

The big ecological roles of small natural features

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Credit: University of Maine

Ecologists and conservationists have long recognized that keystone species have major ecological importance disproportionate to their abundance or size. Think beavers, sea stars and prairie dogs—species that keep a ecosystem balanced.

Similarly across landscapes, the keystone concept of disproportionate

importance extends to other ecological elements, such as salt marshes in estuaries.

Now an international group of researchers is exploring the disproportionate ecological importance of small natural features—unique environmental elements that provide significant ecological and economic impacts.

Desert springs. Caves harboring bat colonies. Rocky outcrops. Strips of natural vegetation edging agricultural fields. Riparian zones. Small coral heads. Tiny islands. Large old trees.

These small natural features are often overlooked, relatively vulnerable yet environmentally mighty in their ecosystem. They also are at the opposite end of the spatial scale from the Earth's large conservation superstars—the Serengeti, Yellowstone and the Great Barrier Reef.

Small natural features have big ecological roles, according to the 37 researchers from 11 countries writing in a Special Issue of "*Biological Conservation*." Sometimes they can provide resources that limit key populations or processes that influence a much larger area. Sometimes they support unusual diversity, abundance or productivity.

They also are small enough to efficiently maintain or restore, while traditional land-use activities continue in close proximity, such as forestry, fishing and grazing.

"Small natural features are an example of what can be termed 'The Frodo Effect,'" writes Malcolm Hunter, University of Maine professor of wildlife resources and Libra Professor of Conservation Biology, in the journal introduction.

"In the 'Lord of the Rings,' the small and unassuming hobbit Frodo has

more strength than any of his larger peers and saves Middle Earth with his brave actions," says Hunter. "Gandalf and the rest of the fellowship of the ring go to great ends to protect him, because they know this."

The July issue of "*Biological Conservation*" includes three synthetic reviews on small natural features and nine case studies. For each of the case studies, the authors explore three fundamental questions: Why are some small natural features far more important for maintaining biodiversity or providing ecosystem services than their size would indicate? What are the management challenges facing these features and what are some innovative approaches to conserving them?

"The importance of some of these small natural features, most notably riparian zones, has long been recognized," says Hunter. "In other cases, our recognition of their role is just emerging, such as caves that harbor large bat colonies known to effect widespread control of insect pests. We are also learning much more about the ecological significance of ephemeral features like temporary streams and pools that are dry much of the time but 'blossom' during limited periods."

"Recognition and management of SNFs (small natural features) can be an efficient way to conserve biodiversity and [ecosystem services](#)."

Most small natural features are defined physically, especially the presence of water or rocks. But some are biological entities. For example, trees large enough to harbor hollows and deep cracks in their bark provide microhabitat for many species that cannot live on smaller trees.

The size of these natural features provide novel opportunities to conserve them, according to Hunter and 13 co-authors, including plant and animal biologists, economists and marine scientists, in the issue's overall synthesis focused on conservation.

While small natural features are often underappreciated, undocumented, vulnerable to degradation and risk of destruction, they also can involve small-scale, cost-effective protection and be easier to restore.

"Ultimately, conservation of SNFs should be complementary to traditional forms of [conservation](#) by developing creative, constructive efforts that address previously unknown or underappreciated roles of some seemingly minor [features](#)—roles that may be critical in the function of their broader ecosystems and the fate of biodiversity," the researchers write.

More information: Malcolm L. Hunter, Conserving small natural features with large ecological roles: An introduction and definition, *Biological Conservation* (2016). [DOI: 10.1016/j.biocon.2016.12.019](https://doi.org/10.1016/j.biocon.2016.12.019)

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