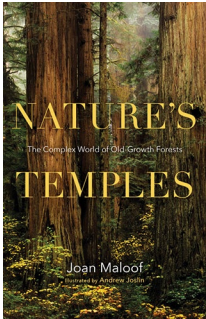


# Stop messing with old-growth forests



## Nature's Temples: The Complex World of Old-Growth Forests

By Joan Maloof,  
illustrations by  
Andrew Joslin

TIMBER PRESS: 2016.  
200PP. US\$27.95

I suspect that most of us in the sciences have our professional ‘heroes,’ those individuals whose work and life helped form our own view of the work we do and whose ideas continually inform our own to this day. One of mine is Frank Egler, the iconic plant ecologist, whose quote regarding ecosystems has always resonated with me, “Ecosystems are not only more complex than we think, but more complex than we can think”<sup>1</sup>. These ecological entities are of great complexity, comprising interactions among enumerable biotic and abiotic components such that, to paraphrase Aristotelian holism, the whole system is indeed ‘more than the sum of its parts’<sup>2</sup>.

Perhaps the most ecologically complex terrestrial ecosystems are forests, with tropical rain forests generally having the highest biodiversity and physiognomic complexity. Not far behind would be temperate (especially deciduous) forests. A general axiom of ecosystem development is that complexity increases with time; thus, the most complex ones tend to be so-called ‘old-growth’ forests that have been spared disturbance by human activity. Regrettably, such forests are extremely rare in the biosphere.

In her recent book, *Nature's Temples: The Complex World of Old-Growth Forests*, Joan Maloof embraces the complexity of these rare, if not vanishing, regions. Her central message is as simple as it is essential — policies must be put in place on a variety of levels, beginning with municipalities, to protect these threatened ecosystems from anthropogenic pressures including pollution, land use and alteration, and, most especially, timber harvesting. Indeed, Maloof’s message is important enough to reiterate here, in plain vernacular: stop messing with old-growth forests!

As an ecosystem ecologist, this book represents a challenge for me to review. It appears to be intended for a ‘lay’ audience,

or at least one outside the field of ecology. On the other hand, as *Nature Plants* is a science journal, much of the readership is either well, or at least partly, familiar with ecology and its basic principles. My brief recommendation is that ecologists would find little new information here, but that non-ecologists (whether non-scientists or non-ecological scientists) would learn a great deal about the unique qualities of the all-too-rare forested areas that have escaped the disruptive, often destructive, influence of human activities. As Francis Bacon reminded us, ‘knowledge is power’, and such new knowledge should arm lay readers with the power they need to help, either through conservation or policy, in protecting old-growth forests.

Maloof organizes her book into sixteen chapters. The first five are of a somewhat introductory nature — defining terminology, discussing natural history and placing these forests in the context of global carbon cycling, as well as describing the ‘tree’ component of old-growth forests. One might ask what else there is to know about forests beyond the trees. Maloof answers this question over the following ten chapters, as she describes characteristics of numerous organisms that are decidedly not trees, yet are equally important in comprising the complex structure and function of forest ecosystems: birds, amphibians, invertebrates (snails and insects), herbaceous plants, non-vascular plants (mosses and liverworts), fungi, lichens, worms and mammals. In the final chapter, Maloof asks, do humans need the forest? A question that should be, yet is tragically not often asked among lawmakers. Here, she briefly discusses the ‘ecosystem services’ (for example, oxygen supply and hydrologic cycle regulation) provided by old-growth forests. Most intriguing, however, is the summary of her published study<sup>3</sup>, wherein she successfully took on the daunting task of quantifying the human perception of beauty in the context of forests.

It would be unfortunate if what I see as shortcomings in this book dissuaded potential, non-ecologist readers from reading it. Nonetheless, there are several areas wherein the book falls short of its potential. Let us begin with the very existence of old-growth forests. Maloof quotes from an expert forest ecologist, Tom Spies, that, “There may never be a single...definition of old growth...” Maloof agrees with this, as do I. I would go a step

further and suggest that even those forests that she repeatedly calls ‘ancient’ may not be so ancient as we may think. This book focuses primarily on temperate forests and I would suggest that the expanse of human populations in temperate areas has left the most indelible anthropogenic imprint among forest types. Widespread forest conversion in central Europe dates back to the Neolithic period; and Romans deforested much of the English landscape 2000 years ago. In North America, notable evidence suggests that, prior to early Europeans, use of fire by Native American peoples altered the composition of eastern hardwood forests, especially regarding trees of masting or fruiting value<sup>4</sup>. Our current epoch — the Holocene — is increasingly being referred to as the Anthropocene, in awareness of the degree of human alteration to all facets of the biosphere during recent millennia<sup>5</sup>. It would have added more relevance to this book to include both this awareness and terminology. Again, this should not dilute the essential message of old-growth protection, but it is naïve to think that ‘ancient’ forests, even the most pristine, are free of profound anthropogenic influences.

Maloof is to be commended for utilizing data and conclusions from the peer-reviewed ecological literature in her book. In at least one chapter, however, the book again falls short. Much of chapter 10, discussing herbaceous plant populations and logging, refers to a study by Duffy and Meier comparing herb layer communities in old-growth versus second-growth forests<sup>6</sup>. However, this study has been widely criticized for extensive problems with methodology, including the confounding of several environmental influences on forest herbs, a problem articulated by Wyatt and Silman<sup>7</sup> in another paper Maloof references in this chapter. The work by Wyatt and Silman (far more appropriately carried out than Duffy and Meier) was greatly expanded — 9 article pages versus ~30 book pages — as a chapter in a book, published in 2014, discussing the ecology of forest herb communities<sup>8</sup>. First, full disclosure, I edited this book; but I certainly do not take its omission as a personal rebuff. Rather, I am instead keenly aware of the wealth of information it contains, virtually all from authors other than me, which would have added to Maloof’s book. Included are an entire chapter on herb communities in eastern old-growth forests, as well as chapters on herb population dynamics

and the numerous anthropogenic threats touched on in Maloof's book, including invasive species, deer browsing, nitrogen pollution and climate change. Its final chapter issues a directive that "...existing old-growth stands...must be preserved, both as ecological legacies and as benchmarks for conservation ecologists"<sup>8</sup>.

Maloof does, however, omit something of mine in this chapter that I found puzzling. In 2007, I published a paper<sup>9</sup> on the ecological significance of the herb layer in forests, wherein I provided an anecdote from my graduate work at Duke University regarding a professor's reference to forest herbs as 'stepovers', and quantified, based on literature data, the relative contribution of the herb layer to forest plant diversity (80–90%). Surprisingly, Maloof shares both of these without citing the 2007 paper.

Given its intended audience, I was also disappointed that Maloof did not describe old-growth forests more explicitly as ecosystems. For a variety of reasons, non-ecologists are often misinformed regarding what constitutes an ecosystem — the functional combination of the biotic community and physical factors<sup>10</sup>. Golley's<sup>2</sup> 'whole' exceeds 'the sum of the parts' because of the intricate and intimate

interactions among those parts. Maloof does an excellent job discussing the parts in the individual chapters, but could have done a better job showing the reader the uniqueness that arises when these parts are allowed to interact in the absence of human interference. She first mentions 'ecosystem services' briefly in chapter 5, though without explanation for what they are. A clear exposition of the ecosystem concept and how these old-growth forests constitute unique ecosystems, along with these services (for example, regulation of oxygen–carbon dioxide exchange and hydrology), at the beginning would have helped, as would a final chapter specifically explaining how all the parts interact.

Despite these criticisms, this book's assets far outweigh its shortcomings. Thus, I want to end on a positive note. One of the mantras coming from a forest industry that espouses harvesting old-growth forests is that they represent a decreasing carbon sink, thus implying that their conversion to managed stands can effectively mitigate increases in atmospheric carbon dioxide. By citing published work Maloof does an excellent job gainsaying this gross misconception — a message that needs more voice, especially considering most ecologists were taught that very same mantra in

graduate school. Professionally, she has admirably transitioned from academia to advocacy and activism, as founder of the Old-Growth Forest Network, and in this book she makes a compelling plea. These complex old-growth forest ecosystems indeed command our awe, reverence and protection.

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Published online: 5 July 2018

<https://doi.org/10.1038/s41477-018-0201-2>

#### References

1. Egler, F. E. *The nature of vegetation: Its management and mismanagement* (Aton Forest, Norfolk, CT, 1977).
2. Golley, F. B. *A history of the ecosystem concept in ecology: More than the sum of the parts* (Yale University Press, New Haven, CT, 1996).
3. Maloof, J. *Int. J. Environ. Stud.* **67**, 431–437 (2010).
4. Gilliam, F. S. *New Phytol.* **212**, 871–887 (2016).
5. Ellis, E. C. *Ecol. Monogr.* **85**, 287–331 (2015).
6. Duffy, D. C. & Meier, A. J. *Conserv. Biol.* **6**, 196–201 (1992).
7. Wyatt, J. L. & Silman, M. *Forest Ecol. Manag.* **260**, 116–124 (2010).
8. Gilliam, F. S. (ed) *The herbaceous layer in forests of Eastern North America* 2nd edn (Oxford Univ. Press, New York, NY, 2014).
9. Gilliam, F. S. *BioScience* **57**, 845–858 (2007).
10. Tansley, A. *Ecology* **16**, 284–307 (1935).

#### Competing interests

The author declares no competing interests.