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International Trade and Deforestation: Potential Policy Effects via a Global Economic Model

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What is the Issue?

An increasing world population and a shift in global diets toward vegetable oils and animal products increase the demand for agricultural commodities. To meet this demand, forestland is frequently converted into crop fields or pasture, especially in developing countries. South American and Southeast Asian countries have emerged as major exporters of “forest-risk” commodities (primarily beef, palm oil, soybeans, and forest products), often produced on newly deforested land. This land conversion not only threatens tropical forests but also raises concerns about biodiversity and carbon dioxide emissions from land-use change. Several factors influence production of forest-risk commodities, including consumption of these commodities in other countries and any barriers to international trade.

What Did the Study Find?

This report analyzes patterns of deforestation in major deforesting countries—Argentina, Bolivia, Brazil, Paraguay, Indonesia, and Malaysia. Deforestation in Argentina, Bolivia, Brazil, and Paraguay is linked with production of beef and soybeans, while deforestation in Indonesia and Malaysia is linked with production of palm oil and wood products. ERS researchers first track the history of production and international trade of forest-risk commodities from 1991 to 2013. The key findings are as follows:

- Although soybean production has increased substantially in Argentina and Brazil since 1991, the greatest post-conversion land-use change from agriculture in South America is due to beef production. In recent years, soybean production has mostly increased by expanding onto previously cleared cropland or pasture, rather than by contributing immediately to further deforestation.
- U.S. imports of palm oil are small relative to global production, and the United States has little influence on markets for palm oil. The United States is, however, a major producer and consumer of other forest-risk commodities (beef, soybeans, and wood products) and, by increasing production and exports of these commodities, can reduce incentives for their production in tropical countries.

ERS is a primary source of economic research and analysis from the U.S. Department of Agriculture, providing timely information on economic and policy issues related to agriculture, food, the environment, and rural America.

In addition to tracking historical land-use patterns, ERS researchers use an economic model of global markets to identify how potential international trade policies could affect tropical forest loss. Two policy options are examined: (1) removing tariffs on forest-risk commodities (tariffs are import taxes that restrict trade by raising imports' costs to consumers) and (2) prohibiting trade of forest products from countries that might be illegally logging.

- In a hypothetical baseline scenario of global economic expansion from 2014 to 2020 and no policy changes, global demand for agricultural products increases (including forest-risk products), which in turn leads to expansion of global cropland by 0.40 percent or 6.3 million hectares (Mha) and pasture by 0.29 percent (7.8 Mha), but a reduction in forest land of 0.88 percent (14.9 Mha). This pattern varies across world regions, with the greatest shares of forest lost in China and the European Union (EU).
- One effective route for reducing or avoiding deforestation involves increasing overall agricultural output by increasing the yield of land for all agricultural commodities. With greater agricultural productivity, less area will be needed for agriculture and more land becomes available for forests. ERS researchers constructed a scenario similar to the baseline, except with zero growth in agricultural productivity from 2014 to 2020. With agricultural productivity gains excluded, in 2020, cropland increases 10.1 Mha more than it increases in the baseline scenario. Likewise, in 2020, forest land declines 4.8 Mha more than it does in the baseline scenario.
- A hypothetical scenario in which tariffs (import taxes) on forest-risk commodities are completely removed leads to an increase in deforestation of 0.6 Mha relative to the baseline scenario in 2020. Because tariffs on imports into the United States are low compared with tariffs of other countries, the global removal of tariffs leads to increased domestic forest land loss in the United States, as U.S. agricultural exports outweigh its imports. On the other hand, because the EU has higher tariffs than other countries, the global removal of tariffs reduces the EU's rate of domestic forest loss as the EU increases its imports of agricultural products.
- The hypothetical scenario banning all trade of illegal forest products leads to a global increase of forest land compared to the baseline scenario of 0.9 Mha. In particular, South America and Southeast Asia—where forest-risk commodities have posed substantial threats—show gains in forest land. The increase in global forest land reduces land for crops (0.3 Mha) and pasture (0.6 Mha).

How Was the Study Conducted?

This study has three major sections: an assessment of recent deforestation trends; an analysis tracing consumption of forest-risk products from consumer back to country of origin; and an analysis of stylized international trade policies that can affect the amount of forest land. ERS surveys recent literature on tropical deforestation and reports the immediate post-conversion land-use change attributable, by remote sensing or other direct study, to forest-risk products. ERS then uses bilateral international trade data from the United Nations Food and Agriculture Organization, along with input-output methods, to trace the path from country of origin to region of consumption for forest-risk products. The MTED-GTAP global economic model with 14 world regions is then used to simulate world land use in 2020 for the baseline and policy scenarios.