

Who is responsible for addressing transboundary climate risks to Nordic trade and food security?



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Abstract (English)

The Nordic countries, heavily reliant on global trade, are increasingly vulnerable to climate change impacts abroad. However, national policies and business practices often overlook these "transboundary climate risks" (TCRs).

Key challenges:

- **Diffuse risk ownership:** TCRs are dispersed across multiple jurisdictions, sectors and value chains, adding far more complexity than conventional direct or domestic climate risks.
- **A lack of business preparedness:** Limited awareness and action from businesses.
- **Policy gaps:** National policies often overlook TCRs.
- **Siloed approaches to adaptation:** Current adaptation approaches do not recognise the need for cross-cutting actions that use multiple policy tools across diverse sectors

Suggested solutions:

- Strengthening Nordic and international cooperation
- Improving risk assessments
- Promoting public-private partnerships to enhance resilience

Sammendrag (Norsk)

De nordiske landene er sterkt avhengige av global handel og er stadig mer sårbare for klimaendringer i utlandet. Imidlertid blir "grenseoverskridende klimarisiko" ofte oversett av nasjonal politikk og i virksomhetsstrategier.

Hovedutfordringer:

- **Diffust risikoeierskap:** risikoen er spredt over flere jurisdiksjoner, sektorer og verdikjeder, noe som tilfører langt mer kompleksitet enn konvensjonelle direkte eller innenlandsk klimarisiko.
- **Mangel på virksomhetsberedskap:** Begrenset bevissthet og risikostyring i virksomheter.
- **Politikkmangel:** Nasjonal politikk overser ofte risikoen.
- **Silo-preget klimatilpasning:** Gjeldende tilpasningsarbeid anerkjenner ikke behovet for tverrgående handlinger og mangler bruk av politiske verktøy på tvers av ulike sektorer.

Foreslåtte løsninger:

- Styrke nordisk og internasjonalt samarbeid
- Forbedre risikovurderinger
- Fremme offentlig-private partnerskap for å øke resiliens

The case for strategic regional cooperation



In June 2024, the Nordic Ministers for Fisheries, Aquaculture, Agriculture, Food and Forestry agreed to work together to map trade flows in the region and cooperate with the private sector to identify and address global supply chain risks to the food supplies of the Nordic countries.^[1] The ministers' declaration in Karlstad, Sweden, was an important acknowledgement of the pressing need to grapple with the risks associated with the region's high dependency on global trade.

Climate change is only briefly mentioned in the Karlstad Declaration, and the wording does not make it clear whether climate change impacts on places from which the Nordic countries import food and other commodities and goods – and not just within the region. Yet, at a time when climate change is making severe droughts, wildfires, floods, cyclones and other crises ever more common for key trade partners^{[2], [3]} Nordic policy-makers cannot afford to ignore those risks.

Experts in the Nordic region have been warning for years about transboundary climate risks (TCRs) – risks that propagate across borders through biophysical connections (e.g. shared ecosystems and natural resources), trade links (e.g. flows of goods and services), financial dependencies (e.g. flows of capital, such as foreign direct investments), and human mobility (e.g. forced displacement and migration or tourism).

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1. Nordic Co-operation (2024). The Karlstad Declaration – Nordic co-operation for preparedness and robustness related to food supply and forestry. <https://www.norden.org/en/deklaration/karlstad-declaration-nordic-co-operation-preparedness-and-robustness-related-food>
 2. See, e.g., Harris, B., Tauschinski, J. and Pooler, M. (2024). Wildfires sweep Amazon as Brazil suffers worst drought on record. *Financial Times*, 14 September 2024. Climate change. <https://www.ft.com/content/bdcdd185-73ba-411b-93f0-1a3b3b879834>
 3. World Weather Attribution (2023). Climate change fuelled extreme weather in 2023; expect more records in 2024. 22 December. <https://www.worldweatherattribution.org/climate-change-fuelled-extreme-weather-in-2023-expect-more-records-in-2024/>

As *The Economist* summarised a 2022 analysis by the Swedish National Expert Council for Adaptation: "Sweden is neglecting vulnerabilities at the far end of its supply chains, and at choke points along them, fostering an unrealistically sanguine view of what it needs to do to cope with climate change."^[4] The Icelandic Met Office also raised serious concerns about TCRs,^[5] and so did the second Norwegian government white paper on adaptation.^[6]

It is crucial to better understand how Nordic countries are exposed to TCRs, how existing vulnerabilities and dependencies might exacerbate those risks, and the individual and collective actions that could stave off the worst effects.

This policy brief distils insights from recent Nordic research on TCRs to support policy-makers in developing effective actions to enhance the resilience of the region's economy and food supplies. Any such effort will require close cooperation with the private sector, and the brief also addresses businesses' concerns and identifies proactive measures to mitigate global supply-chain risks.

This work builds on the results of the 2022 project "Nordic perspectives on transboundary impacts of climate change" (NORD-TCR), which was commissioned by the Nordic Council of Ministers. The brief is based on findings of the 2024 project "Exploring risk ownership linked to transboundary climate risks affecting the Nordic countries" (NORD-TCR-OWNER), also funded by the Council, and "Making transborder climate risks tangible for adaptation actions" (TransAdapt), an ongoing programme funded by the Norwegian Research Council.

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4. The Economist (2022). To those who have... (Special report), 1 November 2022. <https://www.economist.com/special-report/2022/11/01/money-and-moderately-good-governance-make-climate-change-adaptation-easier>
 5. Björnsson, A., Ólafsdóttir, A.H., Sigurðsson, B.D., Katrínardóttir, B., Davíðsdóttir, B., et al. (2023). Umfang og afleiðingar hnattrænna loftslagsbreytinga og áhrif þeirra á Íslandi: Fjórða samantektarskýrsla vísindanefndar um loftslagsbreytingar. Veðurstofa Íslands (Icelandic Met Office), Reykjavík. <https://rafhladan.is/handle/10802/31990>
 6. Klima- og miljødepartementet (2023). Klima i endring – sammen for et klimarobust samfunn. Meld. St. 26 (2022–2023). Melding til Stortinget, Oslo. <https://www.regjeringen.no/no/dokumenter/meld.-st.-26-20222023/id2985027/>



Transboundary climate risks to Nordic food supplies

Nordic countries boast open, market-driven economies that are highly dependent on global trade. In line with this, a recent survey on TCRs, the 54 respondents – from national and subnational authorities, businesses and academic institutions – said risks linked to trade were of particular concern to the Nordic countries.^[7] Respondents considered food security and primary industries, such as the agriculture and forestry sectors, to face the most severe risks.

The TransAdapt project studied the Norwegian food system to explore how climate risks abroad are transmitted to Nordic economies and society through international trade and corporate value chains. As much as 60–76% of the food consumed in Norway (by weight) is either directly imported, or dependent on imports (such as livestock feed).^[8] The country's export-oriented aquaculture industry sources about 90% of its feed from abroad; about 21% is soy imports from Brazil alone. Some of the countries from which Norway imports wheat, rice, maize and sugarcane face significant water scarcity risks (e.g. Pakistan, India, Spain, Uzbekistan and China), while exporters of sugar cane, coffee, rice and maize face climate-related declines in crop yields.

A similar analysis of Sweden's agricultural imports found that it relied far more on countries facing significant climate hazards, such as Brazil, Russia, India and China, than previously thought.^[9] In fact, much of the global agriculture commodities market is dominated by a relatively small number of breadbasket regions that are highly exposed to climate hazards.^[10]

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7. Jansen, M.K. and Hopp, J.Z. (2024). Nordic survey. Report nr. 11-2024. Western Norway Research Institute, Sogndal. <https://www.vestforsk.no/sites/default/files/2024-12/VF-rapport%20nr.%2011-2024%20Final.pdf>
 8. Lager, F. (2025, forthcoming). Cross-border and cascading climate risk in Norwegian food systems. Stockholm Environment Institute, Stockholm.
 9. Lager, F. and M. Benzie (2024). New risk horizons: Sweden's exposure to climate risk via international trade. Stockholm Environment Institute, Stockholm. <https://www.sei.org/publications/swedens-climate-risk-international-trade/>
 10. Adams, K. M., Benzie, M. and Croft, S. (2021). Climate change, trade, and global food security: a global assessment of transboundary climate risks in agricultural commodity flows. Stockholm Environment Institute, Stockholm. <https://www.sei.org/publications/climate-change-trade-global-food-security/>



Nordic businesses are unprepared for TCRs affecting supply chains

Reliable supply chains are essential to companies' success, but recent business surveys suggest that corporate awareness of TCRs that could affect their supply chains remains low, and even fewer companies have actively sought to understand and manage these risks.^{[11], [12]} Frequently cited reasons include the short timeframe of business risk management, insufficient access to risk data, limitations of existing risk modelling tools, and the lack of an enabling policy landscape. Yet physical climate risks have begun to affect corporate credit ratings, with most downgrades attributed to climate risks in supply chains.^[13]

In Norway, the TransAdapt project found businesses in the agriculture and aquaculture sectors did not consider TCRs a top concern, though they acknowledged some underlying risk drivers.^[14] Businesses have not developed any specific plans to mitigate potential risks of climate-related shocks to their supply chains, as they believe such disruptions could be addressed through existing crisis management plans created in response to previous disruptions (e.g. due to Covid-19 and Russia's war on Ukraine). For instance, business leaders suggested they could rely on alternative sources of imports or on substitutions (e.g. bone meal and rapeseed cake instead of wheat and soy products). Norway's high purchasing power was also seen as a strength.

However, during a policy roundtable co-hosted by the Stockholm Environment

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11. See, e.g., World Economic Forum (2023). Taking stock of business efforts to adapt to climate change. WEF white paper. World Economic Forum, Geneva. <https://www.sei.org/publications/taking-stock-business-efforts-adapt-climate/>
 12. Cote, M. and Mikaelsson, M. A. (2024). Climate change and trade in the European Union. ECRT policy white paper. Stockholm Environment Institute and Adaptation Without Borders, Stockholm. <https://www.sei.org/publications/white-paper-on-european-climate-risk-and-trade-in-europe/>
 13. Amiot, M., Sullivant, S. and Wittstruck, N.G. (2023). Physical climate risk: how will challenging credit conditions affect resiliency and adaptation to more costly climate hazards in 2024? S&P Global, 4 December. <https://www.spglobal.com/ratings/en/research/articles/231204-physical-climate-risk-how-will-challenging-credit-conditions-affect-resiliency-and-adaptation-to-more-costly-12935780>
 14. Skagen, K., Aamodt, S., Lager, F. and Hermansen, E.A.T. (2025, forthcoming). Understanding transboundary climate risk ownership in Norwegian agri- and aquaculture. CICERO Center for International Climate Research, Oslo.

Institute and the Nordic Council of Ministers, several experts questioned the effectiveness of such measures. The availability of alternative imports could be severely compromised in the context of compounding and cascading climate shocks to supply chains. Substitutes might reduce the quality of food products and affect nutrition. It is also not clear that Norway and other Nordic countries could leverage their high purchasing power to ensure priority access to available supplies, as exporters would be more likely to prioritise countries and businesses with larger markets.

The TransAdapt study found that while these measures could provide some resilience to short- and medium-term disruptions to supply chains, they would not work for longer-term disruptions. This assessment echoes the conclusions of an earlier report on food security by the Office of the Auditor General in Norway, which suggested that the Norwegian food system is unprepared for, and would likely be overwhelmed by, low-probability but high-impact extreme weather events.^[15]

15. Bardalen, A., Pettersen, I., Dombu, S.V., Rosnes, O., Mittenzwei, K. and Skulstad, A. (2022). Klimaendring utfordrer det norske matsystemet. Kunnskapsgrunnlag for vurdering av klimarisiko i verdikjeder med matsystemet som case. Report M-2341. Norwegian Environment Agency, Oslo. <https://www.miljodirektoratet.no/publikasjoner/2022/ugust/klimaendring-utfordrer-det-norske-matsystemet-kunnskapsgrunnlag-for-vurdering-av-klimarisiko-i-verdikjeder-med-matsystemet-som-case/>



Risk ownership and public policies to manage TCRs

The idea that someone “owns” a risk is well anchored in the practice of risk management. It encompasses the fundamental questions of who is affected, who is left with the bill, and who has the responsibility for and the means to reduce the risk.^[16]

This logic also applies to climate risks. When it comes to transboundary risks, however, the question of risk ownership is complicated by the fact that the trigger – the drought or flood, for instance –and the societal impact can be spread out significantly in both time and space. The complexity of global supply chains further muddles risk ownership: Those who are directly affected are often at the lowest level of governance (e.g. a farmer in Brazil), while those with the most power and resources to mitigate risks are often far removed.

Recent EU legislation could play an important role in enhancing the resilience of Europe’s trade networks and supply chains. The Corporate Sustainability Reporting Directive (CSRD; 2022/2464/EU) and the revised European Sustainability Reporting Standards (ESRS; 2023/2772/EU) place obligations onto EU companies, among others, to disclose the physical climate risks in their own operations and value chain, as well as adaptation policies and actions. These requirements are likely to instigate a systemic change over the next few years with respect to businesses conducting materiality assessments relating to climate change, according to experts from the finance and business sectors. And while not all the Nordic countries are EU members, the widespread impacts of these regulatory obligations on businesses are likely to deliver increased resilience in global supply chains on which other Nordic countries rely.

16. Canales, N., Mikaelsson, M.A., Klein, R.J.T., Lager, F. and Aall, C. (2025, forthcoming). Risk ownership for transboundary climate risks in global supply chains. Stockholm Environment Institute, Stockholm.

National climate risk assessments and adaptation plans in the Nordic countries have yet to grapple with these issues, however – even if, like Finland's 2030 National Adaptation Plan, they acknowledge TCRs as a concern.^[17] A 2023 report published by the Nordic Council of Ministers on adaptation policies in the Nordics highlighted the decentralised and siloed nature of existing governance structures as a key factor hindering effective adaptation to more systemic climate risks such as TCRs.^[18]

European governments, including those in the Nordics, tend to task each department with considering climate risks to its own policy portfolio and associated sectors, and developing adaptation plans. While this "mainstreaming" approach is certainly better than confining climate concerns to a single ministry, it risks uncoordinated and insufficient action to adapt to TCRs.

Moreover, relying on such decentralised structures of risk ownership and management can leave cross-sectoral spillovers of climate risks and their aggregated impact on a systems level unaccounted for. Some climate risks may require actions through multiple policy levers in multiple sectors, whereas some individual adaptation policies can play an instrumental role in managing many different climate risks.

17. See National climate change adaptation plan 2030. <https://mmm.fi/en/nature-and-climate/climate-change-adaptation/national-climate-change-adaptation-plan-2030>

18. Gram-Hanssen, I., Aall, C., Drews, M., Juhola, S., Jurgilevich, A., Klein, R.J.T., Mikaelsson, M.A. and Mik-Meyer, V.L. (2023). Comparison and analysis of national climate change adaptation policies in the Nordic region. TemaNord. Nordic Council of Ministers. <https://doi.org/10.6027/temanord2023-525>



Key challenges in managing transboundary climate risks

Building on insights from the Risk-Owner and TransAdapt projects, five challenges emerge as particularly urgent to address in order to avoid unnecessary harm to Nordic countries from unmanaged TCRs:

Diffused risk ownership is amplified in TCRs, as the initial trigger – the climate hazard – and the ultimate impact – the risk – are dispersed across multiple jurisdictions, adding far more complexity than conventional direct or domestic climate risks. TCRs cascade through diffuse and seemingly abstract pathways.

A lack of business preparedness to disclose physical climate risks within their operations and value chains, along with corresponding adaptation policies and actions, reflects the need for a changing policy environment. New regulatory obligations on businesses are expected to enhance resilience in the global supply chains on which other Nordic countries rely. This may tip the scales in private-public risk ownership of transboundary climate risks, with the private sector taking on a more prominent role than it has to date.

The limited inclusion of TCRs in national policy-making has led to slow policy action, even though the Nordic survey revealed a strong consensus across the public and private sectors that national authorities hold both the primary responsibility and the necessary resources to prevent crises stemming from transboundary climate impacts.^[19]

Siloed approaches to adaptation do not recognise the need for cross-cutting actions that use multiple policy tools across diverse sectors. There is a need for a more systemic outlook as well as oversight and coordination across policy sectors alongside political prioritisation and investment as the main instruments to prevent and manage transboundary climate risks.

19. Jansen, M.K. and Hopp, J.Z. (2024). Nordic survey. Report nr. 11-2024. Western Norway Research Institute, Sogndal. <https://www.vestforsk.no/sites/default/files/2024-12/VF-rapport%20nr.%2011-2024%20Final.pdf>

A final key insight from the two projects' work is that adopting a combined, multi-level and cross-sector approach could involve strengthening domestic food production through agriculture, fishery and other industry policies, while civil protection policies may need to consider options for bolstering emergency reserves.



How Nordic cooperation could enhance resilience to TCRs

Although the Covid-19 pandemic and Russia's war in Ukraine accounted for much of the upheaval in global supply chains over the last few years, there is growing apprehension in both the public and private sectors about potential impacts from extreme weather events abroad. As climate change escalates, such events are increasingly causing supply shocks.

At the Nordic policy roundtable, business representatives stressed the need for national governments to work with the private sector (especially small- and medium-sized enterprises) to help them quantify risks to their supply chains and make the case for adaptation investments. Part of such engagement would be to unlock and integrate existing risk data, which are currently fragmented and often proprietary.

There have been some promising developments in terms of Nordic cooperation. At a meeting of the Nordic Council of Ministers in May of 2024, participants agreed to launch a cooperative initiative to engage with the private sector to map key business and sectoral risks and needs in relation to climate hazard exposure and vulnerabilities of their global value chains. This stakeholder engagement identified several sectors of strategic importance for the Nordic countries (e.g. transport, energy, machinery and finance), and the agriculture and food sector was deemed to be in most pressing need for action. This initiative would also be relevant to the Karlstad Declaration mentioned at the start of this policy brief.

If these efforts can create sustained momentum and deliver tangible outcomes, they could significantly enhance the resilience of Nordic economies and food supplies to transboundary climate risks. At the Nordic policy roundtable, some experts suggested creating a pan-Nordic "climate intelligence agency" to strengthen and institutionalise cross-Nordic coordination around climate risk management. Such an agency could establish a robust knowledge inventory on the systemic and cascading risks facing the Nordic economies and societies (from both domestic and international risk), carry out cross-sectoral and sector-specific scenario analyses against different climate futures, and establish industry task

forces to facilitate public-private partnerships to enhance supply chain resilience in strategic sectors.

Although businesses will ultimately drive actions to bolster the climate resilience of their supply chains, governments have a critical role to play in facilitating public-private collaboration and Nordic cooperation. For instance, the Nordic countries could create larger markets for resilient supply chains through a joined-up approach to public procurement, and thus provide a clear signal to the market to increase the confidence of businesses to invest in adaptation. Nordic cooperation would also allow the Nordic countries to share the risks and costs involved in transforming their supply chains and enhancing economic security.

About this policy brief

The policy brief draws on insights from two research projects: "Exploring risk ownership linked to transboundary climate risks affecting the Nordic countries" (Risk-Owner), carried out in 2024 with funding from the Nordic Working group for Climate and Air (NKL) under the auspices of the Nordic Council of Ministers, and "Making transborder climate risks tangible for adaptation actions" (TransAdapt), launched in 2022 and continuing through 2025, funded by the Norwegian Research Council.

The analysis and recommendations presented here are meant to support the Nordic states in their actions to promote resilience to transboundary climate risks. However, the contents of the policy brief are entirely the responsibility of the authors and do not necessarily reflect the views of the Nordic Council of Ministers.

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Nordic co-operation

Nordic co-operation is one of the world's most extensive forms of regional collaboration, involving Denmark, Finland, Iceland, Norway, Sweden, and the Faroe Islands, Greenland and Åland.

Nordic co-operation has firm traditions in politics, economics and culture and plays an important role in European and international forums. The Nordic community strives for a strong Nordic Region in a strong Europe.

Nordic co-operation promotes regional interests and values in a global world. The values shared by the Nordic countries help make the region one of the most innovative and competitive in the world.

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