European Commission

Science for Environment Policy

The hidden biodiversity impacts of global crop production and trade

01 July 2016
Issue 461
Subscribe to free weekly News Alert

The rise in intensive agriculture, and associated land-use change, is a major driver of biodiversity loss. This study evaluated these effects via international food trade, calculating estimates of species loss for 170 crops and 184 countries. The results show that the majority of biodiversity loss is due to growing crops for domestic consumption but that industrialised countries can 'import' negative impacts from tropical regions.

In the past 500 years, over 300 vertebrate species have gone extinct, and many more are under threat of extinction — causing a lamentable decline in the variety of life on the planet. Biodiversity provides important benefits, from pollination to nutrient cycling, that are vital for human health and the economy. There is, therefore, an urgent need to address the causes of biodiversity loss.

Agriculture is a major driver of biodiversity decline. As the world's economies are become more and more connected, international flows of crops and their products are increasing and it is important to understand the environmental effect of these changes.

A recent study projected the species loss due to land-use change to date in over 800 different regions globally. To do so, the study used the 'countryside species-area relationship' (SAR) model. Unlike classic SAR models (which assume that areas converted for agriculture cannot host biodiversity), this model recognises that species can adapt and survive in the absence of natural habitat and, as a result, is better able to predict extinction. It is important to note that SARs provide an estimate of species 'committed to extinction' rather than those immediately going extinct; and the study's results therefore represent future biodiversity losses due to habitat destruction to date. The researchers then calculated so called 'characterisation factors', providing species loss per m^2 of cropland in each country.

This study extends that analysis by combining this measure of species loss with maps of crop yield to estimate the worldwide species extinction associated with amount of crop production. The researchers — partly funded by the European Research Council — projected species loss per tonne for 170 crops in 184 countries.

Using data on the movement of crop products between producing and consuming countries (from Food And Agriculture Organization Of The United Nations Statistics Division — FAO — databases), they also calculated the biodiversity impacts of international crop trade.

The highest impacts were observed for cropland in tropical regions, followed by temperate and then boreal regions. Impacts per tonne were multiplied by the volumes of crop production in each country to identify 'hotspots' of biodiversity loss.

Unsurprisingly, wheat, rice and maize — which occupy around 40% of global cropland — contributed a matching 40% to global biodiversity impacts. However, other crops, such as sugarcane, rubber, palm oil and coffee, were also responsible for high species loss, despite accounting for comparatively little global cropland. This shows that embodied land area is not the best measure of biodiversity impacts in trade flows.

There were also regional differences in impact. Populous and biodiversity-rich nations such as China, India and Brazil had the largest impacts due to domestic consumption, while exported impacts were highest in Indonesia, Thailand, India and Malaysia. Even countries with comparatively small populations such as France, Germany and Italy cause high biodiversity losses, due to their high per-capita consumption and import levels.

Continued on next page.

Source: Chaudhary, A. and Kastner, T. (2016). Land use biodiversity impacts embodied in international food trade. *Global Environmental Change*, 38: 195–204. DOI: 10.1016/j.gloenvcha.2016.03.013

Contact:
abhinain2010@yahoo.com

Read more about:
Agriculture, Biodiversity, Environmental economics, Land use, Sustainable consumption and production

European Commission

Science for Environment Policy

The hidden biodiversity impacts of global crop production and trade *(continued)*

01 July 2016
Issue 461
Subscribe to free weekly News Alert

Source: Chaudhary, A. and Kastner, T. (2016). Land use biodiversity impacts embodied in international food trade. *Global Environmental Change*, 38: 195–204. DOI: 10.1016/j.gloenvcha.2016.03.013

Contact:
abhinain2010@yahoo.com

Read more about:
Agriculture, Biodiversity, Environmental economics, Land use, Sustainable consumption and production

The highest overall impacts were due to exports from Indonesia and Mexico to the US and China, which were each estimated to cause the loss of 20 and 19 species respectively within the country of origin. The vast majority of estimated species loss (83%, or 4 747 species), however, was due to agricultural land use for *domestic* consumption. The remainder was due to production for export (17% or 969 species). In addition to regional extinctions, researchers also projected the number of global species extinctions due to global food consumption and trade by considering only the endemic species as an input to the SAR model.

The researchers finally ranked countries in terms of their *net* biodiversity impacts. Generally, industrialised countries were net *importers* of biodiversity impacts (i.e. they import more impacts than they export). Imported impacts generally come from developing countries in tropical regions, which experience habitat degradation and biodiversity loss in order to produce crops for export. In Germany, for example, total German food consumption was estimated to result in the regional loss of 46 species — 43 of these were due to imported food items.

The researchers say that, although some countries are reliant on imports due to limited land and resources, others (such as France and Germany) could limit their impact on biodiversity by using more domestic resources for crop production.

Interventions in exporting countries can also help to lessen environmental impact. The researchers cite Brazil's soy moratorium as an example, which has reduced deforestation by prompting traders, processers and retailers to stop buying beef or soy products from farms established on cleared forests.

The results could also be useful for product labelling and certification schemes. In particular, the researchers suggest that carbon footprint schemes should be extended to include biodiversity impacts.

These results could help decision makers across the globe. The researchers say it is still currently possible to take conservation measures, such as restoration of habitats, to safeguard biodiversity and reduce the projected numbers of extinctions presented in this study.