Study looks at tree harvesting as a means to stem beetle spread

November 17 2014, by Charles Sims

Climate change has been linked to the recent surge in natural disturbances, such as storms, wildfires, and insect outbreaks. That's led scientists to look at preemptive measures to mitigate the damage.

In some cases, that could mean cutting down trees to save our forests—eliminating "hot spots" to stave off further insect infestation.

A new study led by Charles Sims, an assistant professor of economics and a faculty fellow at UT's Howard H. Baker Jr. Center for Public Policy, looks at the outbreak of the mountain pine beetle and how targeted timber harvesting can curb the insect's spread.

As part of the energy and environment policy area within the Baker Center, Sims studies how governments, markets, and individuals respond to climate change.

The study, "Complementarity in the Provision of Ecosystem Services Reduces the Cost of Mitigating Amplified Natural Disturbance Events," was published this month in the *Proceedings of the National Academy of Sciences* early edition. The Proceedings is one of the most-cited international journals, publishing the results of original research in the sciences and technology.

"While most of the attention has been placed on mitigating climate change, it is also critical to plan for the changes that are expected to occur," Sims said. "This study shows how planning for climate change

requires a reexamination of how forests have been managed."

The study focuses on the area that encompasses the Rocky Mountain National Park, three national forests, four wilderness areas, the Arapaho National Recreation Area, Eldora ski area, resort communities, and smaller towns.

"Northern Colorado is an appropriate study area because of the severity of the recent mountain pine beetle outbreak in this area, the proximity to population centers such as Denver and Fort Collins, and the variety or forest management objectives within the region," the study explains.

The current MPB outbreak began in the late 1990s and is now more severe than any previous outbreak, causing 70 to 90 percent mortality of mature lodgepole pines and 88 million acres.

The researchers looked at the harvesting of forest trees in northern Colorado from 2000 to 2013 and compared it to alternative harvest plans with respect to the timing, intensity, and location of harvesting. Using this data, the study attempts to prescribe a harvesting plan that would limit the insect's spread, preserve a desired number of trees, and allow for the desired amount of timber production.

The researchers discovered that increasing harvesting in "hot spots"—areas where the probability of a future insect outbreak is greatest—seems to be the best strategy.

"Even in areas where live trees are significantly more valuable than harvested timber, a positive amount of timber harvesting can be justified during the outbreak," the study concludes. Because the insects depend on trees to reproduce, harvesting in these hot spots reduces the impact of the outbreak in other areas.

"Only the hot spot strategy reduces outbreak intensity and extent enough to result in a net gain in live trees. If harvests are spatially located according to this strategy, harvesting one tree during an outbreak actually saves more than one tree."

In short, if harvesting is focused on hot spots, a win-win can be achieved where timber harvesting and forest conservation increase across a large area.

The study concludes with two recommendations for next steps.

First, the researchers say, more work is needed to understand how different forest management strategies impact insect outbreaks. Second, additional research is needed to find out how an increase in timber production stemming from more harvesting might impact the lumber market.

Sims co-wrote the paper with David Adland and David Finnoff from the University of Wyoming and James Powell and Ben Crabb from Utah State University.

The study can be viewed online at the Proceedings of the National Academy of Sciences.

More information: "Complementarity in the provision of ecosystem services reduces the cost of mitigating amplified natural disturbance events." *PNAS* 2014 ; published ahead of print November 10, 2014, DOI: 10.1073/pnas.1407381111

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