Local, regional, and global adaptations to a compound pandemic-weather stress event

Objective

Stress events include pandemics like COVID-19 and widespread droughts like those experienced in 2015 can have significant implications for agriculture and food security through changes in the demand and supply side of the food systems. Here we consider the question: what if COVID-19 had co-occurred with a 2015-like drought year?

Approach

Here we introduce a coupled water-agriculture-economy model to capture the likely impact of a compound pandemic-weather event. We compare the estimated impacts between two specifications of the model: with and without adaptation of the human system.

Impact

The results illustrate the critical role of global-local-global adaptations and connections in understanding the strategies to improve the resilience of the human system to compound extremes. This paper shows how better access to global markets and availability of natural resources can provide benefits to the human system by improving food security.

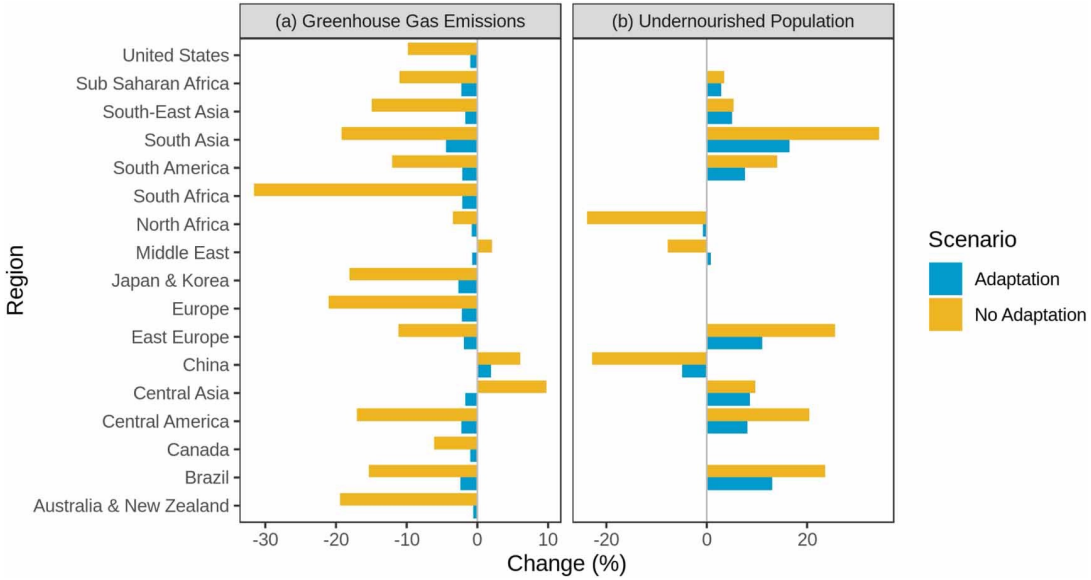

Figure: Percent change in (a) greenhouse gas emissions from the agricultural sector, and (b) undernourished populations in developing nations due to the compound shocks, with and without adaptations. The magnitude of impacts on both emissions and food security varies regionally, though most regions see a decline in emissions and an increase in undernourished population. Comparing the adaptation (blue) to the no adaptation (yellow) scenarios shows that adaptations reduce the impact of the compound disaster in all cases. See table 2 and figure S3 for the undernourished population results in units of millions of people.

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