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Cross-border climate vulnerabilities of the European Union to drought

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Executive summary

Climate change is leading to more severe droughts¹ in many parts of the world. This has implications for the European Union (EU) because many of its sectors rely on imports of agricultural products from third countries that are set to experience increased drought conditions in the near future.

This study quantifies the vulnerabilities of the EU's agricultural imports as a result of climate change. It maps future drought severity in third countries under two greenhouse gas (GHG) emissions scenarios; low (RCP 2.6) and medium (RCP 6.0) for the periods² 2030, 2050 and 2085. It then identifies the EU's key agricultural imports and the production locations where climate-driven drought may have adverse impacts on these imports.

The study finds that the EU's agri-food economy will become highly vulnerable to drought outside its borders due to climate change, indicating that supplies of key imported crops could be disrupted, with potential impacts on food prices. Around 44% of the EU's agricultural imports are sourced from locations that are set to become highly vulnerable to drought as a result of climate change. This is a significant change from current vulnerability levels which stand at around 1%. **The most affected crop imports are identified to be soybean, oil palm, cocoa, coffee and sugar cane.**

Drought severity in the production locations of the EU's key agricultural imports will increase by 35% by 2050 compared to current levels. This is particularly valid for imports that originate from Brazil, Indonesia, Vietnam, Thailand, India and Turkey. Although climate change will negatively impact these countries, others will benefit from a change in rainfall patterns. For example, imports from Russia, Nigeria, Peru, Ecuador, Uganda and Kenya will become less vulnerable to drought under climate change.

The study concludes that there is a clear and urgent need for further GHG emissions reductions, along with more comprehensive adaptation and mitigation strategies to reduce the EU's vulnerability to drought in the near future. The findings highlight the interconnected nature of global imports and exports in the agricultural sector and point to the importance of climate adaptation in international trade.

¹ Drought severity is an indication of an extended period of anomalously low soil moisture affecting agricultural production.

² Three sets of time periods: 2015-2045; 2045-2065; and 2065-2100, represented as averages 2030, 2050 and 2085.

Climate-driven drought is set to disrupt EU imports

- *In 2050, the EU's crop imports may be disrupted due to increased drought in other parts of the world under all GHG emissions scenarios.*
- *Drought severity will increase by up to 35% in the producing countries by 2050, unless GHG emissions are reduced.*
- *There is a direct relation between levels of vulnerability and levels of GHG emissions.*
- *Under a low emissions scenario (RCP 2.6), the risk of drought decreases slightly for all crops in most exporting locations in 2050.*

All EU sectors that use agricultural goods sourced through global supply chains are connected to water resources in the products' countries of origin. As the intensity and frequency of droughts alter under climate change in coming years, sectors that rely on imports from affected third countries, such as Brazil, Indonesia, Vietnam, Thailand, India and Turkey, will become highly vulnerable.

How vulnerable are the EU's imports?

- *Currently, only 1% of EU's agricultural imports are categorised as highly or extremely vulnerable to drought.*
- *In 2050, under a medium GHG emissions scenario (RCP 6.0), 44% of the EU's agricultural imports will become highly vulnerable to drought. Under a low GHG emissions scenario (RCP 2.6), 40% will become highly vulnerable to drought.*

Under current climate conditions (based on 2010 data), only 1% of the EU's crop imports are categorised as highly or extremely highly vulnerable to drought, and around 7% are categorised as medium-high and high, while most (around 93%) come from areas with a low or low-medium drought severity (see Figure 1). This alters significantly under climate change. In 2050, under a medium GHG emissions scenario (RCP 6.0), around 44% of crop imports will come from locations with high and extremely high drought severity, with just 18% supplied by areas with low drought severity. Under RCP 2.6 the risk reduces; around 40% of crop imports will come from locations with high and extremely high drought severity. While a difference of 4% may seem minimal, this equates to imports with a value of more than four billion Euros.

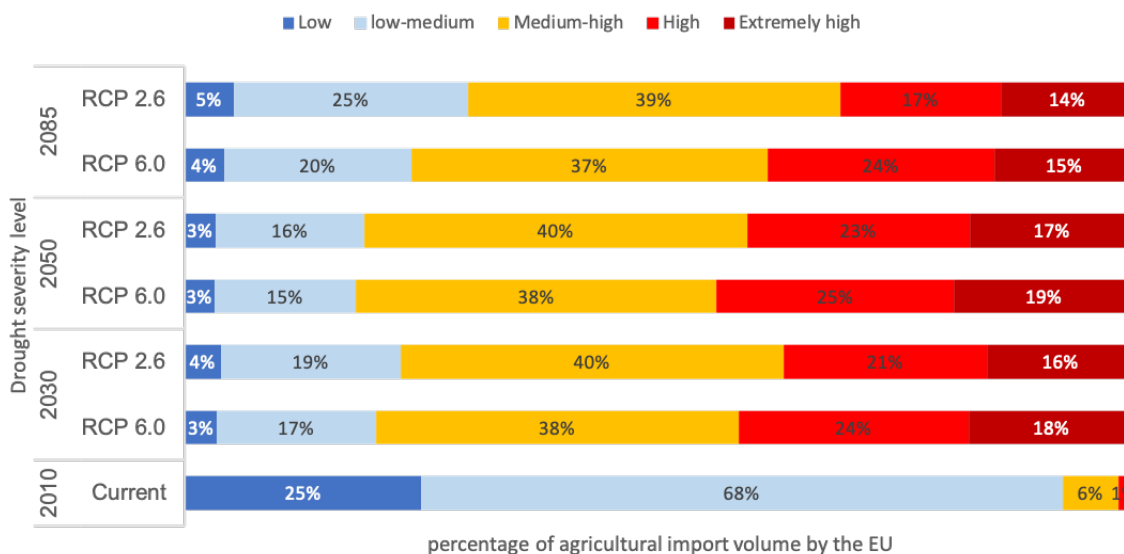


Figure 1. Percentage of agricultural import volume by the EU categorized by the drought severity levels at exporting locations for different climate scenarios and years.

Cross-border climate vulnerability of the EU’s main crop imports

- In 2050, the vulnerability of the EU’s key crop imports to drought will increase sharply compared to current levels. Coffee, cocoa, sugar cane and palm oil will be at high risk of drought, indicating that supply chains and prices could be affected.

Of the eight most important crops imported to the EU, some are far more vulnerable to drought than others. For example, under both medium and low GHG emissions scenarios in all the years studied, sunflower seeds and maize remain at low risk of drought. In contrast, soybeans become moderately vulnerable, and coffee, cocoa, sugar cane and palm oil imports become high or very highly vulnerable to drought (with the exception of cocoa, which decreases slightly in vulnerability in 2085).

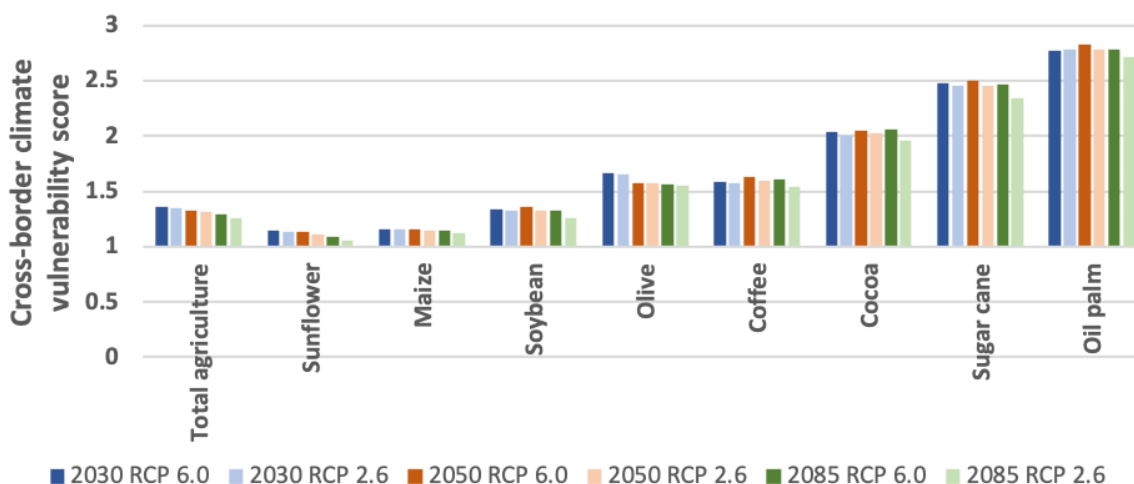


Figure 2. Cross-border climate vulnerability of the EU’s key imported crops

Soybean: Soybean accounts for the EU's greatest dependency on countries outside its borders in terms of water, due to the large volumes imported. In 2050, around 60% of soybean imports originate from areas with a high or very high vulnerability to drought under RCP 6.0. Most of EU's soybean imports come from Brazil, Argentina and the United States of America (USA), which all indicate a moderate to high climate vulnerability in 2050. **The reliance of the meat and dairy industry on imports of soybean to meet demand for animal feed poses a significant risk to the sector and the wider EU economy.**

Cocoa: The EU is 100% dependent on cocoa imports for its chocolate industry. Around 28% of the cocoa imports come from high to very highly vulnerable locations to drought in 2050 under RCP 6.0. **Drought vulnerability levels rise sharply for supplies of cocoa beans from Indonesia and Malaysia, and to a less extent from the Ivory Coast and Ghana.** In contrast, south American suppliers of cocoa will become less vulnerable to drought and cocoa exports from Peru, Colombia, Uganda and Gabon will be less vulnerable to drought in 2050.

Coffee: The EU has a large coffee market and accounts for just under a third (30%) of global coffee consumption. **Coffee imports from Europe's main suppliers - Brazil and Vietnam – are highly vulnerable to drought under climate change in all the years studied.** Supplies from Indonesia will also be greatly affected. However, those from Colombia, Uganda, Peru, Ethiopia and Kenya will become less vulnerable to drought under climate change.

Palm oil: Overall, 61% of the EU's palm oil imports will become highly vulnerable to drought. Indonesia, Malaysia and Thailand are major sources of EU palm oil imports. **The EU's supplies of palm oil from Indonesia are highly vulnerable to drought.** Meanwhile, Malaysia and Thailand will be moderately affected by climate change.

Sugar cane: The EU imports all of its sugar cane from other countries, mainly from Brazil, Mauritius, Cuba, Guyana, Fiji and India. More than 73% of the sugar cane imports will become highly vulnerable to drought by 2050 and only 6% will have a low vulnerability level. This means that, **out of the key crops imported by the EU, sugar cane is the most vulnerable to climate change.**

Olives, maize and sunflower seeds: Although the EU is not dependent on olive imports for its olive-based economy, its olive imports are the one of the most vulnerable to climate change. The climate vulnerability of the major olive-exporting countries, such as Turkey, Tunisia and Morocco, are highly vulnerable to drought under climate change. In contrast, almost all the EU's suppliers of sunflower seeds have a low climate vulnerability to drought, except Bolivia and Paraguay, and only around 20% of the maize imports will originate from highly drought vulnerable areas in 2050 under RCP 6.0.

Conclusions

- *The most affected EU sectors are likely to be meat and dairy, beverage and confectionary (related to chocolate and coffee), and palm oil-reliant cosmetics and food manufacturers, because they depend heavily on imports from third countries that are set to become increasingly vulnerable to drought.*
- *Immediate adaptation and mitigation strategies are needed to prevent the worst possible negative impacts.*

The EU's economy is highly vulnerable to drought outside its borders due to climate change. Its dependency on crops produced in regions that are set to become increasingly vulnerable to climate-driven drought should be considered in government policies and business strategies as a matter of urgency.

The report finds that exporting countries' capacities to adapt to climate change directly affects the EU's cross-border climate vulnerabilities. For example, although the USA, Indonesia and Malaysia are set to experience higher drought severity in the future under all GHG emissions scenarios, the crops they export may be less affected than those from some other countries because they are better able to adapt to change. However, most of the EU's agricultural imports are produced in countries that have a low adaptive capacity, such as soybeans from Brazil and cocoa from the Ivory Coast and Ghana. Working towards more climate resilient production in these countries could reduce the EU's cross-border climate vulnerabilities.

Adaptation and mitigation strategies are necessary at all levels of decision making. Options, such as sourcing from other regions, investing in new market areas or using alternative primary products should be considered on a case-by-case basis. Increased measures to support specific regions with efforts to become more drought resilient could reduce the EU's vulnerability to drought.

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