Resilience in ecosystem management: can we make the concept more concrete?

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Abstract

Resilience is frequently encountered in policy as a desirable goal for conservation and ecosystem management, yet the demand for science-based frameworks for creating resilient systems is currently ahead of what ecologists can confidently provide. Here we consider which aspects of the multi-faceted concept of resilience can be usefully applied to ecosystem management. We highlight that resilience can maintain both desirable and undesirable states, and hence can be both helpful and unhelpful in a management context. A big hurdle in the application of the concept to management has been a lack of guidance on how to identify and measure resilience concepts, particularly ecological resilience. We explore species composition, functional diversity and landscape factors as potential measures. All three measures have a role in helping to define management goals (i.e., the desirable state), assessing ecosystem recovery after disturbance, distinguishing between ‘unhelpful’ and ‘helpful’ ecological resilience and monitoring the maintenance of helpful ecological resilience. In particular, trait-based approaches offer promise for their ability to link pattern to process across scales and so address a crucial element of the resilience concepts. Identifying what drives changes in these measures and ultimately the switch between ecosystem states would enable managers to predict the likelihood of a state change and whether intervention would be useful in maintaining or creating a desired state. Lastly, clarifying which drivers (slow and fast) can and cannot be managed to influence these shifts between states could help translate abstract resilience concepts to real-world guidance for conservation actions and management decision-making.

Keywords: conservation, operationalization, ecosystem management

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