

China floods to hit U.S. economy—climate effects through trade chains

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River floods in China are transferred through trade networks to the US. Credit: PIK/Willner, Otto, Levermann

Fluvial floods will increase due to human-made climate change, particularly in China. This might cause direct and indirect economic losses along the global supply and trade chains. The U.S. is susceptible to indirect climate-related economic losses due to its negative trade balance with China. Trump's tariffs might further reduce the resilience of the U.S. economy.

Intensifying river floods could lead to regional production losses worldwide caused by global warming. This might hamper not only local economies around the globe, the effects might also propagate through the global network of trade and supply chains, according to a study now published in *Nature Climate Change*. It is the first to assess this effect for flooding on a global scale using a newly developed dynamic economic model. It finds that economic flood damages in China, which could, without further adaptation, increase by 80 percent within the next 20 years, might also affect E.U. and U.S. industries. The U.S. economy might be vulnerable due to its unbalanced trade relation with China. Contrary to U.S. President Trump's current tariff sanctions, the study suggests that building stronger and thus more balanced trade relations might be a useful strategy to mitigate [economic losses](#) caused by intensifying weather extremes.

"Climate change will increase flood risks already in the next two decades—and this is not only a problem for millions of people, but also for economies worldwide," says Anders Levermann, project leader from the Potsdam Institute for Climate Impact Research (PIK) in Germany and Columbia University in New York. Without further adaptation measures, [climate change](#) will likely increase economic losses worldwide due to fluvial floods by more than 15 percent accumulating to a total of about 600 billion U.S. dollar within the next 20 years. While the bulk of this is independent of climate change, the rise is not. "Not only local industries will be affected by these climate impacts," says Sven Willner, lead author of the study from PIK. "Through supply shortages, changes in demand and associated price signals, economic losses might be down-streamed along the global trade and supply network affecting other economies on a global scale—we were surprised about the size of this rather worrying effect."

World Bank Economist: "Natural disasters are not

local events anymore"

The World Bank's lead economist with the Global Facility for Disaster Reduction and Recovery, Stéphane Hallegatte, who pioneered research in the area of indirect disaster effects but was not involved in the present study, says, "This work combines two very innovative lines of work: global risk assessment for natural hazards and network theory to understand how localized shocks propagate in time and space. It contributes to scientific progress in multiple ways, but one of the most important policy messages for me is that the world is so interconnected that natural disasters are not local events anymore—everybody can be affected by a disaster occurring far away. It means that risk management is more than each country's responsibility. It has become a global public good."

The study is based on projections of near-future river floods on a regional scale already determined by the greenhouse gas emissions that humans have so far emitted into our atmosphere—impacts after 2035 depend on future additional emissions. The authors investigate the overall economic network response to river flood-related shocks, taking into account the inner dynamics of international trade. They do so with the new economic computer simulation.

Without major adaptation, China could suffer biggest direct losses

Without major adaptation measures, China could suffer the biggest direct economic losses from river floods—adding up to a total of more than U.S. \$380 billion in economic losses over the next 20 years, including natural flood events not related to global warming. This corresponds to about 5 percent of China's annual economic output. In China, \$175 billion of the total losses will likely occur due to climate

change. "This is a lot," says Willner, "and it is only the effect by river floods, not even taking into account other climate change impacts such as storms and heat waves."

The European Union and the United States, on the contrary, might be affected predominantly by indirect losses passed down along the global trade and supply network. In the U.S., direct losses might be around U.S. \$30 billion, whereas indirect losses might be \$170 billion in the next 20 years. "The EU will suffer less from indirect losses caused by climate-related flooding in China due to its even trade balance. They will suffer when flooded regions in China temporarily fail to deliver parts that European companies need for production, but on the other hand, Europe will profit from filling climate-induced production gaps in China by exporting goods to Asia. This makes the European economy currently more prepared for the future," says Willner. "In contrast, the U.S. imports much more from China than it exports to this country. This leaves the U.S. more susceptible to climate-related risks of economic losses passed down along the global supply and trade chain."

Global trade allows global buffering—India could be a winner

"More intense global trade can help to mitigate losses from local extreme events by facilitating market adjustments," explains co-author Christian Otto from the Potsdam Institute and Columbia University. "When a supplier is impacted by a disaster hampering its production, international trade increases the chance that other suppliers can jump in and temporarily replace it. Interestingly, the global increase of climate-induced river floods could even cause net gains for some economies such as India, South East Asia, or Australia."

The study's focus is not on damages to production facilities of

businesses, but to what extent a regional economy stagnates due to flooding. "We adopted a rather optimistic view when it comes to the flexibility and promptness of shifting production towards non-affected suppliers after an extreme weather event," explains Christian Otto. "Hence our study rather underestimates than overestimates the production losses—things could eventually turn out to be worse."

Trump's tariffs might impede climate-proofing the U.S. economy

"We find that the intensification of the mutual trade relations with China leaves the E.U. better prepared against production losses in Asia than the U.S. The prospect that the U.S. will be worse off can be traced back to the fact that it is importing more products from China than it is exporting," says PIK's Anders Levermann. "Interestingly, such an unbalanced trade relation might be an economic risk for the U.S. when it comes to climate-related economic losses. In the end, Trump's tariffs might impede climate-proofing the U.S. economy."

For resolving this risk and balancing out the negative trade relation, there are generally two options: either isolation or more trade. "By introducing a tariff plan against China, Trump currently goes for isolation," says Levermann. "But Trump's tariff sanctions are likely to leave U.S. economy even more vulnerable to climate change. As our study suggests, under climate change, the more reasonable strategy is a well-balanced economic connectivity, because it allows to compensate economic damages from unexpected weather events—of which we expect more in the future."

More information: Sven Norman Willner et al, Global economic response to river floods, *Nature Climate Change* (2018). [DOI: 10.1038/s41558-018-0173-2](https://doi.org/10.1038/s41558-018-0173-2)

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