Soy supply chain stakeholders

Perspectives and responses to cross-border climate change impacts

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Background

- Stockholm Environment Institute at the University of York, as part of the Sustainable Consumption and Production group
- Working on the Cascades project since August 2020
- PhD on cross-border climate risks to the Brazil-Europe soy supply chain: stakeholder interviews and climate impact and supply chain modelling.

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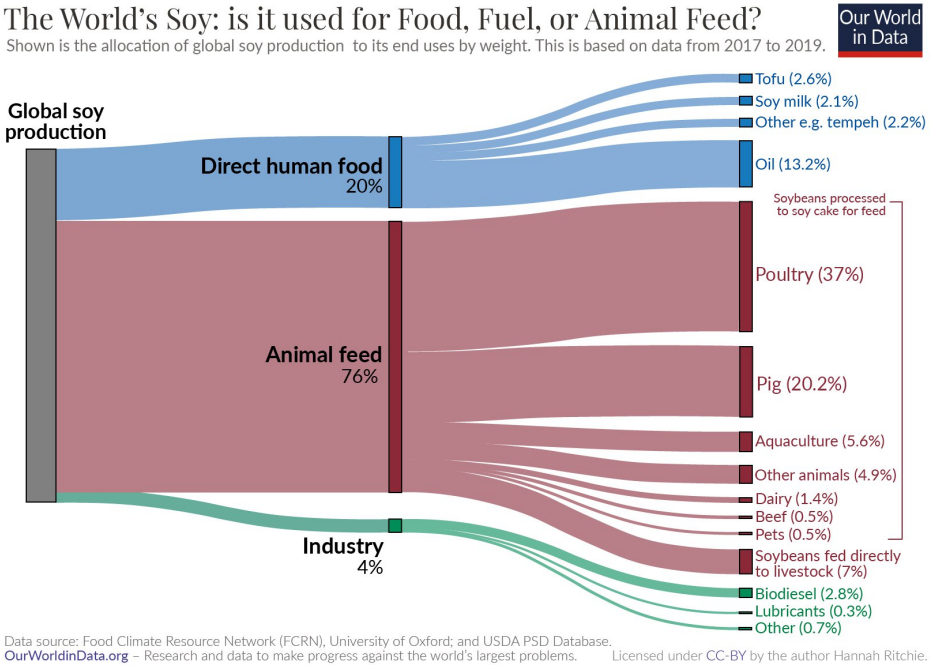
Why the Brazil-Europe soy supply chain?

- Most soy is used in animal feed (76% in 2017-19)
- Brazil has just overtaken the US as the world's biggest producer of soy
- Brazil is also the EU's top source of soy imports
- The EU is dependent on imports for the majority of its soy consumption

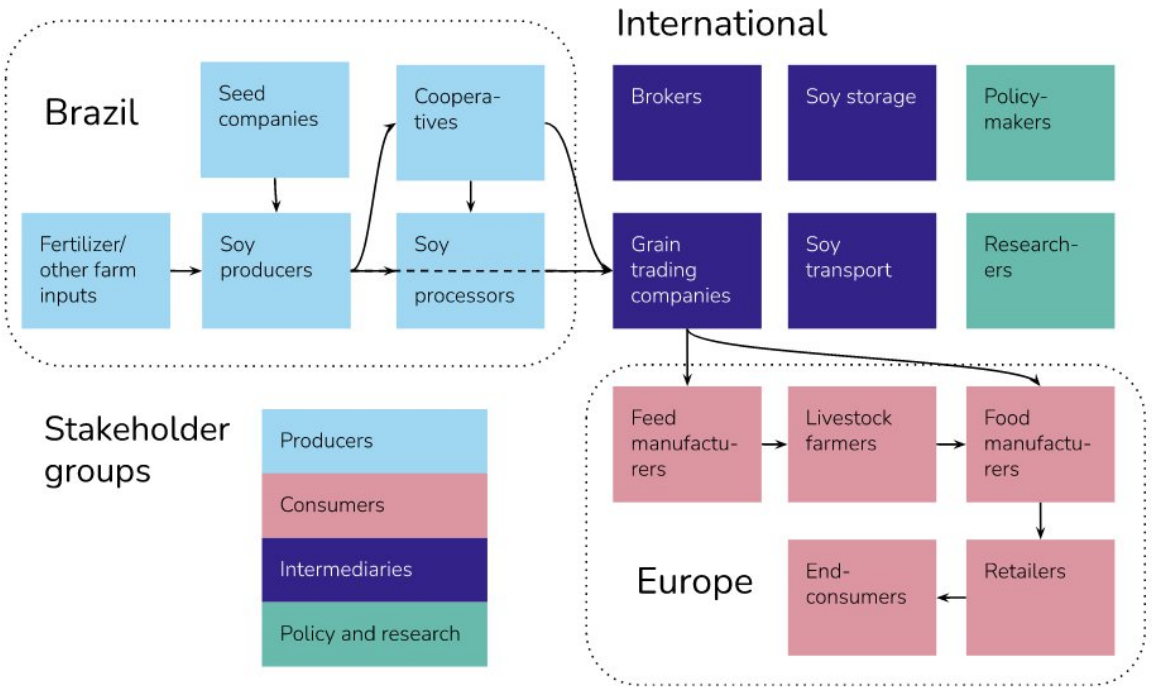


Research questions

What are stakeholder perceptions on past and future climate risk to the soy supply chain?

What are the consequences of weather shocks to the production and transport of soy for different stakeholders?

How might stakeholders respond to these shocks?



Methods

Semi-structured interviews

- Phase A: interviews in Brazil, 2019 (conducted by Tiago Reis)
- Phase B: virtual interviews, 2022 (conducted by me)

Coding in Nvivo

- A priori codes
- Emergent codes

Interview questions

- Could you describe an example of a shock disrupting the soy supply chain in the past? (ideally climate related)
- How did this affect your organisation, and how did you respond?
- What are the main shocks you expect in the future? How does climate change compare?
- What plans are in place to combat shocks, and how does policy affect responses to shocks?

Weather shocks affect many different aspects of the soy supply chain

Participant perceptions of how different weather shocks can affect soy production, transport and infrastructure.

Number of interviewees in brackets.

Shock	*Impacts on soy production*	*Impacts on soy transport & infrastructure*
Drought	Reduces soy yields (43)	Reduces waterway transport of soy (6) Reduces hydroelectric power generation (1)
Excess rain	Delays soy planting (3) Delays soy harvesting (6) Damages soy quality, increases risk of disease (e.g. soybean rust) (21) Unspecified harvest loss (7) Leaches potassium from soil, less light for photosynthesis, lower yields (1)	Delays loading at ports (1) Causes flooding on [unpaved] roads (10) Increased sedimentation in rivers, blocking waterways (1) Damage to soy in storage (1)
Storms	None mentioned	Can damage loading facilities or boats on the water, divert ships and delay docking (2) Can damage railways and bridges (1)
Extreme cold	Frost can damage plants and cold can slow germination (4)	None mentioned
Extreme heat	High temperatures can damage plants (2)	Increase of vermin affecting soy storage (1)

Consequences of shocks

Brazilian soy producers

- Broken advance contracts
- Impact depends on how widespread the harvest failure is, and the relationship with the trader

Intermediaries, grain traders

- Could be benefits or opportunities for traders
- Traders more affected by climate impacts to the transport of soy

Feed sectors & consumers

- Feed costs are a large proportion of meat production
- Retailers feel less of an impact (high bargaining power)

"if you are small [livestock] farmers and you are alone, you have zero power […] with these big player traders of raw materials, soybean, all around the world" (European livestock sector)

"I don't really see the case for a shock which would impact us. [... Retailers have] so many thousands of suppliers who source from all over the world […] I think that that kind of flexibility is built into the system, certainly at the far end of the supply chain that we operate in" (UK retailer)

How might stakeholders respond, and how might these responses affect other stakeholders?

Response type	Response name
Domestic adaptation - Brazil	Soy farmer insurance
	Move soy production to new area
	Loans for soy farmers
	Technology & management practices
	Irrigation
	Export ban
System-wide adaptation	Storage
	Diversifying transport modes
	Futures contracts
	Monitoring yields/ supply chain
	Free trade agreements
	Climate mitigation
Substitution	Using flexibility of supply
	Diversifying protein sources
	(Temporarily) relax trade regulations
	Plant more domestic soy acreage

- Examples of domestic adaptation in Brazil implemented by producers would benefit consumers
- Some consumer level responses negatively affect producers (reduce demand)
- Many examples of potential system-wide adaptation: few of these implemented, so scope for future cooperation

Response types defined by Talebian et al. (2023)

Discussion points

- Climate change affects the supply chain in many different ways, research should address all aspects
- Big differences between stakeholder groups even within one country (cross-sectoral differences)
- General lack of concrete plans (despite many potential responses) - long implementation time
- Relative wealthiness of EU consumers
- Ultimately, scope for better cooperation on adaptation across the supply chain!

“soya today is irreplaceable, it’s ubiquitous, it’s everywhere […] it will take decades before these new or these novel raw materials are able to replace soya in a significant way.” (European aquaculture sector)

“I think we enter a new era, let’s say, where we will face a lot more disruptions.” (European livestock sector)

Next steps

- Paper to be published in the Journal of Cleaner Production

- Two-year part-time secondment on cross-border climate risk with the Department for Business and Trade, UK government

References

Stokeld et al. (upcoming) Stakeholder perspectives on cross-border climate risks in the Brazil-Europe soy supply chain. *Journal of Cleaner Production.*

Talebian, S., Benzie, M., Harris, K., Jarząbek, Ł., Magnuszewski, P., Carter, T.R., Obermeister, N., 2023. A conceptual framework for responding to cross-border climate change impacts (Version 01). Zenodo. Preprint. https://doi.org/10.5281/zenodo.7817615