

Do pulse-disturbance outcomes match up to microhabitats?

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Abstract

Pulses, or irregular resource increases, and disturbances, or removal and reorganization of matter, have usually been used to explain different ecosystem level attributes, although with differing abilities to generate accurate predictions. There is clear overlap between the phenomena that the two concepts describe. Jentsch & White (2019) introduce the concept of the “pulse-disturbance”. Both resource pulses and disturbances can be characterized as events that transform, augment, or reduce resources, nutrients, or biomass properties, along multiple dimensions. These dimensions can be measured with a range of variables representing ecological processes or biodiversity outcomes. Any given multi-dimensional pulse-disturbance event may act as a disturbance (decreases in some variable values) and simultaneously as a pulse (increases in other variable values). Although the pulse-disturbance concept is insightful, alone it does not generate falsifiable predictions about outcomes. Drawing on the pulse-disturbance concept I present a framework for predicting the impacts of pulse-disturbance combinations by relating them to the concept of the microhabitat. Microhabitats explain fine-scale spatial patterning, biodiversity, and are better than macroecological variables at explaining niche coexistence. The establishment microhabitat is particularly good at predicting adult plant distributions. I note that there is a similarity between the multi-dimensional concept of the pulse-disturbance and the multi-dimensional description of microhabitats. I propose that pulse-disturbances can create, and correspond to, microhabitats, or overlap completely or partially with microhabitat requirements. Thus, a predictable aspect of pulse-disturbances is the correspondence between the microhabitats they produce, and the establishment microhabitat requirements of species in the available pool. I propose to focus on the prediction of indicator species, given that data on species’ establishment microhabitat requirements are not always available in databases. To illustrate the approach, I present two case studies of predicting plant community responses to novel or reintroduced pulse-disturbances from central Chile.

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