

RESPONSE ARTICLE

What the novel ecosystem concept provides: a reply to Kattan et al.

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The novel ecosystem concept expands the restoration palette by focusing our attention on what is possible when recovery to an historical pre-disturbance condition is not. Although some elements of the concept have long been accepted in restoration circles, the novel ecosystem framework brings these elements to the fore. There is a growing frustration with restoration prescriptions that above all else emphasize native species and historical trajectories, and there is a clear need for alternatives that recognize real limitations to achieving these goals in at least some instances. Though not perfect, the novel ecosystem framework represents such an alternative.

Key words: decision trees, ecological restoration, historical conditions, proof of concept, restoration terminology

Conceptual Implications

- Definitions of concepts in restoration ecology are necessarily succinct and broad in scope. No such definition can provide the detail needed to inform the particulars of restoration in a given location. This does not diminish the value of the concept.
- The novel ecosystem concept echoes themes already expressed in mainstream restoration ecology. These themes coalesce and are given greater expression in the novel ecosystem framework, creating a point of reference for those who struggle with restoration targets based on local native ecosystems.
- The utility of the novel ecosystem concept will ultimately be determined in a bottom-up fashion by restoration practitioners. There are indications that at least some of the ideas embodied in the concept are gaining traction with this group.

Introduction

In their response to our article on the novel ecosystem debate (Miller & Bestelmeyer 2016), Kattan et al. (2016) focus on relatively few of our main points. Instead, they largely engage in a more wide-ranging discussion of novel ecosystems, often reiterating points made in their earlier writings (Aronson et al. 2014; Murcia et al. 2014). In our article, we examine three key aspects of the debate (irreversible thresholds, non-native species, and the hybrid state) and offer a potential way forward. To be clear, we consider ourselves to be at arm's length from the debate, as we have not previously authored papers on this topic, or participated in any associated workshops or symposia. We are critical of some aspects of the novel ecosystem framework, but find value in others (Miller & Bestelmeyer 2016). That said, we appreciate the opportunity to respond to the assertions

of Kattan and colleagues that are specific to the points we made in the article, as well as those that are tangential to our arguments. Each of the following sections is titled with a question posed by Kattan et al. (2016), followed by a brief response and elaboration.

Is the Novel Ecosystem Definition Precise Enough to Guide Interventions? – No, But That's Not the Point

The novel ecosystem definition does not need to be, nor could it be, precise enough to guide interventions in the myriad circumstances in which restoration is implemented. The same could be said of the term “ecological restoration,” defined as “... the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed” (SERI Science & Policy Working Group 2004). The definition of novel ecosystems is succinct and universal, whereas the particulars of a given intervention must be detailed and locally operational.

Somewhat more guidance for interventions is provided by decision trees, such as the one we offer and similar efforts by Truitt et al. (2015) and Hobbs et al. (2014), where the distinction between the historic state and novel ecosystems is expanded upon. Kattan et al. contend that removing the reference to novel ecosystems in these frameworks would not diminish their

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value. We disagree. Even though restoring some historical elements or functions may be possible in highly altered systems, the point of a bifurcation between the historical and novel states in these frameworks underscores the idea that decisions to forego an emphasis on historical conditions or trajectories in restoration can be made for a variety of valid reasons. None of these reasons need diminish the inherent value of historical states.

Is the Novel Ecosystem Concept a Novel Alternative? It Highlights Alternative Ways of Thinking About Restoration

We did not argue that the novel ecosystem concept was born fully formed in a vacuum. We pointed out that several of the key tenets of this framework have long been codified by the Society for Ecological Restoration, including the existence of irreversible thresholds and the use of non-native species in restoration (SERI Science & Policy Working Group 2004), and restoration objectives that depart from historical targets (Clewell et al. 2005). These and other challenges in restoration coalesce and are fleshed out in the novel ecosystems concept (Hobbs et al. 2013), creating a framework and an identity for those who are struggling with the narrow focus on historical pre-disturbance conditions advocated by Kattan and his colleagues (Murcia et al. 2014).

Rather than being a specific type of ecosystem that can be identified on the ground or in an aerial photo, we see novel ecosystems as a juncture in the decision-making process that allows for management toward an endpoint that is not primarily historical. At the end of the day, the differences between the decision-making process that Kattan et al. describe and the one that we propose might be relatively minor. Perhaps the real sticking point is not so much the idea of novel ecosystems, but the language used in describing it. For example, they reject the notion that “altered” can substitute for “degraded” in describing ecosystems that tend toward novel conditions (Hobbs 2016). While value-laden terms such as “degraded” can motivate restoration, as Kattan and his colleagues correctly point out, such terms can also circumvent productive management actions when ecosystems perceived as unrestorable are abandoned to other land uses (Bestelmeyer 2015).

Along these same lines, Kattan et al. state their preference for descriptors such as “emerging” or “no-analog” versus “novel”—a point that these authors have made time and again (Clewell & Aronson 2013; Aronson et al. 2014; Murcia et al. 2014). We reiterate that such arguments are of little practical use. The phrase “novel ecosystem(s)” has now been cited 352 times in journal articles since 2006 (again excluding those with Richard Hobbs as an author), a substantial increase over the 275 citations that we initially reported. These numbers are based on a literature search of titles, abstracts, and keywords, indicating that the topic of novel ecosystems is central to the content of these articles rather than merely reflecting a social contagion phenomenon, as Kattan et al. assert.

A Path Forward? We Think So

In our discussion of a path forward (Miller & Bestelmeyer 2016), we highlight a number of shared beliefs among those parties engaged in the novel ecosystems debate. Kattan and his colleagues underscore even more areas of agreement: the value of retaining novel elements in restoration and the worthiness of restoration of ecosystem function as a goal whether or not historical elements can be restored. We also agree with Kattan et al. that surveys of practitioners could help move us forward. Toward that end, we cited a survey of conservation experts (Hagerman & Satterfield 2014) wherein nearly 70% of respondents question the relevance of historical baselines as guides to conservation and restoration targets. But this is only one survey—we concur that more input from restoration practitioners may help to identify what they find useful (or not) about the novel ecosystem framework.

Although there are areas of agreement, the perception of widespread support for “the perverse notion that all of conservation, ecosystem management, and restoration should be revamped in light of the novel ecosystem concept” (Kattan et al. 2016, p 3) seems more imagined than real. The novel ecosystem concept does not subvert restoration, but rather offers new restoration opportunities (Higgs 2017). We do not advocate a completely new paradigm in restoration, but rather for broadening the existing one. We do not argue against the value of historical ecosystem structure or composition, just that there are circumstances in which the decision to recover the historic condition may not be the best alternative. What is needed is a more thorough understanding of what those circumstances are, clear policies to guide legislative restoration mandates, and a catalogue of case studies by region to guide future interventions.

The key issue in the novel ecosystem debate is not whether the concept is useful. That is a bottom-up decision that cannot be adjudicated by us, Kattan and his co-authors, or any other select group. It is increasingly evident that many individuals do find the concept useful, as we note above. Kattan and his colleagues caution these individuals against “breaking with the old ways” (Aronson et al. 2014). But it must be remembered that the “old ways” in restoration were once new and, like the novel ecosystem concept, viewed by some as subversive (Spencer 2016). Ecological restoration must evolve with our understanding. Evolution in the conceptualization of restoration is evident in the recent expanded set of SER standards (McDonald et al. 2016), which recognizes the challenges to ecosystem recovery imposed by irreversible environmental change caused by humans. Yet restoration that strives to replicate local native reference ecosystems, the so-called “gold standard” in the new guidelines (McDonald et al. 2016), is beyond the reach of practitioners in some cases (Ewel & Putz 2004) and counter-productive in others. As we see it, the novel ecosystem framework, notwithstanding its flaws, is a step in the right direction as far as providing guidance in instances when the old ways are not useful. And whether the goal is restoration of native communities or the recovery of ecosystem function, all efforts should be honored for contributing to the greater good and the overall restorative mission.

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