

Transnational climate change impacts: An entry point to enhanced global cooperation on adaptation?

The Paris Agreement recognizes adaptation to climate change as a “global challenge faced by all, with local, subnational, national, regional and international dimensions”, and a key component of the global response needed to protect people, livelihoods and ecosystems.

Article 7 of the agreement thus sets a global goal on adaptation, and calls for international cooperation and support to enhance adaptation action. Within countries, it encourages the development of national adaptation plans and priorities for action, as well as periodic adaptation communications under the United Nations Framework Convention on Climate Change (UNFCCC).

The language of the Paris Agreement reflects a growing understanding that while the physical impacts of climate change are location-specific, in a globalized world, people and countries are increasingly connected. This means adaptation is ultimately a collective endeavour: we are all in this together.



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Workers harvest tea in Rwanda. It will be processed for export in the Kitabi Tea Processing Facility, which employs 200 people in peak season.

Applying this insight to adaptation planning requires a new lens through which to view climate impacts and adaptation responses. This policy brief, which builds on an SEI Working Paper published earlier this year, introduces a framework for quantitative assessment of country-level exposure to what we call the *transnational impacts* of climate change.¹

Transnational climate impacts reach across borders, affecting one country – and requiring adaptation there – as a result of climate change or climate-induced extreme events in another country. We have used our analytical framework to develop nine indicators of country-level exposure and a composite index: the Transnational Climate Impacts (TCI) Index.

Key findings

- In an increasingly globalized world, no country is fully insulated from the impacts of climate change outside its borders. This means we need to rethink assumptions about which countries are vulnerable to climate change, and carefully consider how climate risks are transmitted across borders.
- We identify four main transnational risk pathways: The biophysical pathway encompasses transboundary ecosystems such as river basins, oceans and the atmosphere. The finance pathway represents capital flows and climate impacts on assets held overseas. The people pathway involves the movement of people between countries, from tourism to migration. The trade pathway transmits climate risks within regional and global markets and across international supply chains.
- The Transnational Climate Impacts (TCI) Index presented in this brief shows that many countries that do not rate as “particularly vulnerable” to direct climate change impacts are highly exposed to transnational risks: for instance, the Benelux countries, Germany, and the Scandinavian states.
- Since globalization is a key factor in transnational climate risks, less-developed economies may score lower on some TCI indicators. However, several factors can lead to higher TCI scores, such as being a small country (e.g. the Gambia, Fiji), landlocked (e.g. Tajikistan, Swaziland, Armenia, Mauritania), and highly trade-dependent (e.g. Malaysia and Thailand). The four highest-scoring countries are in the Middle East: Jordan, Lebanon, Kuwait and United Arab Emirates.

This brief explains how the indicators and the TCI Index were developed and presents highlights of the results, as well as reflections on the implications for both national adaptation planning, and global cooperation on adaptation under the UNFCCC.

The work described here is preliminary, intended to spark discussion and raise awareness about the potential significance of transnational climate risks. We welcome constructive feedback from readers and invite suggestions for collaboration and future research.²

What are we measuring, and how?

Unlike existing global indices that aim to gauge vulnerability to climate change, our indicators focus on exposure and, to some extent, sensitivity to transnational climate change impacts. We look at key characteristics – such as openness, engagement in trade, or import-dependency – that may influence a country’s risk profile. We do not attempt to assess

¹ Benzie, M., Carlsen, H. and Hedlund, J. (2016). *Introducing the Transnational Climate Impacts Index: Indicators of Country-Level Exposure – Methodology Report*. SEI Working Paper No. 2016-07. Stockholm Environment Institute, Stockholm. <https://www.sei-international.org/publications?pid=2972>.

² See contact information at the end; we also welcome comments on weADAPT: <https://www.weadapt.org/knowledge-base/adaptation-without-borders/the-transnational-climate-impacts-index-methodology-report>.

each country's adaptive capacity, or the broader context (e.g. poverty levels, political stability) that might increase or reduce its vulnerability.

The indicators assess current exposure, based on actual data. No attempt is made to project how exposure may change as the result of future socio-economic, climatic or other changes. They evaluate the world as it looks today, so at least parts of the results will need to be updated regularly. Some aspects of a country's profile can change rapidly – for example, the sources of imports of various commodities or of financial flows. Other aspects, such as a country's long-term strategic trade partners, or its geography, are unlikely to change much, or at all, within current planning horizons.

We selected the indicators via a three-stage methodology. First we defined the characteristics of interest and identified potential indicators that could either measure these characteristics, or serve as reasonable proxies. We then consulted with academic experts in climate change and indicator development to validate our assumptions. Finally, we sifted through the available data to identify datasets with balanced global coverage.

The majority of data used in the indicators are from freely available public sources. One indicator (#8) is produced using original modelling analysis by models developed at SEI.

We identified two dimensions of exposure at the national level: (1) a country's openness and reliance on international flows, and (2) the climate risk in specific countries that it is linked to. The selected indicators each relate to one of these aspects.

Indicators of the first type aim to assess characteristics of **individual country profiles** in terms of openness to and reliance on international flows and systems. Indicators of the second type use bilateral data to describe the nature of a flow between specific countries. They aim to assess the nature of an individual country's **links to specific other countries**, and where possible, weight those links based on climate vulnerability. To assess a country's links to "climate vulnerable" countries, we used the ND-GAIN Country Index, which measures countries' vulnerability to direct climate impacts.³

Risk pathways and indicators

We identified four pathways by which transnational risks can be transmitted. Below we explain each pathway and list the corresponding indicators; for a discussion of the results for each indicator, including a heat map, see the working paper (footnote 1).

The **biophysical pathway** encompasses transboundary ecosystems, such as international river basins, oceans and

the atmosphere. Adverse climate impacts on one part of a transboundary ecosystem can create impacts for all the countries that share the ecosystem's services. For example, heat wave- and drought-induced forest fires in one country can disturb the air quality of countries far away downwind. Furthermore, countries' responses to climate change – for instance, by building new dams or diverting more water into irrigation – can have massive impacts on downstream countries. **Indicator 1: Transboundary water dependency ratio**, corresponds to this pathway.

The **finance pathway** represents the effect of climate impacts on the flow of capital, including the exposure of both publicly and privately held assets overseas that suffer lower yields or devaluation as the result of major disasters, or over time as climate change erodes the profitability and returns from various enterprises. Climate impacts will also affect private capital flows – for instance, when extreme weather leaves migrant workers unemployed, stemming the flow of remittances "back home". Two indicators correspond to this pathway: **Indicator 2: Bilateral climate-weighted foreign direct investment**, and **Indicator 3: Remittance flows**.

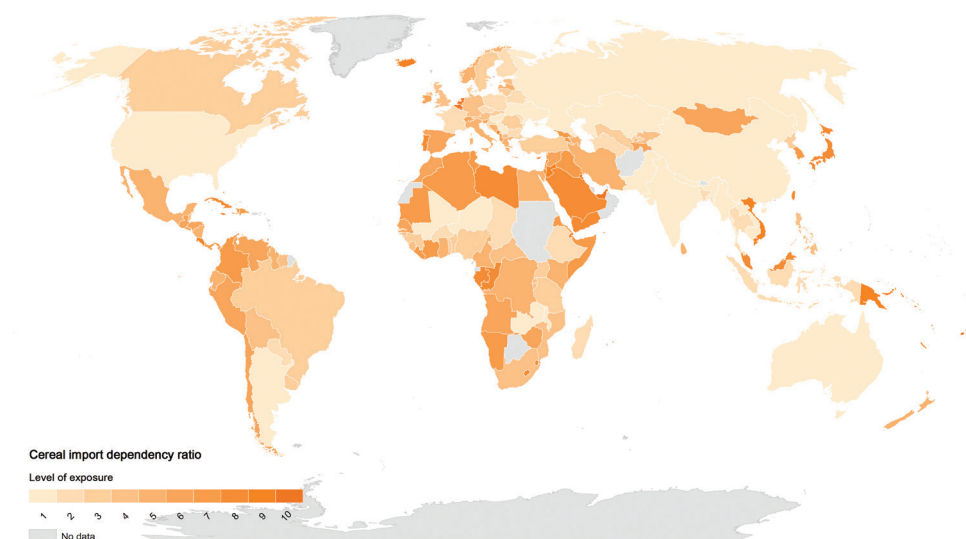


Figure 1: Exposure map for Indicator 7: Cereal import dependency

For high-resolution maps for all the indicators, go to <https://www.sei-international.org/publications?pid=2972>.

The **people pathway** encapsulates the effect of climate change on the movement of people between countries, for example, as a magnifier or driver of new migration patterns, or via the economic impacts of new tourism patterns or climate-sensitive human health risks that result from the movement of people across borders. Two indicators correspond to this pathway: **Indicator 4: Openness to asylum**, and **Indicator 5: Migration from climate vulnerable countries**.

The **trade pathway** transmits climate risks within regional and global markets and across international supply chains. For example, where severe drought decimates harvests in producer countries, the effects on commodity price are felt acutely by import-dependent countries thousands of miles away. Countries' response to climate impacts at home, for example the growing tendency of governments to use export restrictions during poor harvests, to protect food prices in

³ ND-GAIN is the Notre Dame Global Adaptation Index. It includes 36 indicators that compose a score of vulnerability and 14 indicators that make up a score of readiness: we have only used the vulnerability score.

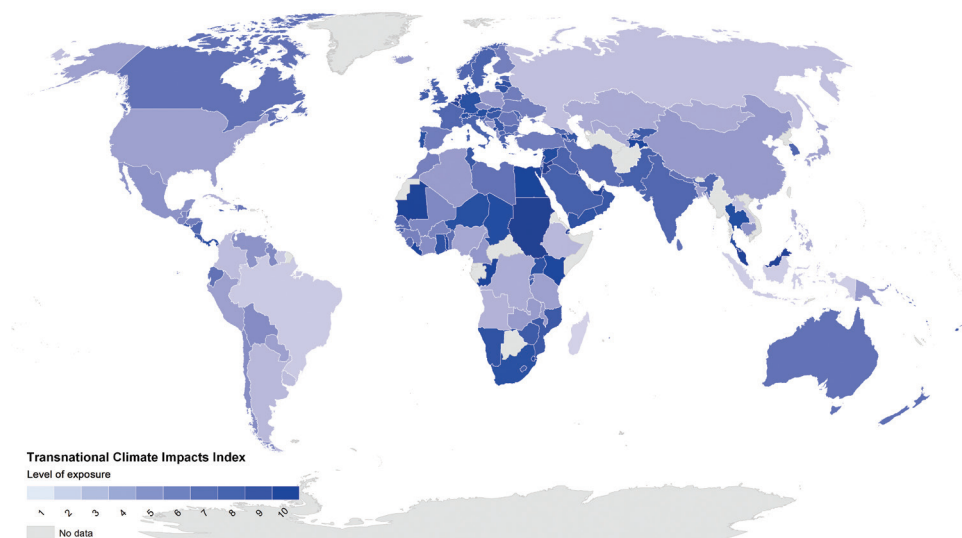


Figure 2: Exposure map for the Transnational Climate Impacts Index

domestic markets, can trigger price shocks and negative impacts in other faraway countries. Here we considered three indicators: **Indicator 6: Trade openness**; **Indicator 7: Cereal import dependency ratio**; and **Indicator 8: Embedded water risk**.

Finally, the framework recognizes the influence of climate change beyond a country's borders on the **global context** in which all countries' adaptation decisions are taken and implemented. For example, under various scenarios, climate change may alter or worsen the security situation in many regions, influencing the range of options – or the costs, benefits and rewards of specific adaptation measures – and the general scope for sustainable development. To gauge a country's level of risk due to the global context, we used **Indicator 9: KOF Globalization Index**.⁴

The Transnational Climate Impacts Index

The Index is a simple composite index that combines the results from each indicator. They are unweighted, as we have found little justification for giving more or less weight to specific indicators at this stage. A total of 203 countries are included in the analysis, coded by the ISO325 standardized country codes. The index maps use the Robinson map projection and have been created in ArcGIS software. The data are from the years 2007–2013. Figure 2 visualizes the results.

Figure 3 compares the results for the TCI Index and ND-GAIN. While there are some overlaps, there are striking differences. For example, although Europe ranks low on ND-GAIN, several European countries rank high on the TCI Index, including the Benelux countries, Germany, and the Scandinavian and Baltic states. All of those countries except Latvia have high globalization levels (Indicator 9). Germany also scores very high on Indicator 1, given its reliance on transboundary rivers, and on the people pathway, given its openness to asylum-seekers and migrants.

Altogether, 30% of the top 30 countries on the TCI Index are small European nations, including the Netherlands, Belgium, Luxembourg, Portugal, Montenegro, Malta, Austria and Lithuania. This makes Europe the most heavily repre-

sented region, reflecting the high dependency of small industrialized countries on neighbours and global systems. By contrast, no European countries feature in the top 30 of the ND-GAIN Index.

Conversely, while the ND-GAIN top 30 only features countries from sub-Saharan Africa, the Middle East and North Africa (MENA), and Small Island Developing States, the TCI Index provides a much more mixed picture, with a variety of countries at all stages of development scoring high – notably smaller (e.g. the European states, Gambia, Fiji, and others), landlocked (e.g. Tajikistan, Swaziland, Armenia, Mauritania), highly trade-dependent (e.g. Malaysia and Thailand) and MENA countries (e.g. Jordan, Lebanon, Kuwait and United Arab Emirates – the four highest scorers). Four countries feature in the top 30 of both indices, all from sub-Saharan Africa (Togo, Liberia, Kenya and Sudan).

Implications for national plans & global cooperation

A key insight from our analysis is that countries are much more interconnected than is often recognized – not just in their economies, but also in their exposure to climate risks. Some countries are clearly more exposed than others to *direct* impacts, but through trade, financial flows, migration, and other factors, we are all increasingly affected by climate change impacts all around the world.

In the context of the UNFCCC, and more broadly in international cooperation, this means it makes no sense to identify one set of countries as “climate-vulnerable” and the others, presumably, as unaffected, but perhaps willing to provide adaptation finance out of sheer generosity. Our analysis shows that even wealthy countries with no significant physical exposure to climate change impacts could face serious economic and social repercussions from impacts elsewhere. Working together to enhance adaptation is in the interest of all countries that want to do well in a globalized world.

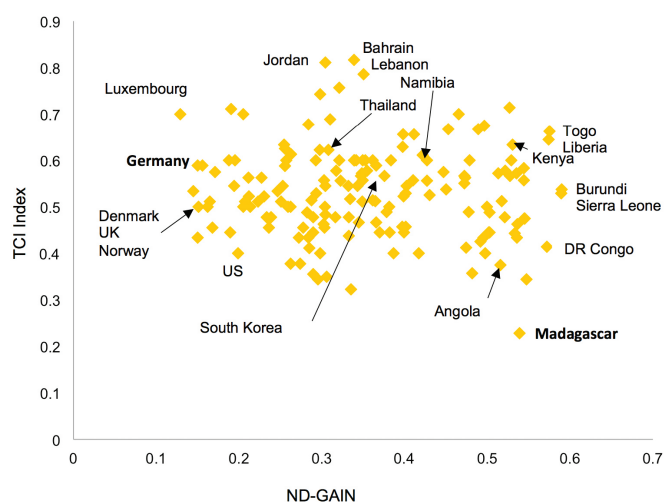


Figure 3: Correlation between the TCI Index and the ND-GAIN Country Index

⁴ See <http://globalization.kof.ethz.ch>.

Policy recommendations

- As the Parties pursue and build on the global adaptation goal set in the Paris Agreement, they should recognize the transnational dimension of climate impacts and the global benefits of adaptation. This could help to secure all Parties' participation in an effective adaptation regime.
- Countries should address transnational climate impacts in their national adaptation plans, and consider opportunities for international cooperation to address shared risks. Regional approaches to climate impact assessment and adaptation planning could be very valuable. Cooperation among trade partners is also crucial.
- Adaptation finance needs to be scaled up significantly, under the UNFCCC and beyond. Industrialized countries need to recognize that climate change will heighten systemic risks to the global economy; global resilience can be achieved by ensuring that all countries have the resources and capacity to adapt. International adaptation finance is an investment in global economic stability.
- Donors should explicitly design programmes and finance mechanisms to address transnational climate impacts, including via multi-country projects. Donors should take care not to engage in "strategic adaptation financing", however, that only seeks to reduce their own exposure to risks abroad. Equity and vulnerability considerations should guide the distribution of climate finance.
- Adaptation communications under the UNFCCC should, among other things, serve the function of climate risk disclosure at the country level. For this, they need to include: a summary of key climate impacts; an outline of planned adaptation responses; a screening of likely in-country adaptation gaps or relevant limits to adaptation; and a brief assessment of how impacts and adaptation effects might spill over to other countries. Parties should see a mutual benefit of providing such information in formats that can be easily digested and compared by other interested countries.
- The global stocktake, as agreed in Paris, should effectively assemble this information into an easily comparable registry of national risks and activities so that countries can more easily survey and assess the consequences to them of climate change in other countries. The global stocktake should also consider the global dimensions of climate risks every five years.
- The Adaptation Committee, in fulfilling its role to "ensure the coherence" of global adaptation, should specifically aim to assess where adaptation gaps or maladaptation at the country level may create systemic global risks or transnational impacts for other countries. All bodies involved in adaptation governance and international cooperation should reconsider their strategies in light of such information.

Another important insight from this work is that countries developing national adaptation plans need to look not just at risks within their own borders, but also at the transnational pathways that may expose them to further risks from climate change impacts abroad. They may need to consider the reliability of food imports or water transfers they now depend on; they may need to be aware of potential humanitarian crises in neighbouring countries. Designing adaptation strategies that effectively address both domestic and transnational climate risks is not easy, but it is essential.⁵ We hope that our work not only raises awareness of the issue of transnational climate risks, but also provides a good starting point for discussing how to address them. We also hope to further develop the framework to support decision-makers who wish to explore climate risk profiles at the national or regional level, such as within the European Union or the African Economic Community.

⁵ We have discussed these issues in greater depth in two previous briefs: Benzie, M. (2014). *National Adaptation Plans and the Indirect Impacts of Climate Change*. SEI policy brief. Stockholm Environment Institute, Stockholm. <https://www.sei-international.org/publications?pid=2624>.

Benzie, M. and John, A. (2015). *Reducing Vulnerability to Food Price Shocks in a Changing Climate*. SEI discussion brief. Stockholm Environment Institute, Stockholm. <http://www.sei-international.org/publications?pid=2657>.

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