

How to manage forest pests in the Anthropocene? Bring theory.

November 13 2017



Coming to a forest near you? *Dendroctonus frontalis*, one of a host of pests whose distributions are changing in the Anthropocene. Credit: Erich Vallery, Southern Research Station, USDA Forest Service.

A set of fundamental tactics ranging from the theoretical to the practical can be used to combat the challenges brought on by pests in rapidly changing forests, according to a research paper from Dartmouth College and the University of Santiago de Compostela.

With forests under pressure worldwide due to human activities in what is now often referred to as the Anthropocene era, the researchers analyzed why forests around the world are being impacted by new pests and what can be done about it.

"Forests around the world are under withering fire from myriad threats associated with human activity," said Matthew Ayres, a professor of biological sciences at Dartmouth College. "It is crucial that we understand these pressures and rapidly adapt [pest management](#) strategies if we are to maintain healthy forests and all that they provide."

According to the research, global trade is generating waves of accidental introductions of tree-eating insects from one continent to another. This is compounded by a changing climate that permits the expansion of [pest](#) populations into regions that were previously protected by cold winters. An increasing number of forests with non-native trees and novel pest problems further aggravate the problems.

Bark beetles, wood-boring beetles, defoliating caterpillars and leaf-sucking insects provide scores of dramatic examples of pests that have recently expanded their ranges and are now killing trees, changing

forests, and impacting people in places where [forest](#) managers lack experience with the new pests.

"Forest managers working in isolation and learning by trial and error cannot possibly keep up with the rapidly changing challenges. We hope that this research can serve as a guidebook for pest [management](#) in the Anthropocene," said Ayres.

The authors identified eight tactics for adapting to the challenges from new forest pests. Number one on the list was the use of practical scientific theory.

One example of a practical theory presented in the paper is that "insect metabolism goes faster when it is warmer," which leads to increased consumption, growth, movement and dispersal.

"Climate warming means that insects begin feeding earlier in the summer, eat more per day, grow faster, and have fewer days when they are exposed to predators," said Ayres. "Understanding the general effects of temperature on insects gives us certainty that continued warming will produce continued changes in where we find pests. In some cases, we can make detailed predictions of where pests will be in coming years under different climate scenarios."

While the relevant theories vary in generality and empirical maturity, the authors argue that "there is nothing more practical than good theory" for adaptation of forest management practices to a rapidly changing world.

The eight general tactics for improved pest management in the Anthropocene include:

- 1) growth of practical theory that is transportable among forests and regions;

- 2) improved biosecurity against future human-aided invasions;
- 3) improved monitoring, prediction, and mitigation of established pests;
- 4) increased sharing of knowledge among regions, countries, and continents;
- 5) management plans that anticipate continuing change;
- 6) improved assessment of costs, benefits, and risks of possible responses to new potential pests;
- 7) assessment of outcomes from pest management decisions to help with the next decisions;
- 8) improved understanding of relations among forests, forest management, and socioeconomic systems.

Even with the challenges to forests, there is optimism that forest pestilence can be managed. The authors note that forestry has been making adaptive adjustments for centuries, and that forestry is already a field where scientists, managers, shareholders, administrators, legislators, and voters have experience working together.

The paper identifies how people from all of these groups can contribute to forest management in the Anthropocene.

"Examples of success in forestry could inspire adaptive adjustments in agriculture, pastoralism, fisheries, and other human endeavours that are similarly important to our environmental security and similarly challenged by global change," said Ayres.

More information: Matthew P. Ayres et al, Forest pests and their management in the Anthropocene, *Canadian Journal of Forest Research* (2017). [DOI: 10.1139/cjfr-2017-0033](https://doi.org/10.1139/cjfr-2017-0033)

Provided by Dartmouth College

Citation: How to manage forest pests in the Anthropocene? Bring theory. (2017, November 13)
retrieved 26 April 2024 from
<https://phys.org/news/2017-11-forest-pests-anthropocene-theory.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.