

Adaptation without borders? How understanding indirect impacts could change countries' approach to climate risks

Climate change – and adaptation to it – will occur in a globalized, hyper-connected world. A rapid expansion of trade and communications networks has delivered benefits to millions of people worldwide, including enhanced access to capital, resources, technology and ideas, greater choice, employment and economic growth. But hyper-connectivity also creates pathways via which people and systems are exposed to new challenges and risks. In the 21st century, what happens in one country can have significant impacts thousands of kilometres away, disrupting financial flows, supply chains, business operations and global commodities markets. The examples keep adding up: the 2008 financial crisis, the global food crisis, the Fukushima nuclear incident, the Bangkok floods of 2011, Hurricane Sandy.

Assessments of how climate change will affect specific countries, sectors or organizations need to take account of this global interdependence. The focus of adaptation efforts to date has been on risks at the national and sub-national levels, but in a globalized world, it is becoming clear countries may also face climate risks that originate outside their borders. In particular, wealthier countries that do not consider themselves to be very vulnerable to climate change impacts may find they are exposed to a large number of indirect impacts from abroad.

Defining indirect climate change impacts

Most of the time, when we refer to climate change impacts, we mean direct impacts – sea level rises and the coast floods, for example, or rainfall declines and crops dry out. By *indirect impacts* we mean impacts that are observed or expected in one place, but are brought about by climate change or extreme events somewhere else: for example, if a soya crop failure due



Helicopter survey of flood damage in Greater Bangkok, October 2011.

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to drought in Brazil leads livestock feed prices to skyrocket in Europe. In this sense, indirect impacts are an important international dimension of climate risk.

Indirect impacts can be transmitted through various pathways – biophysical, trade, finance, people, as well as through changes to the global security and governance context (see Table 1). Examining the trade pathway, for example, might reveal that climate change impacts could reduce wheat crop yields in one country, creating an opportunity for another country to boost its own wheat exports – but also potentially changing local cropping patterns in ways that affect food security. Thus, national adaptation planners need to consider indirect impacts as part of their assessment and prioritization of climate risks and opportunities and adaptation needs.

Table 1: Indirect climate change impacts via different pathways

Pathway	Description	Illustrative examples
Biophysical	Environmental flows from transboundary ecosystems, e.g. rivers, oceans; cross-border movement of species and pathogens	Variable river flows resulting from climate change – as well as water management adaptation measures taken upstream – present risks to downstream countries that rely on transboundary rivers, e.g. in the Indus, Ganges and Brahmaputra river basins in south and central Asia.
Trade	International flows of commodities and products via supply chains and markets	South Korea faces significant food security risks from climate impacts on agriculture in other countries due to its low domestic production and high dependency on food imports (over 70%). Those risks could worsen if governments in food-exporting countries increased export restrictions in response to climate shocks.
Finance	Overseas investments – private and public; global insurance; remittance flows.	The U.S. financial services sector invests heavily overseas, linking its future growth prospects to the success of climate adaptation in far-away markets.
People	Human migration; changes in tourism; transboundary human health risks.	Northern European countries could become more attractive summer tourism destinations if southern Europe becomes unpleasantly hot; conversely, depressed economies in southern countries could lead job-seekers to migrate north.
Global security context	Climate impacts on security and conflict, global governance and political stability	Climate impacts could magnify the risks of conflict in sensitive areas such as the Sahel, Middle East, Caucasus and Arctic, changing the feasibility of various adaptation strategies planned by stakeholders in such regions.

An under-explored area

In recent years, many countries in the global North and South alike have made substantial progress in assessing climate risks and planning and implementing adaptation. However, few have explored the international dimension of climate risk. As a result, knowledge of indirect impacts and their implications for adaptation remains limited, and the topic rarely arises in countries' climate policy discussions.

The Stockholm Environment Institute has launched a two-year project, Adaptation Without Borders, that aims to improve our understanding of indirect climate change effects, highlight “adaptation interdependencies” between countries, and begin to explore the implications for adaptation governance and decision-making. As part of that project, we conducted a text analysis of 25 countries' most recent National Communications to the United Nations Framework Convention on Climate Change (UNFCCC), in order to assess whether and how indirect impacts were addressed.¹ Figure 1 shows the frequency of specific keywords, grouped by pathway, across the whole sample. A few keywords dominate the results, primarily related to the trade pathway (e.g. *imports* over 600 times, *exports* and *trade*) and people pathway (e.g. *disease* and *tourism*, each over 300 times). There were very few occurrences of keywords in the bio-physical pathway and global security context.

Figure 2 shows the results per country. Interestingly, there is no clear difference or observable pattern between the different World Bank income groups (which were used to group results), with moderately consistent use of keywords under the trade pathway, coupled with lower frequencies under the people and finance pathways, across all income groups.

Despite occasional references to the potential significance of indirect climate impacts – such as “indirect consequences due to the climatic change in other countries ... are difficult to assess” (Switzerland) – our analysis found that the keywords were generally not used to describe the international dimensions of climate risk. For example, words such as *trade*, *import*, *export*, *investment* and *indirect* tended to appear in descriptions of a country's economic context rather than its climate risk profile. We found isolated examples of references to potential indirect impacts, such as the Swiss one cited above, but none mentioned any specific adaptation measures being taken in response.

To the extent that governments simply followed the National Communications reporting guidelines, however, they would

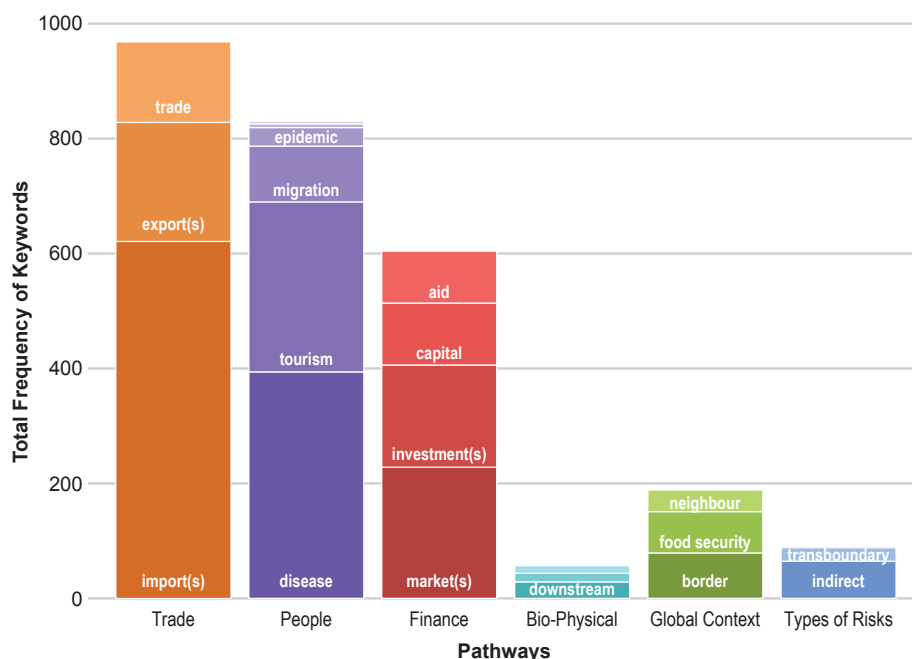


Figure 1: Proportion of keyword frequencies by pathway.

have had no reason to consider indirect impacts or ways to address them. Our review of the current guidance documents found that they neither explicitly require nor exclude the consideration of indirect climate impacts. It is thus important to increase governments' awareness of these indirect risks and of the need to examine their countries' exposure to them.

Learning from others

The poor coverage of indirect impacts in national adaptation strategies does not necessarily mean that there is a lack of tools, evidence or expertise available with which to identify and assess the key risks. In fact, a range of disciplines have recognized the concept of risks being transmitted between locations, in the context of transboundary risks (e.g. Linnerooth-Bayer et al. 2001), corporate and supply chain risk (e.g. Cheng and Kam 2008) and network and systems theory (e.g. Harland et al. 2003; White 1995).

The private sector in particular manages transboundary risks on a daily basis – especially large multinational companies. Large companies also “own” many of the risks associated with indirect climate impacts: for example, businesses control most elements of food supply networks, from production, processing, markets, logistics and retail. Private-sector activity in these areas is thus a matter of public interest. Governments need to gauge the extent to which businesses are aware of and managing these risks, provide incentives for adaptation as needed, and work to ensure that private and public interests are aligned to deliver public goods, such as food security, in both exporting and importing countries, without significant negative side effects. It is also interesting to explore whether there are lessons for public-sector decision makers from private-sector approaches to managing international risks.

The CDP initiative (formerly Carbon Disclosure Project) has examined the extent to which companies already consider climate risks in their supply chains. The Global 500 Climate Change Report 2013 (CDP 2013a), which covers the world's largest companies by market capitalization included in the FTSE Global Equity Index Series, shows 83% of the 389 respondents report physical risks from climate change, with

¹ National Communications are submitted periodically by both industrialized and developing countries, following UNFCCC guidelines, and are posted online, at http://unfccc.int/national_reports/items/1408.php. They thus offer a comparable unit of analysis and are assumed to represent a relatively up-to-date summary of each country's approach to climate change. The analysis focused on two chapters: “National circumstances” and “National adaptation measures”. A detailed description of the methodology and results will be published in a forthcoming SEI Working Paper, to be posted on the project web page: <http://www.sei-international.org/projects?prid=2006> <http://www.sei-international.org/projects?prid=2006>.

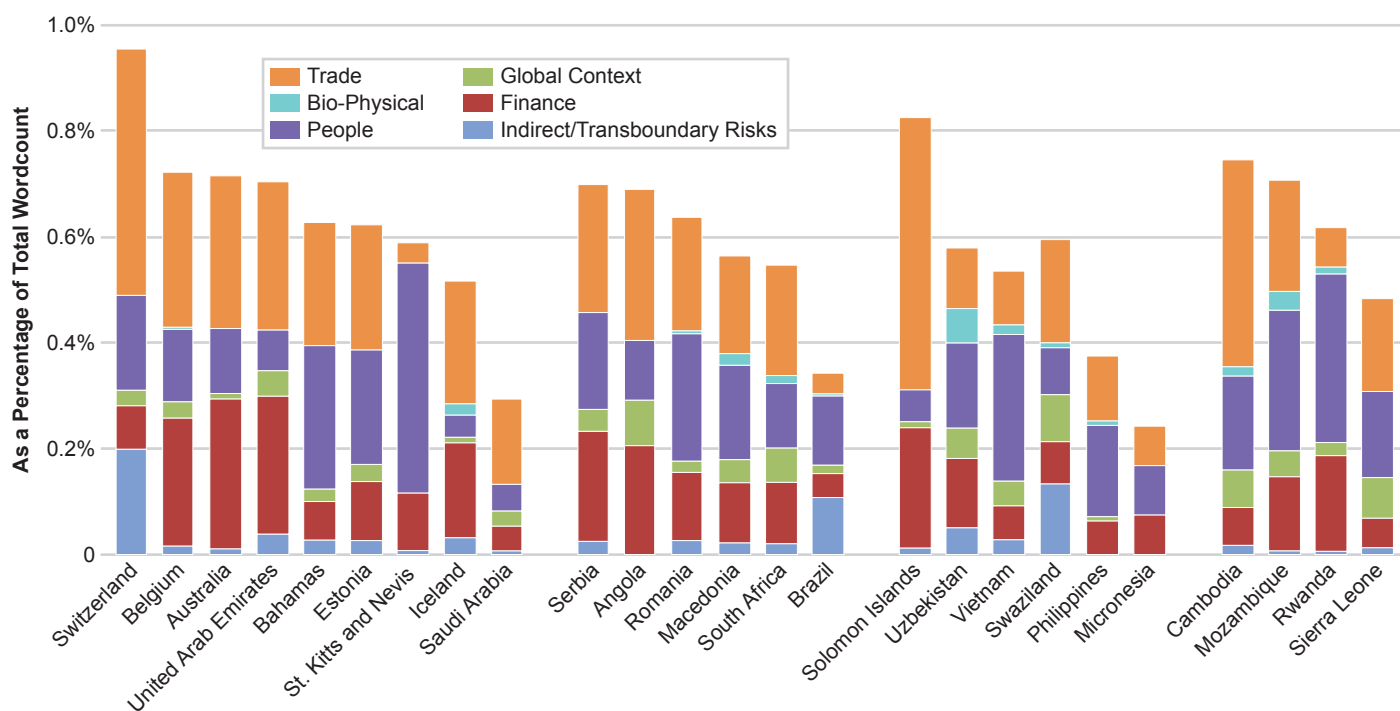


Figure 2: Keyword frequency (as a percentage of total word count) by country, organized in World Bank income groups, from left to right: high income, upper middle income, lower middle income and low income.

changes in precipitation extremes and droughts identified as the biggest physical risks.

The CDP Supply Chain Report 2012–13 (CDP 2013b), meanwhile, which covers members of the CDP Supply Chain Program, finds that 32% are *already* feeling the impact of precipitation extremes and droughts, and another 19% expect to feel it within 1–5 years; such events can reduce or disrupt production capacity (44%), increase operational costs (31%), and even leave some companies unable to do business (11%). In addition, more than half of respondents ranked water-related supply chain risks as either high or medium – yet 19% said their suppliers were unaware of those risks, and another 38% said their suppliers are aware but not actively addressing them. Overall, while 90% of respondents identified physical risks related to climate change, only 45% of suppliers did.

While in many ways, companies are well-equipped to adapt to indirect impacts, they do face barriers, and they may also choose to adapt in ways that negatively affect the wider public – for example, by securing scarce water resources at the expense of local people and ecosystems. The latter is another aspect of transboundary climate risks: the role of foreign actors in increasing or decreasing vulnerability. Governments in the countries where the risks occur play a crucial role in ensuring that private adaptation is aligned with the public interest, but officials in the countries where the companies are based may also want to get involved, to ensure that private-sector actions do not undermine public-sector policies and investments (e.g. via official development assistance).

Through research under the MISTRA-SWECIA programme,² SEI is working with businesses to understand how existing processes, such as enterprise risk management, business continuity planning and supply chain sustainability initiatives, are or could be used to identify and assess climate-driven supply chain risks that originate in other countries. In addition,

the Adaptation Without Borders project will explore how decision-support tools used in other commercial or sectoral disciplines, such as scenario planning and various modelling techniques, could be used to help both the public and private sectors make sense of indirect climate risks in the face of a highly uncertain and dynamic future.

Adaptation Without Borders: A UK case study

The UK is widely seen as a leader in adaptation. Last year, it completed its first formal national Climate Change Risk Assessment (CCRA), which reviewed the evidence for more than 700 potential impacts and identified adaptation priorities (Defra 2012). The CCRA did not consider the international dimension of climate risk – a weakness that has been noted in independent evaluations (Wilby 2012; Watkiss and Hunt 2012). However, two other studies have examined indirect impacts: one commissioned by the UK Department for Business (Foresight International Dimensions of Climate Change 2011), and another commissioned by the UK Department for Environment, Food and Rural Affairs (PwC 2013). The latter, which aimed to “fill the gaps” in the CCRA, addressed five themes – business, infrastructure, food, health and foreign policy – and found that indirect impacts are likely to be “an order of magnitude” larger than domestic (direct) effects for some thematic areas.

The PwC report was also intended to inform the UK’s National Adaptation Programme (NAP – Defra 2013). Yet despite the PwC report’s broad coverage, the NAP only addresses international climate change issues in the section on business,³ assigning relevant tasks to different departments:

- Department for International Development (DfID) and Foreign and Commonwealth Office (FCO): monitor risks to UK interests overseas; supplement existing analysis to inform UK humanitarian, development and foreign policies.

² See <http://www.mistra-swecia.se>.

³ Specifically, Objective 25 on opportunities and Objective 26 on supply chain risks.

- FCO: Use PwC report to support international influencing strategy, including in the United Nations Framework Convention on Climate Change (UNFCCC) process.
- UK Trade and Investment with Defra, FCO, and Department for Business, Innovation and Skills (BIS): Promote and facilitate international opportunities for UK companies.
- Environment Agency with BIS: Encourage supply-chain resilience in the business sector.

As part of the Adaptation Without Borders project, we have conducted interviews with government officials and independent experts in the UK. We found that awareness and enthusiasm for tackling the international dimensions of climate risk and institutional remits differ considerably among departments. While some government departments are engaged, largely as a result of recent studies, gaps remain in the UK government's approach to these issues. This raises a number of questions that we aim to address in the next stages of our case study:

- Whose responsibility is it to identify, assess and manage indirect impacts?
- Is the evidence base sufficiently robust to warrant government action?
- How can research and climate risk analysis improve to provide decision-makers with useful and usable data on the international dimensions of climate risk?

Meeting decision-makers' needs

Our research to date suggests that in order to improve the consideration of indirect impacts in adaptation planning, decision-makers need conceptual clarity, helpful advice and an improved evidence base. The Adaptation Without Borders project will work to meet those needs by:

- Introducing a conceptual framework that adds clarity and helps decision-makers to identify significant potential impacts;
- Reviewing the approaches and methodologies that can be used to support assessments of indirect impacts, including methods that are not currently in the conventional adaptation toolkit (e.g. supply chain risk assessment, general computable equilibrium modelling, and scenario analysis);
- Analysing the governance implications of adaptation without borders, such as how responsibility for owning and managing indirect impacts might best be shared across government departments and with the private sector, donor agencies/recipients and other stakeholders.

We believe this project could also help bridge the gap between industrialized and developing countries in the UNFCCC negotiations, by highlighting the extent to which climate risks in any one place can affect the rest of the world. Greater awareness of shared risks could strengthen the case for coordinated global action to both mitigate and adapt to climate change, and show how it may well be in wealthier countries' self-interest to support adaptation in poorer and more vulnerable countries.

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This discussion brief was written by Magnus Benzie, Oskar Wallgren and Marion Davis, as part of the SEI project Adaptation Without Borders (<http://www.sei-international.org/projects?prid=2006>).

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