Study shows converting land to agriculture reduces carbon uptake

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This image shows agricultural lands in Minas Gerais, Brazil. Credit: ISS026E025373/Image Science and Analysis Laboratory, NASA-Johnson Space Center

University of Montana researchers examined the impact that converting natural land to cropland has on global vegetation growth, as measured by satellite-derived net primary production, or NPP. They found that measures of terrestrial vegetation growth actually decrease with agricultural conversion, which has important implications for terrestrial

carbon storage.

Postdoctoral researcher Bill Smith and UM faculty members Steve Running and Cory Cleveland, along with a former UM postdoctoral researcher and current USGS scientist Sasha Reed, used estimates of agricultural NPP and satellite-derived estimates of natural NPP to evaluate the impact of expanding agricultural land to meet needs for food and fiber. Terrestrial NPP represents the total annual growth of vegetation on the land, which is a critical factor that helps determine how much carbon can be absorbed and stored from the atmosphere.

Their results show that agricultural conversion has reduced that productivity by approximately 7 percent. A small percentage of intensively managed, irrigated or fertilized agricultural land shows an increase in productivity. However, productivity is reduced in 88 percent of agricultural lands globally, with the largest reductions in former tropical forests and savannas.

"Current forecasts suggest that global food demand will likely double by 2050," Smith said. "We hope that this research will help to identify strategies that, from a carbon balance perspective, should be avoided due to the potential for severe degradation of global vegetation growth and carbon storage."

The research was published in *Geophysical Research Letters* and highlighted in the February 2014 issue of *Nature Geoscience*.

Provided by University of Montana