

## Study: Destroying native ecosystems for biofuel crops worsens global warming

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Turning native ecosystems into “farms” for biofuel crops causes major carbon emissions that worsen the global warming that biofuels are meant to mitigate, according to a new study by the University of Minnesota and the Nature Conservancy. The work will be published in *Science* later this month and will be posted online Thursday, Feb. 7.

The carbon lost by converting rainforests, peatlands, savannas, or grasslands outweighs the carbon savings from biofuels. Such conversions for corn or sugarcane (ethanol), or palms or soybeans (biodiesel) release 17 to 420 times more carbon than the annual savings from replacing fossil fuels, the researchers said. The carbon, which is stored in the original plants and soil, is released as carbon dioxide, a process that may take decades. This “carbon debt” must be paid before the biofuels produced on the land can begin to lower greenhouse gas levels and ameliorate global warming.

The conversion of peatlands for palm oil plantations in Indonesia ran up the greatest carbon debt, one that would require 423 years to pay off. The next worst case was the production of soybeans in the Amazon, which would not “pay for itself” in renewable soy biodiesel for 319 years.

“We don't have proper incentives in place because landowners are rewarded for producing palm oil and other products but not rewarded for carbon management,” said University of Minnesota Applied Economics professor Stephen Polasky, an author of the study. “This creates

incentives for excessive land clearing and can result in large increases in carbon emissions.

“This research examines the conversion of land for biofuels and asks the question ‘Is it worth it’,” said lead author Joe Fargione, a scientist for The Nature Conservancy. “And surprisingly, the answer is no.”

Fargione began the work as a University of Minnesota postdoctoral researcher with Polasky, Regents Professor of Ecology David Tilman; he completed it after joining the Nature Conservancy. They, along with university researchers Jason Hill and Peter Hawthorne, also contributed to the work.

“If you’re trying to mitigate global warming, it simply does not make sense to convert land for biofuels production,” said Fargione. “All the biofuels we use now cause habitat destruction, either directly or indirectly. Global agriculture is already producing food for six billion people. Producing food-based biofuel, too, will require that still more land be converted to agriculture.”

These findings coincide with observations that increased demand for ethanol corn crops in the United States is likely contributing to conversion of the Brazilian Amazon and Cerrado (tropical savanna). American farmers traditionally rotated corn crops with soybeans, but now they are planting corn every year to meet the ethanol demand and Brazilian farmers are planting more of the world’s soybeans. And they’re deforesting the Amazon to do it.

The researchers also found significant carbon debt in the conversion of grasslands in the United States and rainforests in Indonesia.

Researchers did note that some biofuels do not contribute to global warming because they do not require the conversion of native habitat.

These include waste from agriculture and forest lands and native grasses and woody biomass grown on marginal lands unsuitable for crop production. The researchers urge that all fuels be fully evaluated for their impacts on global warming, including impacts on habitat conversion.

“Biofuels made on perennial crops grown on degraded land that is no longer useful for growing food crops may actually help us fight global warming,” said Hill. “One example is ethanol made from diverse mixtures of native prairie plants. Minnesota is well poised in this respect.”

“Creating some sort of incentive for carbon sequestration, or penalty for carbon emissions, from land use is vital if we are serious about addressing this problem,” Polasky said.

“We will need to implement many approaches simultaneously to solve climate change. There is no silver bullet, but there are many silver BBs,” said Fargione. “Some biofuels may be one silver BB, but only if produced without requiring additional land to be converted from native habitats to agriculture.”

Source: University of Minnesota

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