

and rather constitute an expensive method to generate random numbers for management decision making. Such data can nevertheless be very precious because they may be the only historical account from a particular location and analysis will benefit from those “sharp tools” that Cressie and Wikle describe.

This book delivers a strong argument that Valvanis' kitchen is ready for the challenge. But in my opinion the real revolution and value of this book will emerge only once recipes can be explored on the open-source stove using raw data that are willingly shared by governments and the scientific community. The examples given in Chapter 9 use relatively simple and small datasets and it remains to be evaluated if the methods are useful for research problems with data that are much more complex, voluminous, and heterogeneous in both space and time. The probability of success will be a product of ingredients and tools multiplied by the creativity of chefs. Much ecological research is done under constrained conditions, where scarce resources need

to be allocated between fresh ingredients (i.e., data) and the acquisition of and training in new tools. I believe that many kitchens will continue to produce excellent output with blunt knives. But saying this, we are in the midst of an explosion where consequences of even small perturbations are difficult to predict.

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Stopping the hands of time

Jordan, William R., III, and George M. Lubick. 2011. **Making nature whole: a history of ecological restoration.** The Science and Practice of Ecological Restoration. Island Press, Washington, D.C. xiv + 256 p. \$70.00 (cloth), ISBN: 978-1-59726-512-6 (alk. paper); \$35.00 (paper), ISBN: 978-1-59726-513-3 (alk. paper).

Key words: adaptive management; ecocentric restoration; history; meliorative restoration; restoration.

We seem to live in a fallen world. An even casual perusal of the technical literature published in ecological journals, the “accessible” literature written for a scientifically literate but non-specialist citizenry, or the daily tabloids, blogs, and tweets rapidly reveals authoritative pronouncements of long-term ecological “imbalance,” ongoing environmental catastrophes, and impending planetary doom. Striding into this breach, with their cattle standing in for extinct Pleistocene megafauna and their flamethrowers replacing unpredictable lightning strikes, come the restoration ecologists. The first restorationists were interested in returning a deposed monarch to his throne and his kingdom to its former state of innocence and grace in the face of the prevailing deity (the *Oxford English Dictionary*, 3rd edition [2010] identifies the first use of “restoration,” ca. 1500, in reference to Job “*This blessid man Job thankyd god of his excellence. And of his restoracion proud neuer he.*”) The now more generally used meaning of restoration—albeit number 5a in the *OED*—as reconstructing a building or an ecosystem came only much later (1663 and 1984, respectively).

Modern restoration ecologists combine these two meanings of restoration as they strive to recreate an entire ecosystem. The pragmatic goal is to reconstruct an entire ecosystem, with all its parts present and processes smoothly functioning. But there is also a sense of returning an ecosystem to an unsullied state of grace; the overarching goal of ecological restoration is to compensate for the novel or “outside” (read: pernicious, fallen) influences on the ecosystem so that it can function or behave as if these influences were not present. This type of ecological

restoration—Jordan and Lubick call it “ecocentric restoration”—is distinct from other forms of land management that focus on improving one or more of the parts of an ecosystem that provide a specific, utilitarian function for people (Jordan and Lubick group these latter approaches into “meliorative restoration”). How ecocentric restoration emerged as the defining principle of restoration ecology, and how it evolved from, and then advanced in parallel with, meliorative restoration, is described brilliantly in *Making nature whole*.

In just over 200 pages of well-crafted prose (the remaining 20% of the book is endnotes and an index), Jordan and Lubick accomplish much more than simply presenting the intellectual history behind the evolution and emergence of contemporary restoration ecology. Jordan and Lubick also bring to life the personalities of the central figures in modern restoration ecology, from the well known (Aldo Leopold) to the rarely remembered (e.g., George Wright, Ossian Simonds, Volney Spalding, Edith Roberts). They illuminate the fundamental (non-economic) values of ecocentric restoration, which provides a self-conscious encounter with nature; a way of making us aware of our influence on ecosystems and landscapes; and an opportunity to pay tribute to nature's intrinsic value. They quote George Wright (then an assistant naturalist at Yosemite National Park) and colleagues as writing, in 1933, “the situation which obtained on the arrival of the (European) settlers may well be considered as representing the original or primitive condition that it is desired to maintain.” Jordan and Lubick reify this idea: “old ecosystems are ecologically privileged assemblages of organisms, endowed with distinctive qualities of stability, beauty, and self-organizing capacity.” What is old? “[The] condition at the time of cultural contact, the distinctive New World experience, [is] the favored objective of restorationists.”

The obvious objection to this baseline—that Native Americans were already here, modifying the landscape, and so ecocentric restoration should use pre-human landscapes as the historic condition or baseline—is forestalled in two ways that further reveal the deep philosophical underpinnings of modern restoration ecology. First, this objection evaporates by definition: “restoration projects initiated by indigenous peoples are

typically examples not of ecocentric restoration but of adaptive management.” That is to say, Native Americans managed forests, grasslands, or rivers for sustainable yields of deer, bison, or fish, but did not have “an interest in the historic system *as a historic ecosystem.*” Second, Jordan and Lubick contrast their perspective on (European) people’s separateness from nature with Native Americans’ connection to nature. Native Americans make “no distinction between humans and an environment that is *out there*” (the phrase is attributed by Jordan and Lubick to Dennis Martinez, Chair since 1995 of the Society for Ecological Restoration’s Indigenous Peoples’ Restoration Network; italics in the original). On the other hand, ecocentric restoration “is a response to the experience of an ecosystem as other than us, here before we got here, and so not our habitat.” In short, (innocent) Native Americans garden, (guilty) European colonists restore.

This distinction is emphasized from the beginning of the book to its very end and its emphasis in contemporary restoration projects reflects the lead author’s central role in the founding and development of the Society for Ecological Restoration. Early on, Jordan and Lubick write that to ensure the perpetuation of actual ecosystems and the full complement of species that compose them, “it is necessary to perceive the ecosystem from the perspective of an outsider in order to perceive and act *against* the current of time and change as an ecosystem responds to changes in the technologies and economies of the people who inhabit it” (italics in original). Before we can restore an ecosystem, we have to “step out of the current of time . . . and see [ourselves] as agents acting on, shaping, altering, and perhaps damaging an environment.”

Jordan and Lubick conclude the book by asking how we come to terms with living at odds with Ralph Waldo Emerson’s nature, a nature that “leads us on and on, but arrives nowhere; keeps no faith with us” (Emerson, as quoted by Jordan and Lubick).

How to live in a “natural world” that seems to care little for humans is one of the fundamental questions of the ages. Religions and their prophets have solved this problem by inventing caring gods, gardeners find solace in their vegetable patches and arboreta, and restoration ecologists carve out spaces where they rehabilitate ecosystems that have been degraded, damaged, or destroyed. In this deeply personal book, Jordan and Lubick take the time to convince us that ecocentric restoration is crucial not because it is the best or only way to manage landscapes, but because it allows us to step outside ourselves for just a moment, to stop the hands of time, and to reverse something larger than ourselves that is simply not interested in us at all.

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A unified paradigm for the climatic elevations of global treelines

Körner, Christian. 2012. **Alpine treelines: functional ecology of the global high elevation tree limits.** Springer, New York. xi + 217 p. \$89.95, ISBN: 978-3-0348-0395-3 (acid-free paper).

Key words: climatic treeline; low temperature limits; tree growth limitations; tree height.

No challenge has been more intriguing or captivating to plant ecologists and biogeographers than the explanation for the existence of the line-like boundaries (so visible from an aircraft) separating mountain forests from the alpine zone of mountain tops. *Alpine treelines* provides a remarkably comprehensive and much-needed update of the seminal book covering this topic published over three decades ago (Tranquillini, Walter. 1979. *Physiological ecology of the alpine treeline: tree existence at high altitudes with special reference to the European Alps.* Springer, New York). Both books attempt to synthesize a unified paradigm for the ecophysiological mechanisms that act to terminate, rather sharply, forest tree occurrence at a maximum elevation. However, Körner recognizes that the literature is dominated by temperate zone studies and attempts to focus on a much broader global explanation, an approach he considers independent of local treeline phenomena such as seasonal snow in temperate latitudes. According to Körner, the common denominator globally is the requirement for a minimum amount of “heat” for tree growth, an amount that

is not reached above treelines. However, he strays from this somewhat historical focus throughout the book, delving into a host of localized phenomena reported for different treelines.

Körner begins (Chapter 2) by defining treeline nomenclature, including a definition for a “tree” based on a minimum height criteria. The common observation that conifer trees are capable of surviving above the treeline in stunted (shrub-like) and distorted growth forms (e.g., krummholz mats), but commonly have vertical, often flagged stems that would be classified as trees, complicates his attempt at clarifying terminology. Precise definitions for such common terms as seedling, sapling, or timber-size tree are not provided (see also Chapter 9). In particular, seedling and sapling designations are often used interchangeably throughout the book. The depiction of typical treeline components does not show the continuous transition that occurs across treeline ecotones in tree size, form, abundance, and spacing, including that of seedlings, saplings, and other landscape features such as ribbon forest. Discussions about the difference in stress versus limitation (e.g., Chapters 2 and 10) and the idea that endemic species are not stressed are interesting digressions, although debatable.

Chapters 3–5 describe global treeline patterns in association with topography and climate, plus mean minimum air and soil temperatures as estimates of the minimum heat requirement mentioned above. Specific temperature data are presented and a conceptual theme throughout the book is introduced—that the tall height of treeline trees results in a tight convective coupling to air temperature (little warming in the sun or radiational