‘cultural landscape’ by some authors. The southern grasslands long pre-date human settlement on the American continent. Besides direct losses to agriculture and urbanisation, fire suppression in the south-east has caused massive biome switches from savannas to broadleaved deciduous forests since European settlement. Noss concludes the book with a chapter on conservation planning, priorities and

management of the grassland remnants. Unlike many conservation planners he does not neglect the need for active management of grassy ecosystems. Active management includes approaches to promoting the necessarily frequent fires and reconstruction of the large mammal herbivore assemblages that helped shape the system in the past.

Despite the book’s focus on a small geographic region, it will be of great interest to ecologists in other parts of the world, especially those dealing with grasslands, savannas and other open ecosystems. Such readers can skip the many sections detailing the species of wondrous localities that will excite the local naturalist. Instead they can focus on those sections of the book dealing with broader contributions to ecology, biogeography and conservation biology. I was reminded at times of Rackham’s brilliant book on the history of the countryside (Rackham 1986), rich in detail on the development of the British countryside but fascinating in opening the mind to the startling revelations of historical ecology. Noss’s book, likewise, is rich in local detail but also of much wider geographical relevance. It is an excellent book and should be read by all interested in the lighter side of ecology, the open non-forested ecosystems of the world.

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Reference

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