Scientists outline novel approach to ecosystem management

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Traditional ecosystems in which communities of plants and animals have co-evolved and are interdependent are increasingly rare, due to human-induced ecosystem changes. As a result, historical assessments of ecosystem health are often inaccurate. A team of scientists present a new approach to management efforts in a paper posted this week on Frontiers e-View, the online prepress publication site of Frontiers in Ecology and the Environment, published by the Ecological Society of America. The researchers suggest that such efforts should focus less on restoring ecosystems to their original state and more on sustaining new, healthy ecosystems that are resilient to further environmental change.

Timothy R. Seastedt (University of Colorado at Boulder), Richard J. Hobbs (Murdoch University in Australia) and Katharine N. Suding (University of California at Irvine) looked at ecosystem management studies from the past 12 years to develop a new approach to managing ecosystems in the face of increasing human impacts.

“The focus of ecological study should not simply recognize change, but should acknowledge that current systems have already been transformed and are in the process of transforming further,” the authors write.

Historically, ecosystems have passed through discrete stages over time, based on a cycle of predictable disturbances. The authors define this variation as the historical range of variability for a particular geographic area. Many human factors contribute to moving an ecosystem away from its historical range of variability, including the composition of gases in

the atmosphere, climate change, invasions of non-native species, extinctions and land fragmentation effects.

In the modern era, human activities augment and promote these disturbances, affecting ecosystems more rapidly and with a broader scope than traditional disturbances. Major permanent ecosystem changes are therefore much more likely. Environmental changes of this magnitude often produce “novel ecosystems,” combinations of animals, plants and environmental regimes that have never occurred before.

As the authors point out, “In managing novel ecosystems, the point is not to think outside the box, but to recognize that the box itself has moved, and in the 21st Century, will continue to move increasingly rapidly.”

Management experts traditionally looked at so-called “pristine” systems when devising management strategies for novel ecosystems, the goal being to restore ecosystems to their presumed historical state. However, the authors of this paper see two problems with this approach. First, such untouched ecosystems are rare if not completely absent from our planet, and therefore cannot be used for comparison.

Second, current management practices often try to fix past mistakes by focusing on one aspect of an ecosystem, such as eradicating invasive species. The authors point out, however, that in many cases this approach results solely in the removal of a negative factor and does nothing to improve the health of the ecosystem. For example, once an invasive plant species is removed, if no further action is taken, there is plenty of room for other invasive species to colonize the area.

The solution, according to the authors, involves acknowledging the current level of change in an ecosystem and using innovative approaches to ensure that the novel ecosystem is resilient to further change. As an example, the authors cite a rare tall-grass ecosystem in which selective

grazing by cows can be an effective replacement for seasonal fires that are actively suppressed due to the proximity to a highway.

Currently, however, enthusiasm and funding are in short supply for these types of management efforts, since policy makers and the public tend to demand short-term results rather than looking at the longer term benefits. The researchers conclude that ecologists should assume the role of liaison between lawmakers and managers.

“Scientists provide an appropriate interface between stakeholders and managers,” say the authors. “Awareness among stakeholders, policy makers, and managers of the realities of current and future ecosystem changes is essential to generate management strategies that have positive rather than neutral or negative outcomes.”

Source: Ecological Society of America