

# Complex dynamics underlie bark beetle eruptions

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Forest management that favors single tree species and climate change are just two of the critical factors making forests throughout western North America more susceptible to infestation by bark beetles, according to an article published in the June 2008 BioScience. Source: American Institute of Biological Sciences

Bark beetle epidemics have become more extensive and frequent in recent years as winter temperatures have risen, and an eruption of mountain pine beetles is currently devastating lodgepole pines throughout the mountainous West.

The article, by Kenneth F. Raffa of the University of Wisconsin at Madison and colleagues at Colorado State University, the University of Idaho, and the US and Canadian Forest Services, stresses the complexity of the biological processes that determine when a bark beetle eruption will occur. When beetles bore through a tree's bark, they release pheromones that summon other beetles to join the offensive.

Trees counter attacks by exuding resin that can kill the invaders, but if too many beetles attack a weak tree, its defenses fail. The beetles then reproduce within its living tissues, with the help of colonizing fungi, and the tree is doomed.

The condition and spacing of nearby trees and the local climate affect whether the beetle progeny released after a successful attack sustain an epidemic--which can kill a high proportion of the trees in an area and so alter the landscape for decades. Because many of the processes in an epidemic operate at different scales and turn on critical thresholds, prediction is a challenge.

It is nonetheless clear that human activities can exacerbate bark beetle eruptions, which cause major economic losses and reduce forests' ability to absorb carbon from the atmosphere.

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