Strapline: Food security
Title: Trading for climate resilience

Standfirst:

International trade plays an important role in ensuring the resilience of the global food system. Now research suggests a further reduction in trade barriers could significantly alleviate the negative impacts of climate change on global hunger risk.

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Through changes in temperature, CO_2 concentrations, rainfall or the abundance of pest and pollinator populations, climate change significantly impacts the nutritional capacity of food systems and could increase the global risk of hunger[1]. As a result, major shifts are expected in the coming decades regarding which crops are planted, where, and how much is grown in different parts of the world[2], with agricultural land migration already observed across the planet[3]. This will likely impact food self-sufficiency at a regional level and will influence future trade patterns with direct impacts on food security. Writing in this issue of Nature Climate Change, Charlotte Janssens and colleagues[4] find that facilitating international trade through lower tariffs and the elimination of trade barriers could help smooth out these food systems alterations and alleviate hunger for tens of millions of people.

Most studies on trade and climate change have focused mainly on the consequences of policies to mitigate climate change for international trade, on the effects of trade policies on greenhouse gas emissions or on the impacts of climate change itself on international trade[5]. Trade has also been linked to climate change as a possible tool to achieve climate goals—for example by reducing tariffs on environmental goods and services, by harmonising environmental standards in trade agreements to encourage the trade of greener products, or by eliminating distortionary subsidies on fossil fuels and agriculture[6]. Nevertheless, the role of international trade in alleviating the negative effects of climate change on food security is still unclear.

Using a global economic model to analyse the international markets for four major crops (corn, wheat, soya, and rice), Janssens et al.[4] consider crop yield responses to climate change to characterise crop production and trade by 2050. The yield responses included in the study cover modifications to average climatic conditions, but also the potential benefits to photosynthetic capacity from CO_2 fertilization. Importantly, the role of trade is evaluated under different assumptions regarding the reduction and elimination of tariff and non-tariff (e.g. from infrastructure and institutional barriers) costs.

The results indicate that the removal of trade costs associated with the international trade flows of crops is an important adaptation measure to the negative impacts of climate change. By 2050, under a high emissions scenario (RCP8.5) and with the current trade costs still in place, global food availability would decrease by -0.2% to -3% compared to a world without climate change. The global population at risk of hunger would increase by 7 to 55 million people, with the highest impacts occurring in Sub-Saharan Africa and South Asia. At the same time, trade

increases by 1% to 7% reflecting a stronger interconnection of food systems and an increased regional specialisation based on comparative advantage. Moreover, the authors show that the additional incidence of hunger could reach 73 million people if trade is not allowed to expand under the pressures of climate change. A complete elimination of trade costs from current levels significantly increases traded volumes and leads to a substantial decrease in hunger, down to 20 million people in addition to baseline values for 2050.

The study therefore provides modelled support for further trade liberalization beyond the outcomes of the Doha Round, the latest round of multilateral trade negotiations among the World Trade Organisation membership, launched in 2001 with the aim to reform the international trading system through the introduction of lower trade barriers. At the same time, however, the results in the analyses by Janssens et al. also depict a diversity of food availability narratives at a regional level. Trade facilitation could improve food security in import-dependent regions like Sub-Saharan Africa by compensating for the reduction in domestic production through imported crops at lower prices. Concurrently, some of the net agricultural exporters like South Asia could face a decrease in domestic food availability given the increase in export demand amplified by climate change.

Efforts to reduce trade costs are indeed ongoing[7] and these steps towards frictionless trade can reduce border tariffs, as well as some of the non-trade barriers included in the analysis by Janssens et al., such as the harmonization of standards or the elimination of export restrictions. However, other cost components, such as those related to transportation infrastructure, are structural and need to be addressed at a national or local level. The regions found by the study to be most affected by climate change also tend to have poorly developed infrastructure. Bottlenecks due to limited transportation systems (highways, ports or airports) or the lack of access to an all-season road in rural areas could impact both international trade and internal food distribution (Figure 1). With infrastructure investment requirements in many of the hunger-affected countries at annual values of above 10% of GDP[8], the mission in the next three decades to drastically improve transit times from a farm in one country to consumers in another will not be straightforward. This achievement might become even more complicated given that trade liberalization policies could produce a fiscal loss, as total tax revenues may drop under decreased trade taxes. These countries are also less likely to recover lost tax revenues from other sources[9].

Figure 1. Unpaved road providing essential market access to farmers and consumers. Roads like these linking villages and cities to boarder points can stretch for hundreds of kilometres and can turn non-operational during the rainy season.

Climate change is expected to most affect the poorest households through a reduction in income combined with an increase in food spending due to higher crop prices[10]. Therefore, besides the direct impacts of trade cost reductions on global crop markets, other economic effects and conditions (e.g. income inequality or the limited mobility of workers from farm to non-farm activities), particularly for developing countries, might also shape the results of any trade policy on food security. These indirect effects could reduce the positive outcomes of trade liberalization and should be accounted for, for instance within a general equilibrium framework.

Janssens et al.[4] show that a freer and lower cost movement of agricultural commodities could reduce the magnitude of climate-induced global hunger, particularly in regions dependent on food imports and, conversely, that trade restrictions could lead to a rise in the number of the undernourished. The study thus indicates that trade will play an even more important role in ensuring food security under climate change. Addressing the needed investment in infrastructure in many developing countries to support the movement of goods will therefore be crucial for both economic growth and climate change adaptation.

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