



## Soybean Production Impacts Climate and Deforestation in the Amazon

A new study by American and Brazilian researchers shows that the Brazilian Amazon is increasingly being cleared for mechanized cropland rather than for grazing cattle, making the deforestation process even more harmful for the environment. This change in land use may alter the region's climate and the land's ability to absorb carbon dioxide.

More than one fifth of the Amazon rainforest has already been destroyed and the forest which remains is threatened by increasing pressure from human activities. Recent expansion of large-scale mechanised agriculture on the edges of the forest has introduced a potential new avenue for forest loss, thus generating debate over the contribution of cropland expansion to current deforestation dynamics. It is therefore important to understand how changes in land use will affect biological, physical, and climate behaviour in the surrounding regions and the possible global consequences.

American and Brazilian researchers have recently examined the fate of large forest clearings in Mato Grosso, the Brazilian state with the highest deforestation and soybean production rates. They combined deforestation maps, field surveys, and satellite-based information to examine deforestation patterns in the mentioned area over a period of three years.

The scientists found that between 2001 and 2004 more than 540,000 ha. of forest were converted directly to large-scale crop production, an area almost twice the size of Luxemburg. In 2003, the peak year for deforestation, clearing for cropland accounted for more than 20% of the total deforestation in this state of the Brazilian Amazon. The high resolution and daily frequency of the satellite images enabled the researchers to determine for the first time that deforestation for cropland was twice the size of clearings for pasture. Furthermore, the land conversion also occurred rapidly, with about 90 percent of new crops planted within a year of deforestation. This finding suggests that the recent cropland expansion in the region is contributing to further deforestation.

The change in the fate of the deforested areas may have important repercussions on the surrounding environment. Deforestation for cropland usually involves larger areas than clearings for pasture, most of the biomass (tree trunks, stumps and woody roots) is removed, and it results in greater separation of remnant patches of forest than with other types of land use. Moreover, repercussions on the carbon flux can also be expected. The carbon once contained in the living material and soil is released into the air from the many fires started during the clearing process, causing atmospheric concentrations of carbon dioxide, a primary greenhouse gas, to increase. Of all land uses and types, croplands are also one of the least efficient at absorbing carbon from the air.

The researchers compared these changes in land use with shifts in agricultural prices in the region. The study found a strong correlation between the amount of land deforested and the average annual soybean price. As soybean prices rose in 2003, the conversion from forest to cropland increased, while the amount of land converted to pasture declined.

Brazil has become a leading worldwide producer of grains including soybean, and agribusiness now accounts for more than one-third of the country's gross national product. This new driver of forest loss suggests that the rise and fall of prices for other crops, beef and timber may also have a significant impact on future land use in the region, and consequently, on the environment.

The current study provides new evidence of the growing contribution of agricultural intensification to forest loss in Amazonia, and the role of international markets on the resulting deforestation process. It also suggests that this change in land use will have major implications for future deforestation patterns, carbon fluxes, forest fragmentation and ecosystems.

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**Contact:** [morton@geog.umd.edu](mailto:morton@geog.umd.edu), [rdefries@mail.umd.edu](mailto:rdefries@mail.umd.edu)

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