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Toward a new paradigm in conservation and restoration

Hobbs, Richard J., Eric S. Higgs, and Carol M. Hall. 2013. **Novel ecosystems: intervening in the new ecological world order.** Wiley-Blackwell, Hoboken, New Jersey. xi + 368 p. $79.95 (cloth), ISBN 978-1-118-35422-3.

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Intact, undisturbed habitats have been the focus of conservation efforts and the public's imagination since before the birth of the environmental movement. Whether as priorities for land preservation or references for management and restoration plans, such "wild" habitats have served as poster children for the notion of what nature is, or at least what it should be. The "other" habitats, even those not currently under plow or other direct human use, have tended to be classified in derogatory terms—"degraded," "disturbed," or even "trashed"—and have not been afforded the same level of protection, study, or appreciation.

What to do, then, as human influences extend to much, if not most, of the biosphere and we realize that pristine wilderness scarcely exists? Furthermore, as the limits of restoration science to successfully undo past human influences become clearer, it is apparent that the extent of such "wild" habitat can only decrease. In the face of these realities, do we (scientists, policymakers, and the public) continually shrink the size of the Earth that is considered worthy of protection and active management? Or, alternatively, do we readjust our notion of value to include a wider range of habitat?

Novel ecosystems explores the evidence for and implications of a new class of habitat to be recognized beyond the traditional "wild" vs. "degraded" dichotomy. It clearly advocates that scientists, stewards, and policy-makers expand their sense of value to include habitats that exhibit a strong legacy of human influence. While there are many points where pains are taken to reassure the reader that elevation of the value of novel ecosystems should not diminish the value of "protecting places and ecosystems that retain their original biota and historical character" (Chapter 1), some modestly dissenting viewpoints are also presented (e.g., Chapters 29, 41). It makes for a lively debate within a single volume.

Surprisingly, the book does not present a clear description of the novel ecosystem concept, in spite of a cooperatively written "working definition" (Chapter 6). This definition maintains the essential components of previous publications— "[A] system of abiotic, biotic and social components ... that, by virtue of human influence, differ from those that prevailed historically"—but also adds enough clauses as to make the outcome rather unwieldy. Other chapters early in the book present the idea of thresholds beyond which a return to a historical state is no longer possible (Chapter 3), and the relationship of the concept in the context of ecological theory (Chapter 5). Still, the book would have benefited from a single chapter that could serve as a stand-alone conceptual introduction.

This criticism aside, various chapters throughout the book make clear that novel ecosystems are neither rare across the landscape nor a recent phenomenon. As Chapter 5 argues, the work of Arthur Tansley, Henry Gleason, and Margaret Davis, among others, has made clear that species composition responds individualistically to environmental changes, and that ecosystem change is, in fact, the norm when viewed in a longer temporal context. When viewed this way, fealty to historical species combinations can be seen as running counter to well-accepted ecological theory. In some conditions, such as islands (Chapter 4), novelty may in fact be the norm rather than the exception. The book also presents numerous case studies that qualitatively describe a variety of novel ecosystems, including some in which species invasions or land-use changes have caused essentially permanent shifts in species composition (e.g., montane forests in the Seychelles, Chapter 27), as well as others in which a unique mixture of species has colonized areas of intense human activity (e.g., the "Hole-in-the-Donut" in the Everglades, Chapter 2).

Individual chapters present theoretical reviews of the role that drivers such as land use (Chapters 8 and 9), climate change (Chapter 10), and invasive species (Chapter 11) play in creating and maintaining novel ecosystems. Patterns of disease (Chapter 12), plant-soil feedbacks (Chapter 13), and fauna (Chapters 14 and 15) within novel ecosystems are also considered. There are also well-written considerations of novel ecosystems within prevailing environmental ethical frameworks (Chapter 31) and implications for policy (Chapter 33). Finally, one of the strongest aspects of the book is the occasional 1–2 page narrative of authors' personal journeys towards recognizing the existence and value of novel ecosystems in their own personal or professional lives.

Perhaps the key practical question is when and how to intervene in the management of a novel ecosystem. Chapter 18

presents a decision framework that describes dichotomies for scientists or stewards who are considering various management approaches—including whether a habitat is novel or whether management could restore its species composition or function to some reference point. The framework is consistent with the kinds of stepwise decision trees that form many adaptive management formulae, and identifies the important points for stewards to consider when considering various management options. Chapters 19–23 are case studies that illustrate some of the scenarios that might be encountered when applying the decision framework. For example, post-restoration assessment is applied in the restoration of meadows in Nova Scotia (Chapter 19), and management goals are identified in heavily invaded shrub ecosystems in the Galapagos Islands (Chapter 22). These chapters, while being mostly anecdotal and informal, still do an excellent job illustrating the decision framework and its real-world application.

The book makes a strong argument that novel ecosystems have value and are worthy of study and conservation. Numerous examples are presented of the importance of novel ecosystems as reservoirs of biodiversity that provide habitat for a range of taxa, including species of concern. Chapters 29 and 30 argue that the novel ecosystem concept could expand public interest and involvement in ecosystem management and conservation by reshaping the way we think about nature and human-nature interactions. We can also appreciate them on a practical level, in terms of their ability to provide essential ecosystem services. Toward the end of the book, Chapter 38 considers the role of urban ecosystems in providing a range of economically valuable ecosystem services. However, I believe the book misses an opportunity to more broadly consider the ecosystem services that novel ecosystems can provide and how ecosystem management could be geared toward maximizing those services.

This is a turbulent time in the fields of conservation and restoration, as many traditional conservation and management goals are being challenged. *Novel ecosystems* takes a less confrontational route, but one that may have longer-lasting effects. Are we in the midst of a paradigm shift, as some authors in this book suggest, in which these widespread yet hitherto less-appreciated ecosystems are seen to be worthy of study, conservation, management, and, yes, even love? If so, this book may be seen in the future as a key step.

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