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Cascading climate risks:
Towards adaptive and
resilient European Societies

Cascading climate risks: strategic recommendations for European resilience

Ruth Townend, Chris Aylett and Magnus Benzie
November 2023

About CASCADES

CAScading **C**limate risks: towards **Ad**aptive and resilient **E**uropean **S**ocieties

This report is a deliverable of the CASCADES project, which ran from September 2019 until December 2023, funded by the European Union under Horizon 2020 (Grant Agreement 821010). The Potsdam Institute for Climate Impacts Research (PIK) coordinated a consortium of 12 partners from across Europe with expertise on climate change, foreign policy, trade, finance, development and policy and stakeholder engagement.

The CASCADES project has produced in excess of 50 deliverables, more than 30 journal articles and several policy briefs and communication products such as videos, podcasts, policy simulations, serious games and other resources. For more information see the project website: www.cascades.eu.

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Front cover: an aerial view of a flooded district just outside Bangkok, Thailand, on 7 November 2011. Thailand experienced the longest duration flooding event in its recorded history, causing the closure of seven major industrial parks and thousands of factories supplying key components to the car and electronics industries, with knock-on supply chain disruption for European manufacturers. Photo: Copyright © Paula Bronstein/Getty Images.

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Acknowledgements

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Executive summary

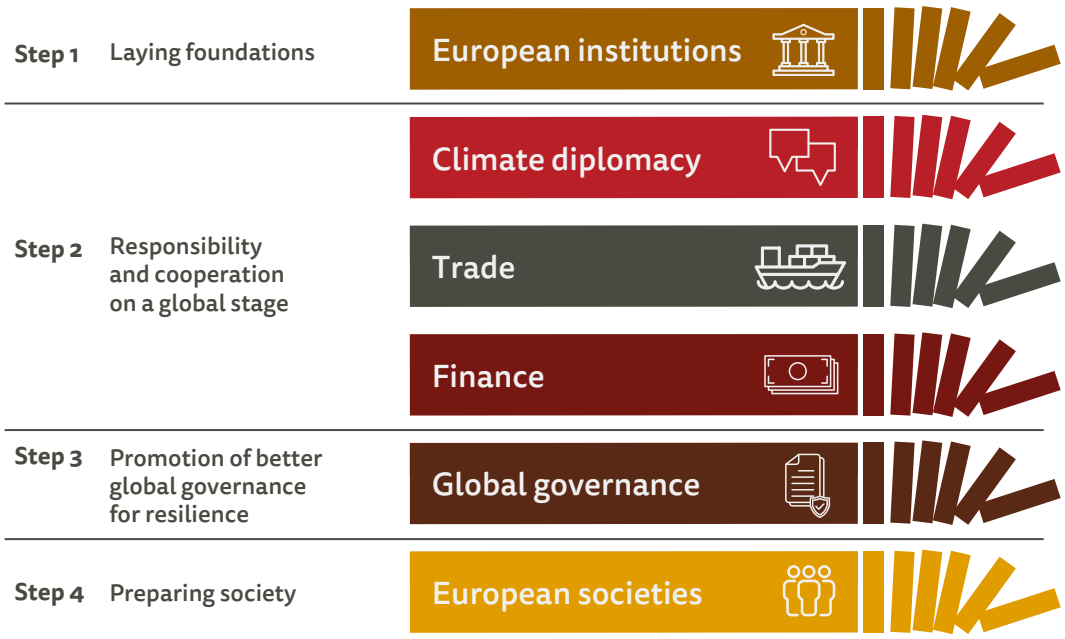
Direct climate change impacts such as increasing heatwaves, floods and wildfires pose a serious risk to European societies. Impacts beyond Europe's borders, in countries with less capacity to prepare, respond and adapt, will be even greater.

'Cascading climate risks' connect European and wider vulnerability, as climate hazards in remote locations create knock-on impacts that spread across borders and through systems, affecting European societies and economies. Europe's exposure to cascading climate risks increases if countries, communities and companies outside the European Union (EU) do not have the capacity to prevent initial climate impacts from escalating and propagating.

Cascading climate risks are, as yet, little understood and seldom assessed or managed. This is extremely dangerous. Such risks will only grow in coming years. This report therefore recommends how European stakeholders, particularly the EU, should respond across policy domains, scales and systems.

To meet the cascading climate risk challenge, a stepwise approach to implementing the recommendations is needed. This summary suggests how this might proceed, to enable European institutions and policymakers to hardwire consideration of cascading climate risks into policies and processes. It moves from the level of individual understanding, through institutional change, to systemic transformations.

Figure 1. A stepwise approach to implementing the recommendations



Step 1: Laying foundations

The European Commission must **build a European Civil Service fit for the cascading climate risk challenge**, increasing the capacity of staff and institutions to understand and manage cascading climate risk.

This process will require effort and commitment, but is not without precedent. The COVID-19 pandemic, the response to Russia's invasion of Ukraine, and the subsequent war and cascading impacts, are case studies of inter-service cooperation, responsiveness and flexibility in the face of systemic crises. In approaching cascading climate risks, the EU can learn from these experiences.

There are limits to the predictability of cascading climate impacts, but much more can be done to **build understanding (Rec 1.1)**, including identifying the cascades the EU faces and perpetuates, and those that are initiated within its borders. By building cascade identification into risk assessment practices, and taking steps to better map cascading climate risk, the EU can be better prepared to **establish risk ownership (Rec 1.2)**, **allocate resources and measure success (Rec 1.3)**. Eventually, countries will need to develop a 'whole-of-government' approach for cascading risk ownership. Wider stakeholders in cascading climate risks, including in the private sector and civil society, will also need to continuously and effectively engage in cascading risk management.

The **development of a risk and resilience mindset (Rec 1.4)** across EU institutions will have wider benefits for Europe. Cascading risk, including from non-climatic shocks, will become an increasingly common challenge for policymakers in an interconnected and potentially resource-strained world. As an acknowledged risk amplifier, climate change and its effects will play a role in many of these risk cascades. The capability to understand and manage cascading risks will only become more important in years to come.

Step 2: Responsibility and cooperation on a global stage

No country, region or sector can govern cascading climate risks alone; yet cascading climate risks must be better governed if resilience is to be achieved. The EU must therefore effectively deploy **climate diplomacy and foreign policy for European resilience** to cascades. At the same time, the EU must demonstrate commitment and investment by **making trade and financial flows work for resilience, not against it**. Through combining direct investments with more just, fair and resilient financial and trade flows, the EU can pull more forcefully in the direction it will need to go.

The EU will need to build its capability to deploy **external action for coherence and efficacy**. A first step in this will be to **meet and exceed adaptation finance commitments (Rec 2.1)** combined with **increased technical assistance and political engagement with partner countries (Rec 2.3)**. Recognizing the shared, though not equal risks and opportunities stemming from cascading climate risks, the EU must effectively contribute to the resilience of low- and middle-income countries. This means meeting existing climate finance and official development assistance (ODA) spending commitments, and ambitiously ramping up adaptation support and finance. This is both in the EU's self-interest, and for the global public good.

It is possible to build resilience with one hand, while undermining it with the other. Inter-service cooperation is therefore needed to **improve policy coherence to avoid harm and harness synergies (Rec 2.2)**. The need to improve policy coherence is relevant not just to development policy, but also wider foreign policy and security actions, and through trade and financial activities. Such an approach would enable the EU to iteratively **cooperate, lead and build trust within the international system (Rec 2.4)**, by demonstrating its firm and ongoing commitment to EU and wider resilience to cascading climate risks.

Trade

If a more strategic approach is taken, trade can both support and benefit from resilience. As a first step towards this, it will be necessary to **formulate a trade resilience strategy for Europe (Rec 3.1)**. Such a strategy would enable a move away from narrow cost reduction/profit maximization motives and towards an approach that supports wider societal objectives and global goods via trade policy. Countries will need to balance investment in long-term, stable trade partnerships with flexibility to maximize resilience to shocks and dynamic responses in a more volatile world of cascading risk. As part of this, the EU would need to **expand the scope of the Critical Entities Directive (Rec 3.2), support and facilitate supply chain 'restructuring' (Rec 3.3)** and **improve risk data and disclosure (Rec 3.4)**.

Finance

Financial institutions and actors need to better understand and manage climate risks which cascade within financial systems. **Enhancing cooperation, communication and disclosure (Rec 4.1)** and action to **reform risk assessment and monitoring approaches (Rec 4.2)** will enable cascading climate risk to be priced. This, in turn, will incentivize investments in adaptation and shift the dial on which projects are considered 'risky'. These changes support proper allocation of funding for climate action and adaptation, bolstering the contribution of private finance and better enabling the EU to **mobilize innovative European finance for widespread resilience (Rec 4.3)**.

Such changes would enable both public and private finance to fulfil their crucial roles in achieving global climate action. This requires unprecedented levels of investment in adaptation, and financial commitment to building widespread resilience.

Step 3: Promotion of better global governance for resilience

Action by the EU to build its own capabilities on cascading climate risks, and concrete assumption of responsibility and cooperation on the global stage will give the EU much-needed credibility and legitimacy in working to promote better global governance for resilience.

Countries across the world need to take steps to both lead and cooperate for better governance of cascading risks, with high-income countries acting in a spirit of solidarity with low- and middle-income countries, based on an acknowledgment of deep interdependence. Tracing and acknowledging the

threads of cascading climate risks through globalized systems will transform the incentives for high-income actors, including the EU, to engage in global efforts to combat and address climate change-related risks.

There is much to be learned about cascading climate risks, and how they should best be addressed. As learning advances, knowledge, skills and best practice should be shared within and across sectors and borders. Development of 'seats' of resilience leadership in government, the private sector and in civil society should be to the benefit of all stakeholders who will be affected by cascading risks, including those initiated and exacerbated by climate change. By considering the implications of the CASCADES project, and supporting the wide dissemination of CASCADES findings, the EU is taking a first step towards this.

Leadership for effective cascading climate risk management will need to **champion global governance that is fit for cascades (Rec 5.1)**: in essence, multilateral, inclusive, rules-based global governance with the aims of justice, sustainability and resilience.

To achieve these aims, the EU would need to **support reform of international structures (Rec 5.2)** through concerted efforts, strategic vision and persistent diplomacy. Cascading climate risks are shared, though not equally, and their management requires good faith engagement and redoubled commitment to building, rather than diminishing global trust and cooperation. This will come at a price and require compromise on behalf of the EU and its member states; but it is an investment that will rapidly pay dividends.

The EU needs to **give climate security a home (Rec 5.3)**. This will help the Commission to build a collective and cooperative approach to managing climate-related security challenges. Avoiding the securitization of resilience can help to avert the possibility of destabilizing and reactive responses, which are likely to create traps and negative cascading feedback loops for the EU.

Step 4: Preparing society

The role of society in cascade management and response cannot and should not be ignored or treated as an afterthought. Businesses, local governments, civil society organizations and individuals will all be affected by cascading risks. All will play a crucial role in ensuring society's resilience. Cascading climate impacts have the potential to increase inequality, impact political stability, feed extremism and destabilize societies. Preparedness across society should therefore be a key pillar of the EU's approach.

In the face of increasing cascading climate risk, the European Commission should proactively work with member states to **engage and support wider society (Rec 6.3)**. Reactive approaches are likely to decrease political capital to effect necessary changes. It will be important to provide technical support to member states in **developing resilient local economies and communities (Rec 6.1)** and to support member states to **reduce social inequality and strengthen cohesion (Rec 6.2)**.

European resilience will depend on having informed, thriving societies, with sufficient political and social capital to endure shocks and participate in adaptation.

Table 1 summarizes the recommendations in this report. More details on each individual recommendation can be found in the corresponding chapter.

Summary of recommendations by report chapter

European institutions

The EU needs to organize itself internally to be fit to handle the complex challenge of adapting to cascading climate risk.

Recommendation 1: Build a European Civil Service fit for the cascades challenge

1.1 Build understanding of cascading climate risks

1.2 Establish risk ownership

1.3 Allocate resources and measure success

1.4 Develop a risk and resilience mindset

Climate diplomacy

Coherent external action by the EU will facilitate the type of mutually beneficial partnerships that Europe needs to reduce vulnerability to cascading climate risk globally.

Recommendation 2: Promote widespread resilience through external action

2.1 Meet and exceed adaptation finance commitments

2.2 Improve policy coherence to avoid harm and harness synergies

2.3 Increase technical assistance and political engagement with partner countries

2.4 Cooperate, lead and build trust within the international system

Trade

The fragility of European supply chains trade is becoming apparent; the EU needs a trade system that builds and benefits from resilience.

Recommendation 3: Take a strategic approach to resilient trade

3.1 Formulate a Trade Resilience Strategy for Europe

3.2 Expand the scope of the Critical Entities Directive

3.3 Support and facilitate supply chain 'restructuring'

3.4 Improve risk data and disclosure

Finance

The low carbon transition already under way in the finance sector must also deliver resilience to cascading risks – public and private finance each have important and complementary roles to play.

Recommendation 4: Promote transparency and accountability for broad resilience

4.1 Enhance cooperation, communication and disclosure

4.2 Reform risk assessment and monitoring approaches

4.3 Mobilize innovative European finance for widespread resilience

Global governance

Achieving resilience in Europe depends on whether the EU can navigate challenging geopolitical headwinds and re-establish its legitimacy and influence as a trusted leader on the global stage.

Recommendation 5: Lead and support global governance of cascading climate risk

5.1 Champion global governance that is fit for a world of cascading climate risks

5.2 Support reform of international structures

5.3 Give climate security a home

European societies

Individuals, communities, businesses and civil society must be prepared for disruption and be capable of contributing to resilience.

Recommendation 6: Support strong societies for cascade resilience

6.1 Develop resilient local economies and communities

6.2 Reduce social inequality and strengthen cohesion

6.3 Engage and support wider society

About this report

This report describes a set of 21 strategic recommendations on how to build resilience in Europe and globally to cascading climate risks. These recommendations are the result of a process of identifying, testing and refining messages from the research undertaken by project partners during the four years of the CASCADES project (see inside cover).

An initial list of 300 recommendations was identified from more than 50 documents produced by consortium partners. Recommendations were then grouped by policy domains, synthesized and prioritized during several engagement exercises with stakeholders and consortium experts during 2022 and early 2023, including workshops and interviews. The final list of 21 recommendations seeks to combine impactful, realistic near-term priorities with more transformative medium-term actions. For more information about this process, see the Methodology section of the Appendix.

How to read this report

The **Introduction** explains what cascading climate risks are and why they are of concern to European decision-makers. It defines 'resilience' and briefly covers the geopolitical significance of meeting this challenge.

The first chapter describes the breadth of **European policy domains that are subject to cascading climate risks**. This section highlights the ways in which different departments and executive agencies in the European Commission may be implicated. Archetypical cascading risks are summarized for 'foreign policy, security and development', 'international value and supply chains' and 'business and finance': the key pillars that were explored by research in the CASCADES project.

Recommendations are then presented in six clusters, each addressing a specific aspect of European resilience. Readers interested in a specific policy field or topic can go directly to the relevant section:

- European institutions
- Climate diplomacy
- Trade
- Finance
- Global governance
- European societies

Each cluster provides a contextual overview before describing an overall recommendation, which is supported by three to four more detailed recommendations. These are followed by a summary of **What is at stake?** as well as a list of **related CASCADES resources** that readers should consult for more details, analysis and evidence supporting each set of recommendations.

At the end of the report readers can find an introduction to a **policymakers' toolkit** comprising resources from the CASCADES project, including conceptual frameworks and serious games. We hope this provides a useful springboard for interested readers who have been motivated and engaged by the recommendations to begin implementing their own measures towards achieving resilience in Europe and beyond.

The report closes with some **conclusions**, including a list of universally applicable **foundational principles** for resilience to cascading climate risk.

The report's **Appendix** signposts the rich resource of other CASCADES project outputs, offers a detailed description of the methodology used to develop these recommendations, and provides further details of the current coverage of cascading climate risks in European policies and strategies.

Introduction

How are climate change impacts affecting Europe?

Climate change is a defining challenge for Europe and the world. Since the Industrial Revolution, a development pathway built on a foundation of fossil fuels has raised living standards and created prosperity for many. The burning of fossil fuels is also responsible for rising average global temperatures, with the last eight years being the warmest on record (C3S, 2022).

Globally, July 2023 was the hottest month on record (C3S, 2023). In Europe, multiple temperature records were broken as countries across the continent, particularly southern European countries such as Italy and Spain, were affected by an unprecedented and sustained heatwave. The worst of several wildfires in Europe took place on the Greek island of Rhodes, ravaging more than 17,000 hectares of forest and farmland and forcing the evacuation of around 20,000 tourists. In 2021, climate change contributed to the deadly flooding in Germany and Belgium, which led to the deaths of 222 people (Kreienkamp et al., 2021).

Direct impacts of this kind are a serious risk to European societies, despite these societies having far greater capacities and resources to prepare for, respond and adapt to such impacts than many regions beyond Europe's borders. A second set of risks, resulting from the knock-on effects of climate impacts in these regions will, however, affect Europe in various ways. We refer to this set of risks as 'cascading climate risks'.

What are cascading climate risks?

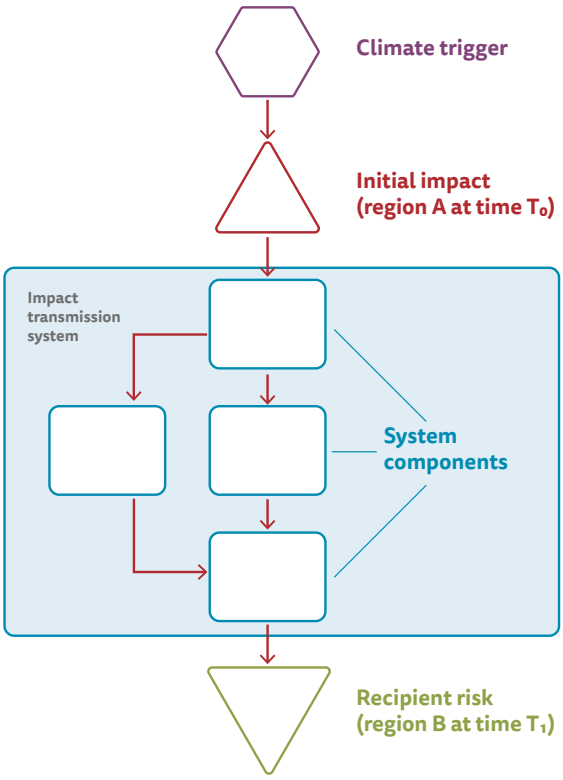
In considering climate change impacts, decision-makers in Europe and across the world tend to focus on 'first order' impacts, such as the heatwaves and wildfires mentioned above. Such impacts occur directly within national borders or regions of responsibility.

In considering climate change impacts, decision-makers in Europe and across the world tend to focus on 'first order' impacts, such as the heatwaves and wildfires

This approach neglects cross-border, cascading climate change impacts. These materialize when initial climate triggers transmit through systems, across sectors and borders. Shocks occurring in remote locations have the potential to severely disrupt societies and economies far away, including in Europe.

A simple example of a cascading climate impact would be flooding in a downstream country caused by melting of glaciers in an upstream country. A more complex example would be the food affordability crisis in Europe, resulting from global food market inflation, caused by drought-induced crop failure in a breadbasket region, co-occurring with the disruption of grain distribution mechanisms resulting from conflict elsewhere in the world.

Figure 2. Transmission of climate impacts across sectors and regions



Source: Carter, T. et al. (2021), *A conceptual framework for cross-border impacts of climate change*, Global Environmental Change, Vol.69

For brevity, 'cascading climate impacts' is sometimes shortened to 'cascades' in this report.

Why should Europe concern itself with cascading climate risk?

Currently, European institutions, much like national governments and wider stakeholders across the world, do not fully grasp the threat of cascading climate risks and are ill-prepared to manage them.

Europe's resilience is tied to the fates of climate-vulnerable regions and communities through its relationships and dependencies within globalized systems. Europe is also bound to such climate-vulnerable regions and communities by its historical responsibility for emissions, its obligations as a responsible global actor, and its partnerships in global resource flows.

Cascading climate risks are inherently more complex than direct climate risks. In focusing primarily on the local and national, governments, businesses and citizens have fundamentally underestimated the size and nature of the adaptation challenge. European stakeholders will need to engage with resilience at systemic and international scales. This is beginning to happen, with the updated EU Strategy on Adaptation to Climate Change in 2021 (EC, 2021a) recognizing that knock-on effects from climate hazards can spill over borders, and that adaptation must go beyond borders to be effective, requiring close ongoing coordination with partner countries.

The existence of cascading climate risk invites countries to recalculate what is in their national interest, and therefore what investments they are willing to make in systemic resilience. The success or failure of adaptation beyond Europe's borders will, because of cascading climate risks, partially determine the level of risk faced in Europe.

If strategic adaptations are made in time, action to address cascading climate risks can present opportunities. Rapid systemic change is needed to prevent and respond to escalating climate impacts. As the Global Stocktake synthesis report states: 'governments need to support systems transformations that mainstream climate resilience and low GHG emissions development... Reaching net zero emissions by or around mid-century and implementing concurrent transformative adaptation requires broad and rapid changes in existing practices.' (UNFCCC, 2023: 4).

Examining the drivers of cascading climate risk reveals the role that policy incoherence plays in creating vulnerability to climate impacts. Addressing these incoherences can reveal opportunities to address some of the world's most complex systemic challenges, including the inequalities and injustices that result from international rules and practices on security, trade and financial markets. Through action on cascading climate risks, decision-makers in Europe and beyond can work to strengthen coherence and cooperation to pursue systemic resilience that delivers multiple dividends for security, sustainability and the well-being of their societies.

What is 'resilience'?

The concept of resilience has been generally understood in an economic/development context as the ability to endure hardship without losing integrity, or to regain or return to an original state following a period of challenge or adversity.

In more recent years, 'resilience' increasingly refers to the capacity of a system to thrive in changing and uncertain conditions:

> ...it involves the capacity to absorb shocks, avoid tipping points, navigate surprise and keep options alive, and the ability to innovate and transform in the face of crises and traps (Rockström et al., 2023).

This more dynamic understanding implies that European resilience to cascading climate risk is contingent upon:

- the capacity to learn from events and about plausible futures;
- sufficiently diverse sources of inputs and resources;
- diverse ways of achieving its objectives (i.e. avoiding over-reliance on systems that might fail);
- strong links and connectivity with other systems, such as countries, supply chains, markets and ecosystems;
- stores and spare capacity to cope with shocks and surprises;
- the stability of Europe's Neighbourhood (the EU's neighbouring regions, both in the south and in the east);
- the capacity to work with other countries and actors and to learn from and influence them effectively;
- methods for including all of society in decision-making and planning to ensure equity.

How does the geopolitical context impact Europe's position?

European policymakers must respond skilfully to the complex challenges posed by cascading climate risk in an increasingly charged and turbulent geopolitical context. No continent is more open and connected to the rest of the world than Europe.[1] This integration brings increased exposure to geopolitical shifts, economic shocks and cascading climate risks. It also brings great potential for leadership in an area of risk where international ties are both source and solution.

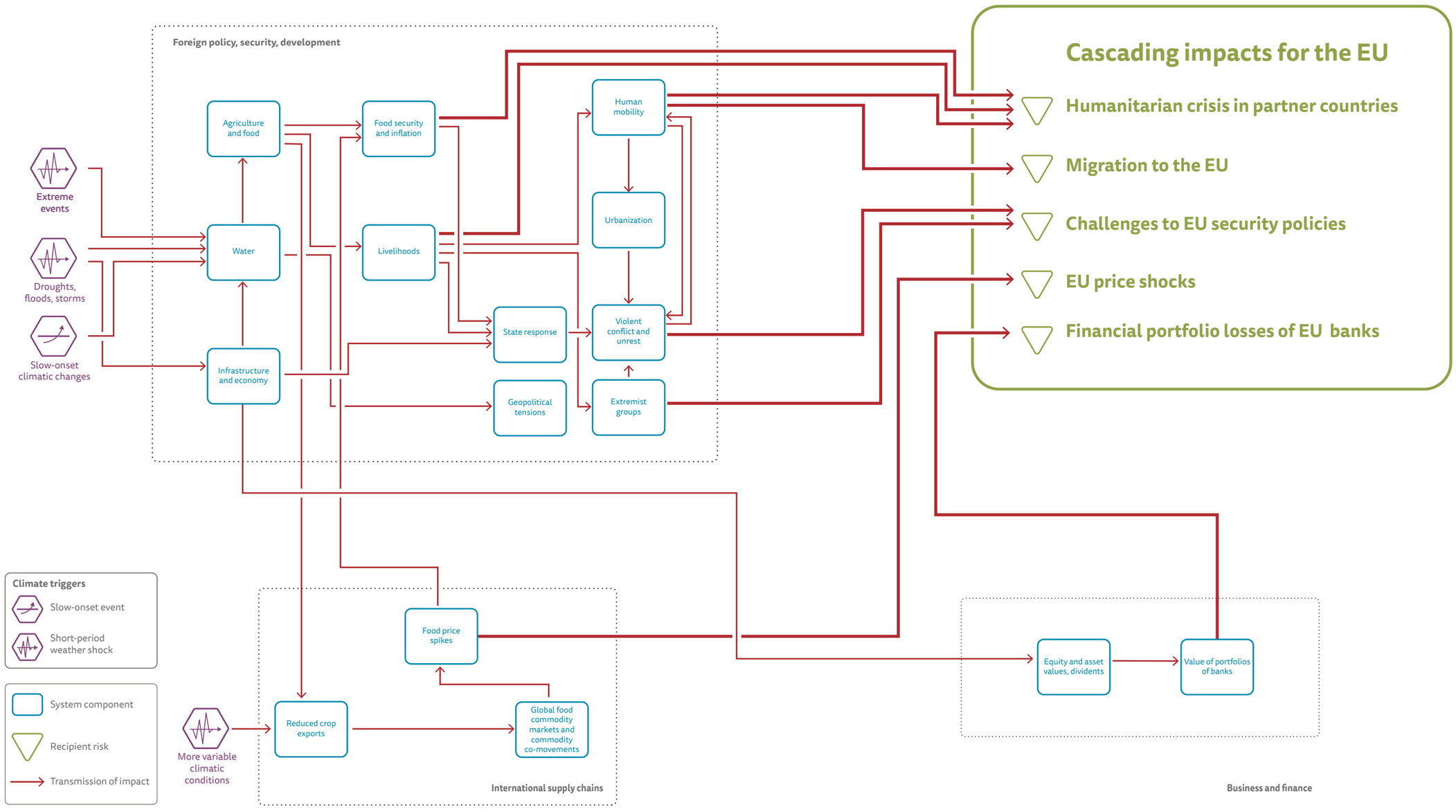
International climate politics and climate action do not occur in a vacuum. The positions taken by governments are inevitably shaped by the broader geopolitical context, narrowing or widening the window of what is possible, constraining or enabling effective action and influence.

As the impacts of climate change become more frequent and severe – and as transition efforts increase – climate politics are likely to exert a growing influence on geopolitics. As the international system undergoes a volatile transformation, as geostrategic decisions interact in unpredictable ways, and as climate politics grow ever more contentious, government policymakers may find that willingness to engage in the deep, multilevel cooperation needed to manage complex cross-border risks is in short supply.

Ukrainian President Volodymyr Zelensky and President of the European Commission Ursula von der Leyen at a joint press conference following the 24th EU-Ukraine summit, on February 3, 2023 in Kyiv, Ukraine.
© Roman Pilipey/Getty images

[1] In the 2022 KOF Globalisation Index by ETH Zurich, European countries occupied 25 of the top 30 positions: see Gygli et al. (2019).

Figure 3. Overarching cascading climate impacts for Europe



Relevance of risk across European policy domains

Figure 3 shows the breadth of different policy domains that can be impacted by remote shocks from climate change. These domains, shown top right, range from humanitarian and development policies, through migration, security and counterterrorism, to price shocks, financial portfolio losses in EU commercial banks, and lower profitability and resilience of businesses in the EU.

The figure outlines archetypal paths for cascading climate risk. An archetype is used because the complexity of real-life cascades can quickly become unwieldy.

Taking the policy domains of **foreign policy, security and development** (top grey dotted box), figure 3 shows how initial climate shocks to ecosystems (the purple hexagons on the left) can impact agriculture, water, infrastructure and the economy (blue boxes). Chains of impact 'transmission' are shown by the red lines, demonstrating how impacts can move through and between systems and sectors. Further blue boxes show factors that can mediate climate impacts, such as 'state response'.

In the absence of resilience and effective mediation, impacts can escalate further, causing – in this archetype – forced mobility and violent conflict and unrest (blue boxes, top centre).

Policy domains that can be impacted by remote shocks from climate change range from humanitarian and development policies, through migration, security and counterterrorism, to price shocks, financial portfolio losses in EU commercial banks, and lower profitability and resilience

Implications of an archetypal cascade in these domains might, for example, require intervention by DG ECHO (European Civil Protection and Humanitarian Aid Operations), DG HOME (Migration and Home Affairs), DG DEFIS (Defence Industry and Space), DG INTPA (International Partnerships), DG NEAR (Neighbourhood and Enlargement Negotiations), FPI (Service for Foreign Policy Instruments), and the European External Action Service (EEAS), the EU's diplomatic arm.

Figure 3 also shows archetypal impacts on **international supply chains** (lower left grey dotted box) from more variable climatic conditions outside Europe. Reduced crop exports can impact global food commodity markets and lead to price spikes. This can in turn can drive food insecurity and inflation outside the EU, with implications for EU development policies, as well as price shocks within the EU itself.

Implications in this domain may require intervention by DG TRADE (the European Commission's trade department), DG CLIMA (Directorate-General for Climate Action), as well as DG AGRI on food exports/imports.

Impacts on **business and finance** are also shown (lower right grey dotted box). Climate impacts on infrastructure and economies outside of the EU can result in reduced equity and asset values and lower dividends, and in turn to financial portfolio losses for EU banks, with policy implications for DG FISMA (Financial Stability, Financial Services and Capital Markets Union), DG ECFIN (Economic and Financial Affairs), and DG BUDG (Budget).

Protestors pushing symbolic empty shopping trolleys lead a demonstration against rising food costs and energy bills in Rome, Italy in October 2022. Photo: © Stefano Montesi/Getty Images.

European institutions

The EU needs to organize itself internally to be fit to handle the complex challenge of adapting to cascading climate risk.

Fragmented responsibilities around risk

The European Union and its member states are currently ill-prepared to meet the challenge of cascading climate risk. Risk management is limited and siloed and is given little political priority. Concerted effort is needed to build recognition of cascading climate risks, and to ensure the European Civil Service is fit for the cascades challenge. As part of these efforts, aspects of the EU institutions and how they work together will need to be transformed.

EU institutions need to be equipped with the capability to build resilience to current and future risks through a concerted, coherent and strategic approach. Resources are needed to build understanding of and capability for cascades management. The EU institutions then need to clearly define and assign risk ownership and set measures of success for cascading climate risk governance.

Within the European Commission, the Directorate-General for Climate Action (DG CLIMA) is responsible for formulating and implementing climate policies and strategies. In addition to crisis response, the Directorate-General for European Civil Protection and Humanitarian Aid Operations (DG ECHO) is charged with disaster prevention and preparedness, which encompasses climate adaptation and resilience measures in Europe and beyond.

Other DGs are responsible for managing risks within their remits. Risk assessments are performed at project and programme level. They do not cover cascading climate risks as standard, and seldom reference or engage with risks within the remits of other DGs. While broader risk assessment exercises do exist, these may not always include climate risks explicitly, and are not currently set up to cover cascading climate risks.

DG CLIMA and the European Environment Agency are co-leading the first European Climate Risk Assessment (EUCRA), with implementing partners including the Joint Research Centre and the Copernicus Climate Change Service. EUCRA will focus specifically on cross-border, cascading and compound climate risks, and is due for publication in the first half of 2024. This assessment should help support the coherence and cross-DG working needed to manage cascading climate risk.

Other external instruments can be used as part of the EU's response to managing these risks. For example, the new Neighbourhood, Development and International Cooperation (NDICI) Global Europe instrument merges various external financing instruments to help the EU achieve its international commitments, including those related to climate change. Additionally, the EU's new Global Gateway strategy aims

to balance similar initiatives by other major powers to support investment into sustainable infrastructure in line with the EU's global commitments, such as the Paris Agreement. While adaptation and resilience are reflected in these instruments, cascading risks are not, as yet.

Recommendation 1. Build a European Civil Service fit for the cascades challenge

Institutional capacity for resilience to cascading climate risks can be built in at least two ways. First, individuals and teams working inside EU institutions should be equipped with the appropriate:

- knowledge: for example, of what cascading climate risks are and potential responses;
- tools: to support risk mapping and governance;
- skills: to embed risk and resilience thinking in their work.

Second, institutional structures need to develop in ways that are conducive to strategic, coherent risk management. This will require some level of institutional reform to overcome the current limited and siloed approach to climate risk.

The European Commission's 2020 Strategic Foresight Report identified 'resilience as a new compass for EU policies' (EC, 2020). While resilience is gaining prominence as a European concern, this aim has not yet been realized. The EU will need to go still further, for example by reviewing existing policies and meaningfully mainstreaming resilience in policymaking. Tackling cascading climate risk will require resilience to be made a guiding tenet, central to European Commission policymaking and implementation across all sectors.

The EU will need to go still further, for example by reviewing existing policies and meaningfully mainstreaming resilience in policymaking

Responses to COVID-19 and the Russian invasion of Ukraine have demanded rapid, cross-departmental responses from the EU, and provide lessons for how European institutions might break silos and work coherently on common, multifaceted challenges. Cascading climate risks will demand that this type of cross-institutional response from the EU, member states and all planning entities in Europe becomes entrenched and commonplace. Essentially, a 'whole-of-government' approach (EC, n.d.a) to resilience needs to become business as usual.

Recommendation 1.1. Build understanding of cascading climate risks

While there are limits to the predictability of such complex impacts, much more can be done to identify and map cascading climate risks. The EU and member states must be informed and transparent about the cascading climate risks that travel through and end in their own territories, as well as those that are initiated within the EU.

New and updated tools and approaches are needed to enable this, including:

- Imperatives to consider and include cascading climate risks as part of procedural risk assessment practices.
- Proactive identification and mapping of cascades, for example, by drawing on the CASCADES Conceptual Framework and Response Framework (see CASCADES Resources).
- Stress-testing all major EU Directives and Strategies against shocks from cascading climate risks. This is a task that could be undertaken by the Vice President in charge of Strategic Foresight.
- Updated National Adaptation Plans (NAPs) to clearly identify and describe potential cascading climate impacts that might begin, travel through and end in EU and member state territories. Communication of these cascades to the stakeholders they are likely to affect, both within and beyond national borders, will then be needed.
- Via Climate-ADAPT, existing risk management tools (for example, the Adaptation Support Tool[2]) should be updated to account for cascades. New guidance should be issued for adaptation planning in non-traditional policy domains such as trade, security and finance. This guidance should encourage users to identify cascades and allocate responsibility for their management (see Rec. 1.2: Establish risk ownership). This ownership needs to focus on convening and coordinating stakeholders in risk, rather than creation of yet more silos.
- Make resilience a key criterion in EU policy impact assessment.

Recommendation 1.2. Establish risk ownership

Once risks are better known, they must also be owned. Specifying 'risk owners' encourages accountability and enables convening and coordinated involvement of the many departments and teams implicated in individual cascading climate risks.

- DG CLIMA and DG ECHO should collaborate to provide strategic leadership on cascading climate risks, and should play a more prominent strategic role. These DGs should co-lead to coordinate action and stipulate overarching 'risk owners' at DG and inter-service levels to manage and respond to specific cascades. For example, ownership of climate risks to critical supply chains should be assigned to a specific unit in DG TRADE, and so on.
  - The results of the EU Climate Risk Assessment (EUCRA) and similar assessments should be used to inform allocation of risk ownership.
  - Recognition of 'ownership' should be flagged in forthcoming iterations of each DG's Strategic Plan.
- A new interservice 'Resilience Agenda' should be developed and assigned to a relevant Commission Vice President (VP). The responsible VP should set out options for structural or procedural reform to clarify and elevate the resilience agenda within the Commission.
- Implementation of the EU Adaptation Strategy should become a political priority for the next Commission.

[2] See Climate Adapt's Adaptation Support Tool at: https://climate-adapt.eea.europa.eu/en/knowledge/tools/adaptation-support-tool/index_html.

- Cascading risks should be acknowledged by the European Council through Council Conclusions on cascading climate risks. A Council resolution can set out future work foreseen and invite the Commission to make a proposal or take further action (Council of the European Union, n.d.).
- The need for ownership should feature in the European Council Strategic Agenda 2024–2029.
- The EU must work towards a 'whole-of-government' approach to cascading climate risk. This should enable work across policy domains, stakeholders and governance levels. This approach should be reflected in corresponding institutional restructuring at member state level.
- Carry forward and enhance commitments to future generations in EU Missions for the next Commission mandate. Cross-cutting commitment to future generations across the decisions of EU DGs, as seen across public bodies in Wales under the Well-being of Future Generations Act 2015, would help to embed a long-term resilience perspective in policymaking.

Recommendation 1.3. Allocate resources and measure success

Resilience cannot be built without the necessary resources and metrics for success:

- The 2028–2035 Multiannual Financial Framework should clarify the resilience budget. If this were to align with global aims for climate finance, 50 per cent of climate investment would need to be devoted to adaptation. Given the cascading nature of climate risk, it would be important for some of this investment to happen outside Europe's borders, bolstering resilience in ways that reflect and strengthen Europe's international role.
- The EU could lead by example on adaptation reporting under the second Global Stocktake, by setting its own indicators for building domestic and global resilience to cascades.
  - Define resilience targets for each cycle of the Global Stocktake (2028, 2032, and so on) and under the EU Adaptation Reporting framework, articulating how to assess:
    - resilience gains in Europe to cascading climate risk;
    - how the EU's own adaptation contributes to resilience beyond the EU's borders.

Recommendation 1.4. Develop a risk and resilience mindset

Cascading climate risks are complex and systemic, and those dealing with them need the skills to think in complex, systemic ways. To prepare for increasing cascades, 'risk and resilience thinking' needs to become both a basic competency and a leadership skill.

- Climate change should be approached as a generator and amplifier of systemic, rather than localized, risk, with limited predictability.
- The Horizon Europe programme for research and innovation should continue to support research on cascades. Experts from regions linked to Europe by cascading climate risks – both inbound to and outbound from Europe, and regions otherwise likely to experience transition impacts from European action to reduce or manage cascading climate risks – should be integral to consortiums, bringing their perspectives on risk and resilience.

- More diverse decision-makers should be brought into adaptation processes relating to cascades at an early and formative stage. This should include representatives of EU regions and local authorities via the EU Mission on Adaptation to Climate Change, and from beyond Europe via existing international partnerships. Examples could include EU–African Union (AU) exchanges on climate change via the EU–AU Summit and other diplomatic channels, as well as global forums such as the UNFCCC Adaptation Committee.
- Risk and resilience thinking should be included in the European Civil Service competencies for policy and programme management roles, and at the core of leadership development programmes. This needs to include development of the capacity to learn as a system unfolds, changes, or is challenged, and as system dynamics emerge.
- Cascading climate risks should be integrated into the activities of the Union Civil Protection Knowledge Network.
- Risk and resilience should be made a central focus of the European Skills Agenda 2025–2030.

Institutional arrangements for resilience

Difficulties faced by national governments, regional blocs and the international communities in adequately responding to mounting, interlinked global crises has sparked debate* about the institutional arrangements that are needed to build resilience. Many global institutions, such as the UN Security Council, or the Bretton Woods institutions, reflect post-war geopolitical dynamics that have since changed radically. Furthermore, the nature of systemic risk in the 21st century differs significantly from challenges faced in the mid-20th century. The risks of financial contagion, biodiversity collapse, unregulated artificial intelligence, cybercrime, pandemics and climate change require a coordinated approach. Particularly when interlinked, such risks might not fit easily into the remit or field of expertise of single government departments. These risks are also 'external', arising outside national borders and government structures, and there is limited predictability and finite potential to control them.

Two potential approaches to increase institutional preparedness for such risks are:

- **Mainstreaming governance** of cascading climate – and other – risks into existing sectoral policies – for example, health plans that prepare for pandemics, trade strategies that build resilience to external shocks;
- **Institutional reform** that creates new structures and mandates to lead and coordinate the process of building institutional resilience to cascades.

This report focuses on processes for mainstreaming governance of cascading climate risk, as recommendations developed by the CASCADES project tended to fall within this approach. An alternative approach would be the creation of new institutions to lead cross-sectoral resilience planning in response to multiple threats or crises. 'Ministries of Resilience' at national level, for example, might cover: strategic foresight of new risks and updates to national systemic risk registers; crisis response across multiple and interlinked threats; strategic resilience-building at home and abroad; and coordination of the resilience agenda across government. In the European Commission, an equivalent would be a new DG RESILIENCE.

Coordinated investment and cooperation at an international level might be achieved through convening Ministries of Resilience via a Global Resilience Council. Such a structure might provide support to systemic resilience-building and offer a counterpoint to trends towards fragmentation and zero-sum approaches to risk and resilience governance at the international level (FOGGS, 2022).

New institutions, however, might serve to reinforce or create new silos, especially if politically weak and unable to work effectively across government. Institutional reform would be helpful and necessary only if it strengthened, centralized and networked – rather than fractured – the governance of resilience.

*For example: Karlsson-Vinkhuyzen and Dahl (2021); World Economic Forum (2023); Boyd and Wilson (2021); UK Parliament (2022).

What is at stake?

In an increasingly unstable geopolitical context, failure to mainstream resilience and reform institutional risk governance within the EU will leave Europeans exposed to a wide range of cascading risks, including those which do not have climate triggers at their origin. Opportunities will be missed for proactive, early, strategic interventions which could prevent harm and disruptions to European societies. It is not always possible to quantify the severity and probability of cascading climate risks and the cost of managing them as they unfold, due to their complexity (Quiggin et al., 2021). However, the economic and social costs are likely to far outstrip the costs of strategic adaptation and resilience-building.

Without changes to institutional governance for resilience, the EU will struggle to achieve its aims of contributing to peace, security and sustainable development, solidarity and mutual respect among peoples (European Union, n.d.).

Related CASCADES resources

- Detges, A. and Foong, A. (2022), *Foreign Policy Implications of Climate Change in Focus Regions of European External Action*, https://www.cascades.eu/publication/foreign-policy-implications-of-climate-change-in-focus-regions-of-european-external-action
- Knaepen, H. and Vajpeyi, I. (2022), *European responses to transboundary climate impacts and insecurity*, https://www.cascades.eu/publication/european-responses-to-transboundary-climate-impacts-and-insecurity
- Mackie, J. (2020), *Promoting policy coherence: Lessons learned in EU development cooperation*, https://www.cascades.eu/publication/promoting-policy-coherence-lessons-learned-in-eu-development-cooperation
- Ranger, N., Mahul, O. and Monasterolo, I. (2021), 'Managing the financial risks of climate change and pandemics: What we know (and don't know)', https://www.cascades.eu/publication/managing-the-financial-risks-of-climate-change-and-pandemics-what-we-know-and-dont-know
- Talebian, S. et al. (forthcoming) *A conceptual framework for responding to cross-border climate change impacts*, https://zenodo.org/record/7817615
- Thiery, W. et al. (2021), 'Intergenerational inequities in exposure to climate extremes', https://www.cascades.eu/publication/intergenerational-inequities-in-exposure-to-climate-extremes

Climate diplomacy

Coherent external action by the EU will facilitate the mutually beneficial partnerships that Europe needs to reduce vulnerability to cascading climate risk globally.

External action for coherence and efficacy

The European External Action Service (EEAS), launched in 2011, is the EU's diplomatic service, responsible for carrying out foreign and security policy. Within the Commission, DG INTPA (International Partnerships) is responsible for formulating and implementing international partnership and development policy. DG NEAR (Neighbourhood and Enlargement Negotiations) leads negotiations with countries seeking to join the EU and broader engagement within the 'neighbourhood'. The Service for Foreign Policy Instruments works on implementation of foreign policy priorities, including climate security. Published in 2016, *A Global Strategy for the European Union's Foreign and Security Policy* (EEAS, 2016) recognizes that investing in climate resilience abroad is also in the interests of European citizens.

Climate finance to third countries is provided by the Commission, EU member states, and the European Investment Bank, totalling €23.04 billion in 2021. This made the EU the largest provider of public climate finance in the world. In 2021, more than 54 per cent of climate finance was for adaptation or cross-cutting action (Council of the European Union, 2022). Increasingly, official development assistance (ODA), of which the EU provided €67 billion in 2020, is integrating climate action, with the EU's main financing tool for external action (the Neighbourhood, Development and International Cooperation Instrument) now holding a 35 per cent spending target for climate-relevant objectives over the 2021–2027 period (EC, n.d.c). The regulation establishing the Instrument recognizes the transregional effects of climate change and commits to providing technical and financial assistance to partner countries to mitigate these. The Mid-Term Review of NDICI, forthcoming at the time of writing, will also assess these commitments.

The European Security Strategy labelled climate change as a security risk in 2003. Many EU policies and strategies in this domain recognize the potential of climate impacts to cross borders, such as the New Pact on Migration and Asylum (EC, n.d.d) and the Concept for an Integrated Approach on Climate Change and Security (EEAS, 2021). The 2023 'Joint Communication – A new outlook on the climate and security nexus' (EEAS, 2023) states that Europe must prepare itself for the increasing 'spillover effects' of climate impacts occurring outside its borders, and sets out actions designed to integrate the 'climate, peace and security nexus' into all levels of EU external action.

Ensuring the coherence of its externally focused policies, especially regarding development, has long been a concern of the EU. Coherence is one of the Maastricht

Treaty's '3Cs' (European Union, 1992), alongside coordination and complementarity. There is much expertise within the EU in the field of policy coherence, and the European Green Deal (EC, n.d.e) exhibits a strong commitment to the concept. However, achieving policy coherence in the age of cascading climate risks represents a complex and novel challenge.

Cascading climate risk as a 'bridge' between Europe and the world

The Common Foreign and Security Policy (EC, n.d.f) commits the EU to promote peace, prosperity, security and the interests of Europeans across the globe. Cascading climate risks are one of many 'bridge' issues which connect the interests of Europeans with the interests of fellow citizens around the world. European resilience to cascading climate risk is, in part, a function of resilience in other countries. In addition to Europe's fundamental commitments to promote global peace, prosperity and security, European actors, therefore, also have a self-interest in building resilience in third countries. This perspective is beginning to take root; a new strategic approach based on this principle is being developed for the next EU–African Union Summit, for example.[3]

European external action – and coherent European security, development and foreign policy – can support resilience-building outside Europe

European external action – and coherent European security, development and foreign policy – can support resilience-building outside Europe. These policy domains, however, follow their own sometimes competing agendas. Despite best efforts, coherence can be difficult to achieve. The following recommendations explore potential steps.

Recommendation 2. Promote widespread resilience through external action

Transparency requires that the EU and its member states openly acknowledge the range of their own interests in third-country resilience and the potential for incoherence to exacerbate, and be exacerbated by, cascading climate impacts. To contribute to wider resilience-building at the scale necessary for meaningful promotion of peace, prosperity and security, the EU must ambitiously ramp up contributions to climate change adaptation outside Europe.

The EU and its member states must also find ways to align their diverse policy objectives and interventions in third countries so that they do not exacerbate vulnerability to climate change anywhere, including where impacts may spill

[3] Announced by President von der Leyen in her State of the Union speech, September 2023. Source: von der Leyen (2023).

over into Europe. The Joint Programming approach of Team Europe[4] Initiatives (TEIs) offers a model, but to address cascading climate risks, greater attention should be given to such risks, and the systemic challenges they often stem from.

The EU can contribute effectively to systemic resilience by making strategic, informed, coherent and targeted interventions. Resilience should function as a central tenet of the EU's external action.

Recommendation 2.1. Meet and exceed adaptation finance commitments

The climate justice and equity that is at the heart of global climate action is integral to international capacity to manage cascading climate risks. Recognizing this, the EU and member states must effectively contribute to the resilience of low- and middle-income countries through financial support. The EU should:

- dramatically increase its proportion of spending and lending on adaptation, both in Europe and overseas – in the first instance, this would be by following through on its existing commitments, such as the European Investment Bank's 2021 pledge to triple overall investment in adaptation by 2025, and to take on more risk when funding adaptation overseas, including by financing 100 per cent of costs associated with adaptation projects in the most vulnerable parts of the world (EIB, 2021);
- enhance the timeliness, transparency and monitoring of its adaptation-related finance and avoid double-counting.[5]

More and better-targeted funding for developing countries could support adaptation and prevent crises before they occur. In particular, the EU should improve its readiness to cooperate with fragile states and local non-state actors that are vulnerable to climate shocks, including through articulated multilevel engagement. A current example of this is FPI management of a climate security partnership with the United Nations Environment Programme (UNEP) which engages at local, (sub-)national and regional/global levels.

Priorities for financing should include programmes to address complex challenges like multidimensional fragility,[6] disaster preparedness and systemic resilience in agri-food systems. Action to counter climate-related security risks by scaling up adaptation support in fragile countries must:

- be context-sensitive and sustainable;
- enhance third-country institutional capacities;
- support decentralized and inclusive governance systems.

4 'Team Europe' was launched in April 2020 to coordinate EU and member state responses to the COVID-19 pandemic. It consists of the EU, EU member states, the European Investment Bank (EIB) and the European Bank for Reconstruction and Development (EBRD). Source: EC (n.d.g).

5 This is when the same financial flows are counted more than once – for example, as part of an ODA package, but separately also as a commitment to adaptation finance targets.

6 This refers to the various dimensions of risk and coping capacity that create fragility, such as economic, environmental, human, political, security and societal.

Recommendation 2.2. Improve policy coherence to avoid harm and harness synergies

Europe could potentially worsen cascading climate risk by: failing to adapt; failing to support the adaptation of others; having incoherent policies; or through 'mal-adaptations' that redistribute or exacerbate risks.

European policy incoherence, combined with failure to deliver on promised climate finance, has undermined third-country trust. To develop the cooperative capacity needed to tackle cascades, the EU must undertake and support programmes that strengthen societal resilience in third countries, particularly for marginalized groups.

The EU should pursue and promote coherence across foreign policy, security and development cooperation policies in a way that accounts for cascades. This will require a review of existing policies across both the European Commission and member states, covering both avoidance of harm in third countries and active resilience-building. The EU should:

- Develop a 'policy coherence for resilience' approach in the Better Regulation agenda under the Commission Work Programme. This should go beyond 'policy coherence for sustainable development' (PCSD), which focuses on how incoherence can result in unsustainable outcomes. It should add a focus on how incoherence can exacerbate risks, and thereby articulate the resilience benefits of a more strategic and coherent approach to European policymaking. Innovation in this area is likely to come from member states (such as via national PCSD Focal Points), who could pioneer approaches and share lessons with each other and the European Commission.
- Develop indicators of successful cascade anticipation and management and incorporate these into the monitoring and evaluation of the EU Adaptation Strategy.

The EU should avoid undermining the resilience or adaptive capacity of partner countries through foreign policy interventions, flagship initiatives, military operations and development cooperation efforts as well as its own internal or common policies. Action to achieve this should include the following:

- Identifying and addressing adverse, unintended effects of the EU's own green transition plans on third countries' capacities to develop, mitigate and adapt to climate change.
- Make the avoidance of adverse effects an explicit criterion for EU transition plans, for example, through strategic reinvesting of CBAM revenues and monitoring of due diligence frameworks to counter adverse effects on trading partners' development or adaptation efforts.

Recommendation 2.3. Increase technical assistance and political engagement with partner countries

The EEAS, and DGs INTPA and NEAR should support climate-resilient development effectiveness in partner countries. Both technical assistance and political engagement from the EU can help to support and promote enhanced coherence with and between partner countries' policies.

Currently, cascading climate risks are neither prevented nor managed. Default responsibility for their management in effect lies with stakeholders at various points of impact. Where the costs are human and infrastructural, this equates to disaster risk reduction, the humanitarian policy domain, international humanitarian organizations, local and national government and civil society. Within trade and financial systems, impacts are borne by more varied actors (see Recommendation 3 and Recommendation 4 respectively).

A more proactive approach from the European Commission could better support climate-resilient development effectiveness in partner countries. There is a need for ODA to tackle the root causes of vulnerability that can generate or perpetuate cascades. TEIs should be used to pursue systemic resilience to cascading climate risks, based on joint analysis, programming and monitoring. In line with the TEIs' focus on coordinated and coherent effort by Team Europe, approaches should harmonize EU and member states' policies to help build systemic resilience.

Particular systemic challenges of relevance to cascading climate risks include:

- support for the development of cascade-resilient agri-food systems to:
  - reduce third-country vulnerability to volatile food prices;
  - manage climate-related food security risks in both partner countries and Europe;
- better governance mechanisms for human mobility and migration as a humanitarian priority and as a driver of cascading climate risk;
- improved disaster preparedness;
- conflict reduction and management;
- strengthened social protection and social safety nets.

Relevant EU actors including DG INTPA, DG ECHO and EEAS should engage with regional organizations in partner countries or regions to drive integration and political dialogue on the implications of cascades for regional stability, development and peace. They should also:

- move away from reactive 'single point of crisis' responses towards proactive approaches that enhance resilience to multiple shocks;
- incorporate approaches that account for cascading climate impacts as a driver of insecurity when responding to conflict and humanitarian crises. For example, ask agencies being funded to conduct work in humanitarian crises to make use of UNEP's Joint Environment Unit (JEU) and the Global Plan of Action for sustainable energy in displacement settings to assess and reduce environmental impact of operations;
- harness adaptation projects to build stability and resilience. For example, fostering partnerships between relevant local non-government organizations and local and/or national government bodies already making progress in or interested in adaptation. This could build trust, avoid unnecessary duplication and support investment in more accountable and sustainable models that will outlast the crisis. Where resilience challenges are geographically wide-reaching, explore options to support cross-border projects of this kind;

- development, reconstruction and humanitarian infrastructure projects should take into account changing climatic conditions (for example, more intense dust storms, humidity and water scarcity) and long-term impact on water, land, food, energy and local air quality.

Greater alignment is needed between development and humanitarian partners to improve the coherence between preventative and responsive measures.

As part of the Team Europe approach, the EIB and EBRD, alongside private investors subject to EU regulations, should ideally appraise the implications of existing and new projects for cascading climate risks and disclose relevant findings to Team Europe partners. As a further step, coordination and alignment of European actor investment strategies with private investors from outside Europe could help to maximize coherence and benefits from a cascading climate risk perspective – for instance, at forums such as the World Economic Forum and others. A first step in this direction is to build expertise on complex risk among technical staff in development finance institutions, which is needed to facilitate this kind of appraisal, disclosure and coordination.

Recommendation 2.4. Cooperate, lead and build trust within the international system

Recognizing the need for international solidarity in the face of common risks, the EU needs to strengthen cooperation with, and the trust of, third countries through diplomacy, foreign policy and development action. This would help to deliver resilience within the international systems in which Europe engages along with 'just and fair outcomes' that benefit all.

Understanding of cascading climate risks is still emerging. The EU has been at the forefront of efforts to better understand such risks and how to respond. As part of its global responsibilities, and to improve its own capacity to manage cascades, the EU should invest in a flagship programme of knowledge-building and exchange, led by DG CLIMA. This programme should begin within the EU, then be extended to the international community through external action that:

- engages EU staff across Foreign Policy, Security and Development policy portfolios;
- integrates training on climate change and risks into capacity-building efforts in third countries for diplomats, development planners and military officials;
- strengthens the integration of research and innovation partnerships under Horizon Europe with local research and capacity-building institutions to strengthen adaptation to cascades in third countries.

DG CLIMA should lead efforts to develop technical guidance on mainstreaming adaptation and resilience-building for cascading climate risks across European foreign policy, security, humanitarian and development cooperation strategies.

As part of this, a systematic review should take place, covering existing indices and tools in foreign policy, security and development cooperation, such as the *European global conflict risk index*. This should assess opportunities for integration of cascades and identify gaps and needs.

UNFCCC processes also provide opportunities to cooperate, lead and build trust:

- EU stakeholders in the development and operationalization of the Global Goal on Adaptation (GGA) should push for the goal to account for the transboundary and cascading elements of climate risk and consequent adaptation needs. The goal represents an opportunity to promote more coherent policies on adaptation to cascades at a global level.
- Assessment of progress towards meeting the GGA, via the Global Stocktake, could help to assess global progress towards cascades preparedness.

What is at stake?

Regions surrounding and close to Europe, including the Sahel, the Middle East and North Africa, are extremely vulnerable to climate change. Some sub-regions are already experiencing severe instability partly driven by climate impacts. Without coherent and effective external action, the human and financial costs of disaster management and humanitarian relief will escalate in tandem with increasing climate hazards.

Occupied with reacting to preventable cascades in Europe and its neighbourhood, the EU will be more vulnerable to risks emerging in more distant regions, where it may have less influence. Its capacity to react to multidirectional cascades with the requisite speed and flexibility will be reduced.

If action is not taken to strengthen relations and restore trust with low- and middle-income country partners, the EU's ability to coordinate vital third-country responses to cascades will be eroded, and its standing and influence as a global actor will be diminished.

Related CASCADES resources[7]

- Abdullah, H., Elgendy, K. and Knaepen, H. (2021), *Climate Resilience in Cities of the EU's Southern Neighbourhood: Opportunities for the EU Green Deal*, https://www.cascades.eu/publication/climate-resilience-in-cities-of-the-eus-southern-neighbourhood-opportunities-for-the-eu-green-deal
- van Ackern, P. and Detges, A. (2022), *Climate change, vulnerability and security in the Sahel*, https://www.cascades.eu/publication/climate-change-vulnerability-and-security-in-the-sahel
- Detges, A. and Foong, A. (2022), *Foreign Policy Implications of Climate Change in Focus Regions of European External Action*, https://www.cascades.eu/publication/foreign-policy-implications-of-climate-change-in-focus-regions-of-european-external-action
- Detges, A., Mueller, A. and Reuter, M.H. (2023), *Climate vulnerability and security in the Euphrates-Tigris Basin*, https://www.cascades.eu/publication/climate-vulnerability-and-security-in-the-euphrates-tigris-basin
- Knaepen, H. (eds) et al. (2023), *The role of Europe in building system-wide resilience to cross-border climate impacts*, https://www.cascades.eu/publication/the-role-of-europe-in-building-system-wide-resilience-to-cross-border-climate-impacts

7 More regional and country case studies can be found at www.cascades.eu/publications.

- Knaepen, H. and Vajpeyi, I. (2022), *European responses to transboundary climate impacts and insecurity*, https://www.cascades.eu/publication/european-responses-to-transboundary-climate-impacts-and-insecurity
- Lahn, G. and Shapland, G. (2022), *Cascading climate risks and options for resilience and adaptation in the Middle East and North Africa*, https://www.cascades.eu/publication/cascading-climate-risks-and-options-for-resilience-and-adaptation-in-the-middle-east-and-north-africa
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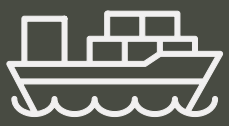
- Wolfmaier, S., Foong, A. and König, C. (2021), *Climate, conflict and COVID-19: How does the pandemic affect EU policies on climate-fragility?*, https://www.cascades.eu/publication/climate-conflict-and-covid-19-how-does-the-pandemic-affect-eu-policies-on-climate-fragility

Trade



The fragility of European supply chains trade is becoming apparent; the EU needs a trade system that builds and benefits from resilience.

EU policies and agreements on international trade lag behind other sectors, such as foreign policy, security and development, regarding the extent to which they account for cascading climate risk. The EU's 2021 *Trade Policy Review*, for example, does not consider how climate impacts may be transmitted through trade networks, although it asserts that trade policy should 'unequivocally support the Green Deal in all its dimensions'.

A key pillar of the European Green Deal is the Farm to Fork Strategy, which directly addresses trade resilience, among other issues, as well as production and consumption aspects of the food system. This is an example of sectoral European policies that address trade-related risks, despite the relative lack of engagement from trade ministries on climate change risks in supply chains and markets.

Since 2009, the EU has included chapters on trade and sustainable development in its Free Trade Agreements (FTAs), with climate change increasingly integrated through, for example, commitments to implement the Paris Agreement. While agreements such as the pending EU–Mercosur FTA note the positive role that trade can play in climate-resilient development, they generally do not flag or explore trade systems as conveyors of climate risk.

Trade system fragility in focus

The relationship between trade policy and climate risk is beginning to receive attention at the global level – for example, through WTO's *World Trade Report 2022* (WTO, 2022). The increasing use of trade restrictions to manage agricultural production shocks, in part driven by climate change impacts, is also drawing greater political attention to these issues.

Overall, there is a growing recognition that today's trade system is increasingly fragile. Decades of specialization in products and services – and the globalization of supply chains – have delivered gains in efficiency and profitability, albeit with an uneven distribution of benefits globally. But in a fragmented and shock-prone world, the lack of diversification that results from this specialization is increasingly being understood as a source of instability.

‘Resilience thinking’ for trade and supply chains

Global events such as the COVID-19 pandemic and Russia’s invasion of Ukraine have triggered cascading risks that are still unfolding across international supply chains. As a result, there has been an upsurge in ‘resilience thinking’ across businesses and governments. Recent events have provoked a clear recognition of trade-related risks, without producing a consensus on the preferred pathway to a more resilient trade system. Action to address these risks is as yet lacking.

One of the key challenges for European actors is to develop a shared understanding of what a resilient trade system would look like. This should include aspects such as the diversity and connectivity of European trade links, the level of redundancy, storage capacity and domestic production in Europe, the flexibility of European trade diplomacy, and issues relating to the equity and affordability of resilience in Europe and beyond. Achieving trade resilience may require striking a balance between investing in long-term partnerships with exporters and retaining flexibility to react with agility and to adapt during and after shocks and crises.

Mounting political momentum for a more strategic and resilient approach to trade policy and supply chain governance presents an opportunity

Mounting political momentum for a more strategic and resilient approach to trade policy and supply chain governance presents an opportunity. Building resilience to cascading climate risk can become an important objective of this new approach to conceptualizing, planning, disclosing and managing international supply chains.

There is a danger, however, that climate change considerations might be lost in the rush to restructure, which is primarily driven by other concerns than climate – and that European reactions may worsen vulnerability over time. ‘Strategic autonomy’ for Europe carries its own dangers. If European actors restructure supply chains or reshape the patterns of regional and global trade without systemic thinking, exposure to climate and other types of risk may be inadvertently increased. For example, EU policies to shorten supply chains and produce more food in Europe would concentrate risk inside European borders, where climate impacts will also be felt. European food security would then depend more profoundly on the success of adaptation in Europe and reduce the diversity of suppliers to the European market. Withdrawing from international supply chains might also exacerbate the vulnerability of producer regions in low- and middle-income countries. This, in turn, increases the danger of climate risks cascading back into Europe.

Transforming trade to deliver strategic, systemic resilience for Europe is essential. To achieve this, a shift in mindsets is needed, away from narrow efficiency and maximized profit, and towards resilience. A strategic approach to trade is needed that identifies and delivers on broader societal and international objectives. Using new insights from data and disclosure will be crucial, enabling complex risk to be factored into decision-making.

Recommendation 3. Take a strategic approach to resilient trade

Recommendation 3.1. Formulate a Trade Resilience Strategy for Europe

As a first step, an interservice consultation is needed on how the EU can incorporate 'systemic resilience' into its current 'open, sustainable and assertive' trade policy. This should be consistent and coherent with the objectives of the EU Adaptation Strategy, as well as other dimensions of the European Green Deal.

In a systemic resilience approach, mutual resilience benefits to the EU and trade partners would be achieved via long-term, stable trade relationships within a robust multilateral rule-based trade regime. Building on the interservice consultation, DG TRADE, in close collaboration with other DGs, the EEAS, member states and international partners, should lead the formulation and implementation of a Trade Resilience Strategy that promotes resilience to cascading climate risk. This should be based on a fresh trade policy review that identifies:

- how EU trade policy currently contributes to third-country resilience;
- where EU trade policy undermines third-country resilience (for example, through major incoherences, such as those between European agricultural subsidies, widely seen as harmful to food and water security in low- and middle-income countries, and EU adaptation support, which aims to boost food security in recipient countries);
- which EU trading partners and regions should be prioritized for resilience investments to create long-term, stable partnerships that maximize mutual resilience;
- options for diversifying critical supply chains to manage cascading climate risk;
- demand-side measures to reduce risk exposure – for example, policies that incentivize changes to industrial processes to reduce waste and enhance circularity, and changes to diets and consumption patterns that reduce the 'import-intensity of consumption'[8] in Europe;
- comparative resilience benefits of 'just in time' and 'just in case' supply chain models, alongside wider implications such as for emissions and waste;
- intersections between the internal and external dimensions of European trade strategy, including the desired balance between demand-side measures, diversification and resilience-building in third countries.

The Trade Resilience Strategy should also:

- provide guidance on how new EU trade agreements can mainstream clauses to address potential cascades and specify options to boost mutual resilience with trade partners;
- develop Trade Crisis Response Plans that prepare European industry and society for major trade disruptions, including those from cascades;

[8] The volume and number of imported products that are embedded in what is consumed in Europe.

- articulate how existing international, informal trade policy forums (like the Transatlantic Initiative on Sustainable Trade) can be used to boost preparedness. For example, early warning systems could alert members of potential supply chain shocks and enable coordination for recovery. A precedent is offered by the 'crisis response network' agreed by the 14 countries of the US-led Indo-Pacific Economic Framework (IPEF) at their May 2023 meeting (Lawder, 2023).

Recommendation 3.2. Expand the scope of the Critical Entities Directive

The European Commission should identify critical and strategic imports that are subject to potential cascades. After formal adoption of the Resilience of Critical Entities (CER) Directive, its scope should be expanded to include critical supply chains.

- An assessment of the Corporate Sustainability Due Diligence Directive (CSDDD) should be conducted to determine its role in supporting supply-chain resilience to cascades. Synergies with the CER Directive should be clarified.
- In its report to Parliament (scheduled for July 2027) the Commission should highlight and request risk management plans and guidance under the CER Directive to build resilience in Europe to cascading climate risks faced by critical entities and their supply chains.

Recommendation 3.3. Support and facilitate supply chain 'restructuring'

The Commission should establish a working group with European businesses on strategic restructuring of European supply chains[9] in response to changing geopolitics including other nations' industrial strategies, for example the US Inflation Reduction Act (IRS). The remit of the working group should include the following points:

- Just and systemic resilience to cascading climate risk as a key topic for discussions within the working group. The role of EU coordination and 'pre-competitive' knowledge transfer and sharing[10] should be considered in these discussions.
- Mechanisms for aligning businesses' commercial strategies with the sustainability, foreign policy and resilience objectives of the EU and member states as part of the working group discussions. This would contribute to Commission efforts to promote such alignment.
- Action by the working group to identify businesses' needs and clarify expectations of all parties, in recognition that the EU's diplomatic, financial, legal and logistical capacities are needed to ensure the feasibility of new supply chain networks.

9 This refers to the practice of changing the structure and operations of supply chains to avoid or replace areas of weakness, or high risks, and to capitalize on new opportunities. The discussion around supply chain restructuring is very active among businesses, particularly in the wake of the COVID-19 pandemic, which revealed many such weaknesses in companies' existing supply chain networks. 'Strategic restructuring' refers to the process of aligning this process with broader strategic objectives, such as sustainability, resilience and new geopolitical realities.

10 'Pre-competitive' collaboration is where businesses in the same industry facing common challenges come together to invest in research and knowledge-sharing that does not impact on direct competition or create unfair advantage.

The proposed working group should commission a special report on the role of European and member state policy in facilitating a transition from 'just in time' to 'just in case' supply chains. The report should address how to:

- create mechanisms for smoothing the distribution of costs during trade shocks, between private firms and the state, and between income levels in society – for example, through the use of innovative tax (e.g. windfall taxes) and/or insurance mechanisms;
- ensure fair societal distribution of costs and benefits from supply chain restructuring, including affordability concerns, job security and other social impacts;
- engage diplomats and investors to reduce Europe's vulnerability to 'choke points' in international supply chains.

Recommendation 3.4. Improve risk data and disclosure

Improved data are needed to increase the transparency of risk in supply chains. Working with industry bodies, existing investment and supply chain transparency initiatives and civil society, the EU should do the following:

- Develop risk assessment tools, models and practices that better incorporate complexity. Encourage adoption of these tools, models and practices by public and private decision-makers.
- Build capacity to track, disclose and use data on complex risk across policy domains by facilitating exchanges of best practices between planning communities (for instance, in defence, cyber, health).

The EU can improve risk disclosure processes for private and public actors via the implementation of the CSDDD. A broader scope of risks than those currently included (i.e. human rights and environmental impacts) should be disclosed to increase transparency and inform investment and governance decisions that boost resilience to cascading climate risks.

Existing supply chain transparency initiatives (such as labelling schemes and footprint analyses) should evolve to provide specific insights on climate risk and resilience. Civil society and the EU should encourage corporate members of these initiatives to embrace the evolution towards greater risk disclosure, given the wider societal benefits that greater supply chain resilience would deliver (such as price stabilization, job security, and so on).

Risk assessments by public and private entities should also take better account of how actors will *respond* to climate change impacts both within and outside Europe, including protectionist and securitization responses. Examples of responses of this kind include border fortification in response to immigration, framing of climate impacts as security threats, and militarization of crisis response with longer-term consequences for military power balance. Data on the type and plausible effects of responses to shocks and crises should be developed, for example, under Horizon Europe.

Special attention should be paid to the likelihood of risk (mis)perception, 'irrational' responses and the variation of actor interests and objectives in the international arena. Current risk modelling studies tend to neglect these factors, and therefore inaccurately portray how crises may unfold.

What is at stake?

Without coordinated, long-term strategies for managing trade-related cascading risks, European actors will have to react to multiple crises in ways that will likely undermine their resilience over the long term.

A short-term and incoherent form of adaptation is not in the strategic interests of Europe. It will lead to increasing disruption to the profitability of European businesses, with implications for competitiveness, investment and jobs. It will reduce the EU's ability to access critical and strategic resources via trade and to achieve its twin green and digital transitions (European Commission, 2022). European citizens will be exposed to repeated affordability crises, and pressures on the environment in Europe and elsewhere will increase.

Related CASCADES resources

- Adams, K. M. et al. (2020), *Climate resilient trade and production*, https://www.cascades.eu/publication/climate-resilient-trade-and-production
- Birkbeck, C. D. (2021), *Priorities for the climate-trade agenda*, https://www.cascades.eu/publication/priorities-for-the-climate-trade-agenda
- King, R. (2022), 'Exploring the cascading impacts from climate shocks to chokepoints in global food trade', https://www.cascades.eu/publication/exploring-the-cascading-impacts-from-climate-shocks-to-chokepoints-in-global-food-trade
- Stockeld, E. et al. (2021), 'Climate change, crops and commodity traders: subnational trade analysis highlights differentiated risk exposure', https://www.cascades.eu/publication/climate-change-crops-and-commodity-traders-subnational-trade-analysis-highlights-differentiated-risk-exposure
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Finance

The low carbon transition already under way in the finance sector must also deliver resilience to cascading risks – public and private finance each have important and complementary roles to play.

Moves towards transition and resilience

Recent changes to EU sustainable finance regulations and supervisory interventions are designed to facilitate transitions to a low-carbon and inclusive economy. They also hold the potential to build the resilience of the financial system, including to physical climate risks beyond Europe. These changes fall into three categories:

- disclosure regulations, such as the *Corporate Sustainability Reporting Directive* (EC, n.d.h);
- technical standards and consultations, such as the European Banking Authority's *Technical Standards on Prudential Disclosures on ESG Risks*; and
- stress tests led by the European Central Bank. The stress test exercise, first carried out in 2021, assesses the ability of Eurozone banks to weather both transition and physical risk. It also considers how the geographical distribution of a bank's lending activity exposes it to climate shocks.

The European Commission and member states are also under growing pressure to commit climate finance to build climate resilience and support transitions in other countries, particularly those most vulnerable to climate impacts. Such action is a fundamental tenet of the EU's commitments under the UNFCCC and the Paris Agreement. It is also one of the primary policy mechanisms via which European actors can reduce exposure to cascading climate risk both in Europe and beyond, by preventing or reducing the number and severity of cascades initiated by climate triggers and impacts beyond Europe's borders.

In this context, recipient countries are frustrated with donor country counterparts' failure to deliver on existing promises, and with the slow pace of transformation in climate and development finance. They are leading initiatives to rethink the global financial architecture in ways that have the potential to boost collective resilience to intersecting shocks and challenges, including from climate change. These include the Task Force on Climate, Development and the International Monetary Fund (G-24, n.d.), which includes the Vulnerable Group of Twenty (V20), and the Bridgetown Initiative, spearheaded by the prime minister of Barbados, which has gathered buy-in and momentum at an international level.

Governance and regulation adequate to manage cascading climate risks

European financial institutions invest and lend in markets outside Europe, in all regions of the world, and therefore expose themselves to climate risks overseas. Financial markets are a classic example of cross-border systems, where events, changes and trends in one part of the world can influence asset values, operations and profits for European-based actors (see Figure 3. Overarching cascading climate impacts for Europe).

European financial institutions have generally been successful in pursuing their core purpose of maximizing profit and efficiency. As the financial crisis of 2008 revealed, financial institutions are less proficient at weathering shocks.

The methodologies and regulations that govern the finance sector must be able to manage climate risks that cascade through markets

Current stress-testing models and regulations are not necessarily geared towards building resilience in the financial sector to novel systemic risks like compound and cascading climate risks. This is problematic because the lack of resilience in financial networks endangers not just profits, but also social cohesion and political stability. It is therefore necessary to ensure that the methodologies and regulations that are used to govern the finance sector are adequate to manage climate risks that cascade through markets.

Enhanced coordination between financial institutions and governments may also be needed to align private and public investment strategies that actually build societal resilience, rather than simply resilient profits. This would help to avoid, for example, the abandonment of high-risk markets outside Europe which might then become trigger-points for cross-border cascades.

Recommendation 4. Promote transparency and accountability for broad resilience

As climate risks and impacts intensify it will be hard, if not impossible, for financial institutions to sustain their profitability without contributing to broader resilience. It will therefore be necessary to shift from a pure profit-maximization paradigm in European financial institutions, to one that strives also to deliver resilience for all stakeholders: the recipients of finance and investments outside Europe, financial institutions themselves and European societies.

As a starting point towards this paradigm shift, European financial institutions must better assess and manage the physical risks posed by climate change. They should close data gaps on climate risk indicators and develop the business cases for investing in resilience to multidimensional shocks outside Europe. A robust approach to monitoring cascading climate risks will support better pricing of such risks. Improved pricing should reveal the financial and wider incentives for funding climate adaptation at multiple scales.

Recommendation 4.1. Enhance cooperation, communication and disclosure

Efficient mechanisms and standards are needed to facilitate cooperation across financial institutions and with public sector, scientific research and civil society organizations. This will support coherent action to address cascading risk in the finance sector.

European institutions and member states should:

- Enhance disclosure regulations for climate and sustainability risks across the financial sector, including for SMEs.
- Foster cooperation between financial supervisory authorities, scientific research and civil society organizations to better understand the propagation of climate risk in markets and to identify resilient investment opportunities.

The Directorate General for Economic and Financial Affairs (DG ECFIN) should:

- Explore opportunities for sharing data and insights on systemic climate risk at large scales (i.e. markets, regions) with reinsurance companies and other actors in the insurance industry. Reinsurance companies operate across borders and hold valuable insights on cascading risk from which the EU could benefit.
- Support fulfilment of the potential for risk-guarantee mechanisms that combine the resources of public and private actors, including through private reinsurance of public guarantees.

European development finance institutions should:

- Establish dialogues between private and public sectors to share insights on climate risk and to seek opportunities for coordinated action to invest in resilience. This would stimulate joint endeavours and help to identify needs for improved guidance and tools. It would also help to avoid incoherences that work against societal resilience.
- Seek to increase coordination and communication with private investors in highly vulnerable markets. It is not in the EU's interest to encourage capital flight from vulnerable countries (a possible unintended consequence of better risk pricing). In some cases, public investment (i.e. adaptation finance) may be required to build resilience where market incentives are lacking. Clearer communication will help to avoid surprises and increase the consistency of investments in places where adaptation is needed most.

Recommendation 4.2. Reform risk assessment and monitoring approaches

The financial sector and supervisory institutions need new methods to accurately assess and effectively address climate risk.

European institutions and member states should:

- Develop accurate, transparent, harmonized climate risk assessment methods, including by providing or creating reliable databases of climate-related impact and risk information.
- Help financial institutions to accurately quantify risk in their portfolios, to make the financial case for more ambitious and effective investments in resilience.

- Support the development of tools to align financial appraisal with physical climate risk scenarios: accounting for indirect losses, compound effects and feedback dynamics across sectors.

Financial actors and institutions should:

- Internalize climate risk assessment and management in overall sustainable investment strategies.
- Explicitly price climate risks and calculate return on investment for climate adaptation.

The European Investment Bank (EIB), central banks and international financial organizations should integrate climate and sustainability factors into risk management for their own operations as well as those of the institutions they supervise. This would advance the mainstreaming of sustainable finance and enable finance to fulfil its crucial role in achieving resilience to climate change globally.

Recommendation 4.3. Mobilize innovative European finance for widespread resilience

The EU and its member states should continue to invest in building resilience to climate impacts outside Europe and increase support to reduce local barriers to resilience, such as those related to conflict, human rights abuses, poor governance and hydrocarbons export dependence. Not only will this reduce Europe's exposure to cascading climate risk, it is a political necessity, given commitments already made under the UNFCCC and in other forums. It is also a strategic investment, vital for maintaining the EU's credibility in all aspects of external action to manage cascading climate risk on the international stage.

Mobilizing new and additional finance is not a new challenge; many actors know what needs to be done. Projections of increased cascading climate risk simply further magnify the case for and benefits of doing so. Priorities include:

- Continue to develop and expand innovative finance instruments to address adaptation, especially in the most vulnerable low- and middle-income countries.
- Ensure the EIB and other European development finance institutions (DFIs) and public development banks (PDBs) have a stronger focus and explicit financial targets on adaptation finance.
- Stimulate greater synergies and exchange between development cooperation institutions and development finance institutions (DFIs and PDBs) on adaptation and resilience-building. This can help to develop sustainable pipelines of transformative adaptation projects and establish the necessary local governance 'ecosystems' for resilience. For example, building requisite capacities among public and private planners, and conducive markets and regulatory environments, and capacities to disburse and manage funds in the local banking sectors.
- Adopt more ambitious targets for grants and ODA focused on non-bankable adaptation projects. Leverage private finance at scale for impactful investments in resilience to multidimensional shocks.

What is at stake?

The approach taken to adaptation in the European financial system will directly influence the viability of livelihoods where European investments are made, both in Europe and the wider world. If action is not taken, financial institutions in Europe and beyond will be exposed to shocks and mounting systemic risks, which the European financial system itself may inadvertently amplify.

Reacting to this, some governments may be forced to increase their reliance on sovereign debt spending, potentially reducing their ability to invest in long-term societal resilience, propagating a vicious circle. Other governments may become more heavily reliant on other international lenders, spreading risk throughout the system and potentially marginalizing the EU.

Unless climate resilience is adopted into the core objectives of European financial institutions, and cascading climate risks are fully accounted for, climate adaptation will continue to be neglected.

Related CASCADES Resources

- Ahairwe, P. E. (2021), *The EIB Group Climate Bank Roadmap 2021-2025: What does it mean for developing countries?,* https://www.cascades.eu/publication/the-eib-group-climate-bank-roadmap-2021-2025-what-does-it-mean-for-developing-countries
- Ahairwe, P. and Bilal, S. (2019), *Boosting EU climate finance,* https://www.cascades.eu/publication/boosting-eu-climate-finance
- Ahairwe, P. E. et al. (2022), *Climate risk mispricing: why better assessments matter in financing for development,* https://www.cascades.eu/publication/climate-risk-mispricing-why-better-assessments-matter-in-financing-for-development
- Ahairwe, P. E., Bilal, S. and Adeniyi, D. (2023), 'Mobilising European development finance for climate adaptation and resilience', CASCADES Deliverable 5.5 (forthcoming) https://www.cascades.eu/publication
- Bressan, G., Duranovic, A. and Monasterolo, I. (2023), *A review of European sustainable finance regulation with a focus on climate risks,* (URL to follow)
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- Ranger, N, Mahul, O. and Monasterolo, I. (2021), 'Managing the financial risks of climate change and pandemics: What we know (and don't know)', https://www.cascades.eu/publication/managing-the-financial-risks-of-climate-change-and-pandemics-what-we-know-and-I-know
- West, C. et al. (2021), 'Europe's cross-border trade, human security and financial connections: A climate risk perspective', https://www.cascades.eu/publication/europes-cross-border-trade-human-security-and-financial-connections-a-climate-risk-perspective

Global governance

Achieving resilience in Europe depends on whether the EU can navigate challenging geopolitical headwinds and re-establish its legitimacy and influence as a trusted leader on the global stage.

The EU has positioned itself as a global leader in climate action, setting ambitious targets, introducing innovative policies such as the Emissions Trading System (ETS), and engaging energetically in international climate diplomacy. It has consistently pursued the most ambitious climate policy of all major economies (Oberthur and Dupont, 2021). With the European Green Deal in 2019, the EU set a goal to become the first climate-neutral continent (European Commission, n.d.b).

Ursula von der Leyen's tenure as European Commission President (2019–2024) has overseen multiple legislative initiatives to cut emissions. The Commission has placed increasing emphasis on climate adaptation, with the publication of the updated EU Strategy on Adaptation to Climate Change in 2021 (EC, 2021a).

It is not clear that adaptation is being politically prioritized relative to other aspects of EU climate policy

The strategy has many strengths. It explicitly recognizes that climate impacts occurring outside Europe can have knock-on effects which spill over into Europe; that effective adaptation requires looking beyond borders; and that this necessitates close ongoing coordination with partner countries. However, it is not clear that adaptation is being politically prioritized relative to other aspects of EU climate policy. In her September 2023 State of the Union address President von der Leyen emphasized the successes of the European Green Deal and outlined its 'next phase', but she did not mention climate adaptation.

Geopolitical headwinds

Yet the EU faces powerful headwinds as it embarks on efforts to build resilience to cascades. The present conditions of geopolitical turbulence, in the context of conflicts in Gaza and Ukraine, the widening US–China rift, the uncoordinated emergence of protectionist trade measures, and the rise of political populism in the EU itself do not favour effective international cooperation.

The reputation of the EU in the Global South was damaged by an insular response to the COVID-19 pandemic (Balfour, Bomassi and Martinelli, 2022), while without sensitivity in preparatory arrangements with exporting regions, the roll-out of

the Carbon Border Adjustment Mechanism (CBAM) has the potential to harm its standing further (Eicke et al., 2021). Its unequal handling of refugee and migration crises over the last decade, and its approach to issues such as subsidy reform and retraction of finance for fossil fuels have provoked charges of double standards. It is becoming apparent that the EU must earn trust from partners in this new era: this cannot be taken for granted.

An early mover on cascading climate risk

The nature and scale of the threat posed by cross-border cascading climate risk is just beginning to be understood. By considering the implications for and beyond Europe, the EU is an early mover. Leadership for effective cascades management can and should follow, with the EU championing the necessary multilateral, inclusive, rules-based global governance needed to coordinate, reach compromise and invest in building resilience to cascading climate risk. The following recommendations explore how this could be done.

Recommendation 5. Lead and support global governance of cascading climate risk

Cascading climate risks are shared, though not equally. Their management requires good faith engagement between governments of territories through which cascades flow. Growing rather than declining global trust and cooperation between governments will be required.

To achieve an upward spiral of trust-building, the principles of justice, equity and sustainability will need to be central to international engagement on cascading climate risk, adaptation and resilience. Concerted effort, strategic vision and persistent diplomacy will be needed from both the EU and its partners to advance these goals.

Given its deep international dependence, the EU's only viable strategy is to strive for leadership on cascading climate risk, and to collaborate globally. Leadership will require firm commitment and deft handling of both internal and external politics. Further, the EU must consistently conduct itself on the international stage in a way that engenders trust, solidarity and reciprocity.

Recommendation 5.1. Champion global governance that is fit for a world of cascading climate risks

No country can effectively govern cascading climate risks alone, or even through their bilateral relationships and partnerships. The EU should therefore:

- use its participation in international forums, structures and agreements to forward and champion a renewal of multilateral, inclusive, rules-based global governance that is re-oriented towards justice, sustainability and resilience;
- actively promote understanding of cascading climate risks on an international stage, and pursue enhanced international cooperation to address such risks;
- lead and support new transnational coalitions of state and non-state actors to enhance the dialogue, collaboration and forms of institutional innovation needed to address and manage cascades;

- show leadership in its approach to adaptation and finance negotiations under the UNFCCC, to drive explicit recognition of the shared risks of climate change and the benefits of a collaborative approach to adaptation. It should drive the raising of ambition, the operationalization of the Global Goal on Adaptation (GGA), and the avoidance of losses and damages.

Recommendation 5.2. Support reform of international structures

The EU should take an active leadership role in the reform and development of international structures and frameworks which will be necessary for the effective governance of cascading climate risk (see also Recommendation 4). This leadership should not be at the expense of low- and middle-income countries' agency or ownership in such endeavours.

Examples of this kind of leadership might include:

- meaningful participation and commitment to the process and outcomes of initiatives for the reform of the multilateral financial system and the global financial architecture, including the Bridgetown Initiative, the Accra-Marrakech Agenda, the UN Secretary General's SDG Stimulus Proposal and the Paris Summit for a New Global Financing Pact. Such reforms should address structural weaknesses that feed global inequality and vulnerability to climate hazards that perpetuate cascades. Immediate actions could be:
  - providing emergency liquidity, expanding multilateral lending to governments and mobilizing private-sector finance via new mechanisms;
  - committing to an ongoing process of dialogue with developing country partners on the reform of the global climate and development finance architecture, including impactful reforms such as debt restructuring and forgiveness and natural disaster debt suspension clauses in new loans.
- support for and, where appropriate, taking the lead on efforts to build global and local early warning and comprehensive risk management frameworks in light of the cross-border and cascading nature of climate risk – for example, under the UN's Early Warnings for All Initiative (United Nations, n.d.);
- work with an inclusive coalition of international actors to create the institutional architecture to support global risk pooling mechanisms (Ciullo et al., 2023).

Recommendation 5.3. Give climate security a home

The resurgence of traditional security threats should not distract the EU and member states from the nuanced and specific challenges brought by climate-related security challenges. Cascading climate risks will jeopardize traditional security capabilities, while the securitization of resilience needs to be avoided. Building a collective and cooperative approach to managing climate-related security challenges can avert the possibility of destabilizing and reactive responses, which may lead to social instability or wider challenges within member states.

To enable more coherent handling of the climate–security nexus, climate-related security issues, including preventative action, need an institutional home in the EU's external action service. A 'hub' approach could facilitate the necessary inter-service coordination, and should:

- learn from security and defence departments' long-held experience of strategic foresight and risk analysis;
- build on the 2023 'Joint Communication – A new outlook on the climate and security nexus' (EEAS, 2023). This provides an initial unifying vehicle across DGs and the EEAS to exchange views on this topic, and could be strengthened to promote strategic and operational coordination. The Commission should support the implementation of the 30 actions listed in the Joint Communication;
- understand and account for changes to geostrategic behaviour from international actors, which seek to exploit instability created by climate change and transition (Lazard, 2023).

What is at stake?

Europe's exposure to cascading climate impacts increases if countries, communities and companies outside the EU do not have the capacity to prevent initial climate impacts from escalating and propagating. The same is true if international institutions are unable to facilitate the cooperation needed to prevent and reduce such risks.

Poor awareness of cross-border cascades, and incoherent approaches to foreign policy in third countries, can exacerbate both the initial impact and the impact chain or cascade.

As cascading climate impacts play out in an increasingly unstable world, a retreat from multilateralism will feed polarization, will further damage and impoverish countries most at risk of direct climate and cascading climate impacts, and will isolate the EU. This will ultimately constrain the EU's options for building resilience and managing cascades.

Related CASCADES resources

- Adamczak, W. et al. (2022), 'Lessons from the final CASCADES stakeholder workshop', https://www.cascades.eu/lessons-from-the-final-cascades-stakeholder-workshop
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- Ringsmuth, A. K. et al. (2022), 'Lessons from COVID-19 for managing transboundary climate risks and building resilience', https://www.cascades.eu/publication/lessons-from-covid-19-for-managing-transboundary-climate-risks-and-building-resilience

European societies

Individuals, communities, businesses and civil society must be prepared for disruption and be capable of contributing to resilience.

Within its borders, the EU is committed to promoting its values, peace and the well-being of its citizens. It aims to combat social exclusion and discrimination, to promote social justice and protection, and to enhance economic, social and territorial cohesion and solidarity among EU countries (European Union, n.d.).

There is broad variation of approaches to governance, social contracts and political ideologies both within and across member states, and the authority and influence of the EU as an institution over member states waxes and wanes over time and differs across these contexts. Among the public, there is widespread popular disenchantment. Both these factors increase the challenges the EU faces in promoting common values and pursuing common goals and ideals.

In the EU, as across the rich world, economic inequality and stagnating living standards have fuelled support for formerly fringe political figures and projects, with polarizing and destabilizing consequences. Increasing inequality, particularly, has prompted scepticism of the current system's ability to address complex problems, including climate change, in what is seen as a fair or equitable manner.

Preparing for disruption

Cascading climate risks have the potential to disrupt European societies at multiple scales via networks of trade, finance, mobility and communication. In Europe, as elsewhere, society's most vulnerable members are likely to face the greatest impacts. As elsewhere in the world, European societies are practically and psychologically underprepared to meet and manage the impacts of climate change, including cascading climate impacts (Creutzig et al., 2022).

Local resilience can help to avert or halt cascading consequences that might otherwise have national or international impacts

Communication about climate change between governments and citizens, in Europe as elsewhere, has tended to focus on improving efficiency and consumer choices which achieve only minor mitigation gains. Current policies on consumer action are not in line with climate mitigation goals, and tend to avoid potentially economically disruptive or politically unpopular aspects of transition, such

as reducing meat and dairy consumption and avoiding flying (Ibid). Attempts to engage the European public on adaptation have been even less successful (Mulholland et al., 2020), although this is now increasing in step with the escalation of direct climate impacts in Europe, such as heatwaves and wildfires.

Shocks from cascades have the potential to impact individuals, communities, businesses and civil society. Conversely, these groups are integral to Europe's strategic response to cascading risks. Local resilience can help to avert or halt cascading consequences that might otherwise have national or international impacts.

Recommendation 6. Support strong societies for cascade resilience

Societies will need strong political and social capital to endure shocks from cascades. Action by the EU to reduce inequality, and to promote participatory leadership and democratic health can help to maintain or strengthen the social fabric and enable society to play a part in the management of cascades and wider resilience-building.

Recommendation 6.1. Develop resilient local economies and communities

One way that cascading impacts will affect local economies in Europe is via financial cascades that disrupt firms (see Figure 3. Overarching cascading climate impacts for Europe). Such impacts could harm entire local economies, especially where they rely on a major employer or sector that dominates local industry and jobs.

Other impacts for local communities from cascading climate risks are likely to include disruptions to food supply and volatile food prices, fertilizer shortages and price volatility impacting agricultural regions, as well as inward migration to European communities. If such impacts are not well managed, political destabilization and damage to social capital are likely to result as further cascading impacts of the above.

- Transparency, consultation and coordination should be enhanced around European climate policies and regulations to manage cascading climate risk, which themselves have cascading impacts on local economies. The Commission should support member states and local governments to anticipate and proactively manage adverse cascading effects on economies at local level.
- Local resilience plans should be created as part of sub-national adaptation strategies, which directly consider the role of local economies in offering resilience to cascading climate risk. These plans could also feature or link to Action Plans under the Urban Agenda for the EU.
- DG AGRI should collaborate with member states and local government representatives to build local visions for food production which support resilience in European agri-food systems in line with European and global visions of resilient, sustainable food systems. The strategic dialogue on the future of agriculture in the EU, announced by President von der Leyen in her September 2023 State of the Union address, should advance this approach.

Recommendation 6.2. Reduce social inequality and strengthen cohesion

Cascades, like other climate impacts, disproportionately affect the most vulnerable in society. Reducing inequality, and providing targeted support, can help to prevent some of the worst cascading impacts for European citizens.

A redefinition of strategic economic objectives could help to build resilience at multiple, interconnected levels. This would require local and national economies to adopt and pursue a broader suite of performance metrics in addition to gross domestic product (GDP). These redefined objectives would ideally have a long-term focus and would target and promote human well-being, including societal and ecological resilience.

Trust in government is also vital for managing cascading climate risks, which will often seem intangible to wider society, and which are likely to encompass impacts in politically sensitive domains such as security, food prices and migration. The EU and its member states must therefore re-double their efforts to build and engender trust in society and of government in particular.

- To support such trust, the Directorate-General for Communication (DG COMM) should act to address disinformation and support accurate understanding of politically sensitive issues such as climate-induced mobility, migration and displacement. Such disinformation can undermine European unity and international solidarity and can feed extremism.
- Feelings of political disempowerment have been shown to undermine trust, while openness, integrity and equal treatment are critical for trust in democracy (OECD, n.d.).
  - The European Parliament should recommit to better informing the public about climate change, including on complex areas such as cascading climate risks.
  - Inclusive consultations should be held, where appropriate, on responses to cascading climate risks. Public will should be incorporated into solutions, and process and outcomes should be clearly communicated to the public to reinforce trust and a sense of democratic agency.

Recommendation 6.3. Engage and support wider society

Despite best efforts, Europe is likely to experience an increase in cascading climate impacts resulting from hazards originating beyond its borders. To prepare for and manage such risks, European civilians will need to be engaged as part of comprehensive responses, which are likely to be different to those needed for direct climate risks, such as Emergency Alert Systems for wildfires or flooding.

These more traditional forms of adaptation may, however, act as a stepping stone to engaging the public with more complex responses to cascades – for example:

- Longer-term engagement in demand reduction and resource conservation during crises, as seen in the 'Playing my part' campaign by the Commission and International Energy Agency (European Commission, 2021b), in the wake of Russia's invasion of Ukraine.

- Shifts in consumption of certain goods to help with supply chain insecurity as a result of climate impacts, such as shifting staple grains in the event of breadbasket failure.
- Participation in humanitarian responses to buffer cascading impacts, such as support for climate refugees or donations to disaster response funds.

Public engagement of this kind is likely to be a joint responsibility between civil society organizations and local and national governments within member states. Those supporting European citizens in cascades response should themselves be supported through EC dissemination of access to the best available tools, skills and information, and the sharing of best practice. These parties should be informed of the steps that the Commission and member states are taking, and be enabled to adapt these to the contexts in which they operate.

What is at stake?

The cascading impacts of climate change are becoming increasingly difficult for European citizens, businesses and civil society to ignore. Political reticence to actively engage the public as part of the solution cuts off an avenue of responses, reducing options for building European resilience.

As stresses increase, long-term agendas may become increasingly politically unpopular and difficult to prioritize, trapping the EU and member states in 'fire-fighting' mode, while risks continue to escalate

Resilience requires long-term planning that may run against short-term societal, economic and political incentives. As stresses increase, such long-term agendas may become increasingly politically unpopular and difficult to prioritize, trapping the EU and member states in 'fire-fighting' mode, while risks continue to escalate.

If the public is insufficiently prepared, shocks from cascading risks, including known political 'triggers' such as rising food prices and entrenched negative perceptions of the impacts of increased migration, will compound existing strains on societies, with potentially negative consequences for political and social stability. This in turn will undermine the potential for measured, constructive government responses to these issues.

Related CASCADES resources

- Bodirsky, B. L. et al. (2020), 'The ongoing nutrition transition thwarts long-term targets for food security, public health and environmental protection', https://www.nature.com/articles/s41598-020-75213-3.pdf
- Hildén, M. et al. (2020), *Cascading climate impacts: a new factor in European policy-making*, https://www.cascades.eu/publication/cascading-climate-impacts

- Knaepen, H. (2022), *Looking back at the 5th European Climate Change Adaptation Conference* (ECCA 2021), https://www.cascades.eu/publication/looking-back-at-the-5th-european-climate-change-adaptation-conference-ecca-2021
- O'Neill, B. C. et al. (2021), 'Achievements and needs for the climate change scenario framework', https://www.cascades.eu/publication/achievements-and-needs-for-the-climate-change-scenario-framework
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- Thiery, W. et al. (2021), 'Intergenerational inequities in exposure to climate extremes', https://www.cascades.eu/publication/intergenerational-inequities-in-exposure-to-climate-extremes
- Van den Hurk, B. et al. (2020), 'What can COVID-19 teach us about preparing for climate risks in Europe?', https://www.cascades.eu/publication/what-can-climate-risks-teach-us-about-preparing-for-climate-risks-in-europe

The policymakers' toolkit

CASCADES tools and resources have been developed, which may be useful to policymakers in learning about, understanding and building approaches to manage cascading climate risk.

The CASCADES conceptual framework

The CASCADES project proposes a 'conceptual framework', which includes a set of terms for describing and analysing cascades:

The framework distinguishes:

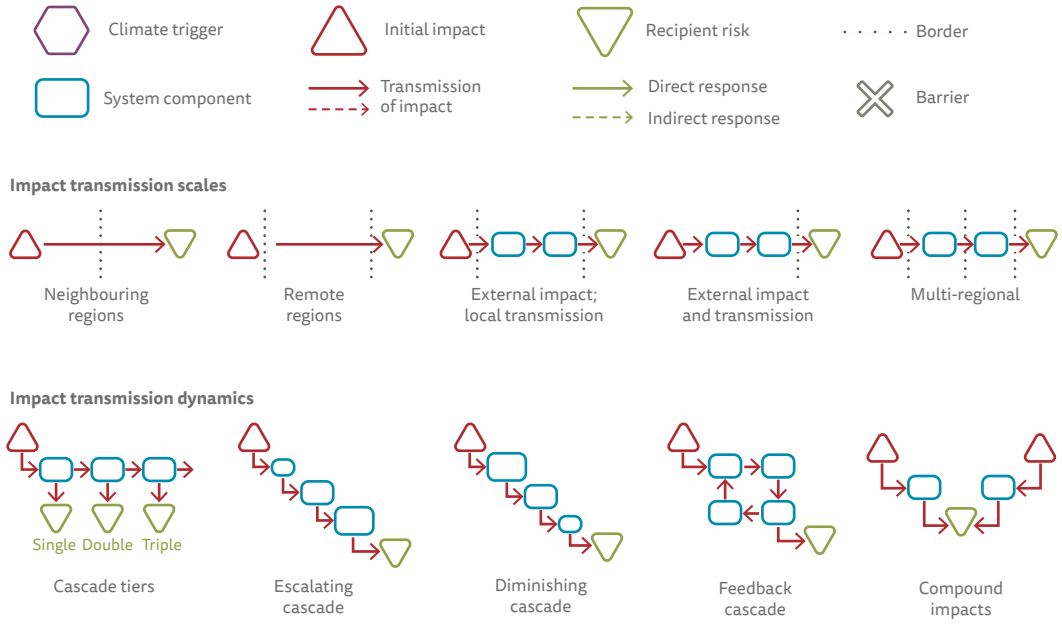
- **initial impacts** caused by a climate trigger (often within a specific region);
- the '**impact transmission system**' through which impacts propagate, often across borders;
- the '**response transmission system**' through which adaptation responses interact with the impact transmission system.

To help understand cascades, the framework recognizes different types of climate triggers, categories of cross-border impacts, scales and dynamics of impact transmission and the targets and dynamics of responses. The framework also accounts for the current and future socio-economic and environmental context in which cascades occur.

The framework can be used to identify relevant causal relationships, both in retrospect, and proactively. A retrospective approach is useful for learning, while proactive usage can help policymakers plan for, adapt to or potentially prevent cascades.

Carter, T., Benzie, M., Campiglio, E., Carlsen, H., Fronzek, S., Hilden, M., Reyer, C.P.O. and West, C. (2021), 'A conceptual framework for cross-border impacts of climate change', *Global Environmental Change*, Vol.69, https://doi.org/10.1016/j.gloenvcha.2021.102307

Figure 2. Examples of cascading climate impacts from the CASCADES conceptual framework



The CASCADES response framework

The CASCADES response framework can be used to identify and filter different types of responses to cascading climate risk. The framework:

- links cascade and response typologies;
- defines 'constellations' of actors involved in cascade responses;
- proposes a set of 'governance modalities' that may be appropriate for specific types of cascading risks.

Early applications have revealed that most of the responses identified to date by planners and stakeholders tend to focus either on addressing the triggers and initial impacts of cascading risks (i.e. upstream), or alternatively on coping measures for risk recipients (i.e. end of pipe). The framework also helps to focus attention on the options for cooperative responses throughout the impact transmission system (i.e. pipeline solutions). This focus broadens the set of options available to those tasked with managing cascading climate risks, and enables more proactive responses once a cascade has been initiated, but before its full impacts have materialized.

An important element is the recognition that responses to cascading risks can themselves exacerbate or trigger 'cascading' impacts. The response framework offers a structure to potentially minimize undesirable outcomes.

> Talebian S., Benzie M., Harris K., Jarząbek Ł., Magnuszewski P., Carter T. R., and Obermeister N. (2023). 'A conceptual framework for responding to cross-border climate change impacts (Version 01)', Zenodo, https://doi.org/10.5281/zenodo.7817615

The CASCADES policy simulations and serious game

Policy Simulations[11]

Policy simulations allow participants to explore plausible, research-based stories of the future with realistic effects of several cross-border cascading climate impacts. Using roleplay and design elements from serious games to structure communication, the experience involves real-world stakeholders: experts and practitioners concerned about the future of a region or an organization.

The simulation allows them to develop strategic insights by building on selected, fictionalized representations of real-world structures and processes. Conceived as a learning and creative opportunity, it offers a safe space for experimentation, and gives participants novel tools to confront natural-human systems complexities.

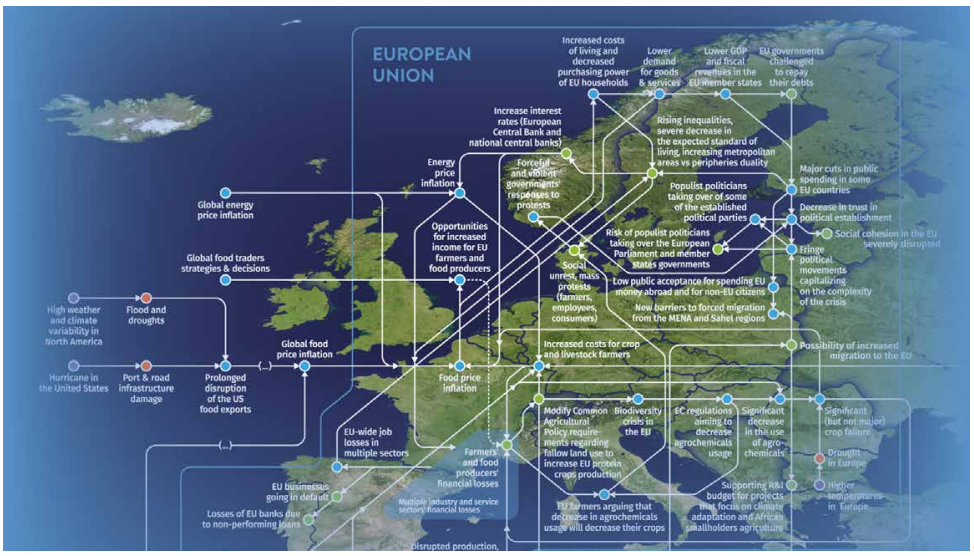
The policy simulation sessions conclude with a debriefing that bridges the simulated experience with the real world and leads to stakeholder dialogue about required changes that can bring them closer to their desired futures.

Three policy simulations were developed based on CASCADES research: Future of Food, Raw Materials Crisis, and Arctic Future.

The CASCADES Serious Game[12]

The CASCADES game is an interactive educational tool introducing the concept of cascading climate impacts and policy responses to address and tackle them. The storyline presents participants with a concrete, complex challenge that is first generated by a series of climate triggers outside the European Union, and then, through a sequence of teleconnected cascading impacts, severely influences European society, economy, and politics.

The CASCADES game was created for policy and climate educators and university teachers searching for an interactive introduction to the topics connected with cascading climate risks. It is also possible to use the game during workshops and other initiatives engaging policy makers.



[11] https://www.cascades.eu/topic/simulations-and-serious-game/

[12] https://www.cascades.eu/multimedia/the-cascades-multiplayer-game/

Conclusions

Relevance of CASCADES recommendations beyond Europe

While the focus of CASCADES is on Europe, the findings of the project, as with cascading climate risks themselves, have implications across the globe. The CASCADES project explores climate risks which are not, or cannot be, confined within national borders. Different regions, countries and sectors will, of course, need to approach cascading climate risk in different ways, and each face their own unique challenges and circumstances. There are, however, many points of common interest:

- All regions, countries and continents need to consider what cascading climate risks mean for them, including how they might be affected, and how their action or inaction will affect those beyond their borders.
- Countries' actions to address cascades will themselves have cascading impacts for other countries, for example:
  - changes to adaptation finance;
  - changes to foreign policy, security and development;
  - changes to international operations, including attempts to build alliances and trust with countries who might partner in cascade response.
- Strategies to build resilience require interventions in global systems which will affect all countries.

Adaptation therefore needs to be inclusively planned and implemented, with cooperation at international and global scales.

Figure 3. Foundational principles for cascades resilience

Foundational principles for cascades resilience

Cascading climate risks are likely to exceed what climate projections and models can accurately predict. In response, a strategic and transformative approach is needed. The tools, structures and mindsets needed to manage cascading climate risks will improve resilience to a range of emerging and growing threats in a complex and uncertain world.

The following principles cut across the recommendations and could help to inform efforts to build cascading climate risk resilience in Europe.

1. **Prevent** – mitigating climate change is the best, most certain and efficient risk management policy option available. The more effective mitigation is, the lower the costs of adaptation, including the uncertain, potentially astronomical costs of adapting to cascading climate risk.
2. **Do no harm** – in external action and international relations, building resilience with one hand, while undermining it with the other, exacerbates vulnerability for all, further driving cascading risks. It also damages legitimacy and credibility. 'Policy coherence for resilience'[13] needs to become a thread throughout governance. Doing no harm by acting coherently and strategically reduces the scale of the adaptation challenge.
3. **Be transparent** – countries and regions will need to be informed and honest about the cascading climate risks that begin, travel through and end in their territories. National Adaptation Plans and the EU Adaptation Strategy should clearly identify and communicate to affected stakeholders:
   - which cascades may originate in or pass through their territory;
   - where and how domestic or regional policies, including those aimed at adaptation and resilience-building, may drive, exacerbate or redistribute cascading risks within or beyond their borders.
4. **Cooperate, compromise and lead** – recognizing the need for international solidarity in the face of common risks, countries and regions should be willing to invest in resilience beyond their borders, and accept near-term costs for longer-term resilience gains. Higher-income countries especially should demonstrate willingness to work with others to reform regional, international and global institutions to better respond to cascading risks.
5. **Work for just resilience** – Cascading climate risks reveal the interdependence between countries at all levels of development, and how systemic resilience benefits all. Attempts to build resilience beyond borders that are solely or primarily intended to protect the narrow self-interest of high-income countries are unlikely to be accepted by low- and middle-income countries. Such an approach would be neo-colonial, divisive and ultimately ineffective. High-income actors, such as the EU, should, therefore work for *just systemic resilience*, with outcomes that fairly benefit all parties touched by the relevant cascading climate risk. Procedural justice is important – meaning that those affected by adaptation outcomes must be involved in assessment, planning and evaluation. This represents a new approach to global adaptation.

[13] '... the idea that it will be necessary to align objectives and means of implementation across a wide variety of policy domains – such as trade, finance, security and foreign policy – in order to build resilience to future climate risks that originate both at home and abroad.' Source: Adaptation Without Borders (2023)

Final reflections

The European Union is not prepared to manage cascading climate risks. Changing this is an urgent necessity for two reasons.

First, climate hazards will only intensify and accelerate over the next 10 to 15 years. Failures to mitigate global climate change mean that even if greenhouse gas emissions can be rapidly curbed, warming will continue until at least 2040. The level of adaptation action that is currently planned and the provision of finance for adaptation that is currently foreseen fall far short of what is required to build resilience to these proliferating climate hazards. Escalating cascading climate change impacts, are, therefore, inevitable. The EU's only choice is whether to be reactive or proactive in its approach to them. The more proactive it can be, the lower the human and economic cost of cascading climate risks will be.

Second, rapid systemic change is necessary to curb greenhouse gas emissions, limit climate hazards, and adapt to climate change that is already happening, or that is unavoidable given the status of global mitigation efforts. Systemic changes are likely to 'lock in' new ways of doing things. A concerted and proactive response to cascading climate risks offers an opportunity for European policymakers to increase their systemic literacy and build risk and resilience thinking. Seizing this opportunity will enable those tasked with effecting rapid, systemic change to do so in ways that benefit rather than undermine widespread and longer-term resilience.

Cascading climate risks are likely to transform international relations and human experience as the planet warms. Decision-makers now have the opportunity to influence this transformation. By examining the threads of cascading climate risk, which run throughout complex global systems, the EU and other global actors can better understand the fabric of our current system. This understanding will help them to weave a more resilient social and economic fabric for the future.

Appendix

Acronyms

CBAM	Carbon Border Adjustment Mechanism
CER	Critical Entities (Directive)
CSDDD	Corporate Sustainability Due Diligence Directive
DFIs	Development finance institutions
DG BUDG	Budget
DG CLIMA	Directorate-General for Climate Action
DG COMM	Directorate-General for Communication
DG DEFIS	Defence Industry and Space
DG ECFIN	Economic and Financial Affairs
DG ECHO	European Civil Protection and Humanitarian Aid Operations
DG FISMA	Financial Stability, Financial Services and Capital Markets Union
DG HOME	Migration and Home Affairs
DG INTPA	International Partnerships
DG NEAR	Neighbourhood and Enlargement Negotiations
EEAS	European External Action Service
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EIB	European Investment Bank
ETS	Emissions Trading System
EU	European Union
EUCRA	European Climate Risk Assessment
FTAs	Free Trade Agreements
GGA	Global Goal on Adaptation
IPEF	Indo-Pacific Economic Framework
NAP	National Adaptation Plans
ODA	official development assistance
PCSD	policy coherence for sustainable development
PD	probability of default
PDBs	public development banks
SMEs	small and medium-sized enterprises
TEIs	Team Europe Initiatives
UNFCCC	United Nations Framework Convention on Climate Change
V20	Vulnerable Group of Twenty
VP	Vice President
WTO	World Trade Organization

Methodology

The methodology for development of the final CASCADES recommendations was a multi-step, multi-stakeholder process. Key steps are detailed below.

'Top-of-mind' recommendations mining

The recommendations process began with a workshop session among the consortium held at the University of Venice. Consortium members split into work package groups and noted their top-of-mind recommendations emerging from the project, breaking these down into near-term actions and strategic transformations. Recommendations were then incorporated into the 'long list' at the next stage.

Long-list recommendations

An initial 'long list' of more than 300 recommendations was drawn up from across the CASCADES project work. Around 60 CASCADES publications and the combined knowledge and understanding of the consortium partners and wider stakeholders were used as inputs into a summary of recommendations in Excel.

Recommendations were categorized according to the following measures:

- source of the recommendation – e.g. CASCADES publication, discussion among consortium members;
- work package of most relevance (WP3 Trade, WP4 Foreign Policy, Security and Development, WP5 Finance), or cross-cutting across work packages;
- adaptation or mitigation focus;
- timescale for implementation: near-term (one to two years), mid-term (three to five years) or long-term (up to 2030).

Thematic coding

The recommendations were also coded thematically, with themes emerging of:

- agricultural resilience / food security
- land use
- trade / industry / private sector
- finance / economy
- development / social inequalities
- knowledge / data / skills
- security / stability / conflict
- international cooperation
- EU / national governance
- local governance
- regulations
- coordination / coherence
- individual action
- technology.

Comparison with the CASCADES response framework

The recommendations were then considered against the CASCADES response framework (see The policymakers' toolkit), and categorized according to:

- Response type, covering:
  - block
  - domestic resilience
  - adaptation at the origin of the risk
  - targeted influence within the system
  - targeted influence outside the system
  - substitution
- Governance modality, covering:
  - internal adaptation
  - targeted collaboration
  - external collaboration
  - broad collaboration
  - deflection.

The comparison with the response framework was used to sense-check the completeness of both the response framework and the CASCADES recommendations. The long list was found to have a spread of response types, with most recommendations focusing on building domestic resilience to risks, and supporting adaptation at the origin of cascading climate impacts. Targeted influence responses, both within and outside the transmission system were also common. Perhaps unsurprisingly, very few CASCADES recommendations were of the 'block' or 'substitution' response types.

Regarding governance modalities, none of the recommendations suggested 'deflection' responses, but rather collaboration governance responses were favoured, primarily 'targeted collaborations', but also 'external' and 'broad collaboration' response types. Internal adaptation responses were also favoured.

This analysis supported the premise that constructive responses to cascading climate impacts are likely to flourish under conditions of collaboration and compromise, while 'blocking', 'deflection' and 'substitution' of risk are not supported by the CASCADES recommendations.

Assigning recommendations to Directorates-General

Each recommendation was assigned to the DG or EU institution(s) likely to:

1. lead delivery of the recommendation;
2. support delivery of the recommendation.

As part of the validation process, 'briefing documents' were generated from the recommendations long list. In a workshop session held at Chatham House in London, the CASCADES consortium team engaged with these briefing documents, pulling out 'headline recommendations from CASCADES' for each relevant DG. This process fed into shortlisting of the recommendations, focusing the team on what was most relevant and actionable for the EU in practical terms.

Shortlisting recommendations

An iterative process of shortlisting, testing and refining recommendations then took place among the consortium team, and through collaborative stakeholder engagement (see Table 2. summary of stages in the recommendations development process). The aim was to arrive at a list of recommendations which would be sufficiently high-level and broadly relevant, but also would be actionable by key European stakeholders.

The CASCADES recommendations validation workshop

One of the final steps in the process of recommendations development was the CASCADES recommendations validation workshop, held in Vår Gård, Stockholm archipelago, on 27–29 March 2023. The workshop set out to equip and engage EU and wider stakeholders with recommendations to better manage the cascading climate risks that Europe faces, and to strengthen the impact and legacy of the project.

Participants explored the recommendations' novelty, relevance, timeliness, feasibility, appropriate targeting and potential impact. The group also generated new recommendations through reflection on the findings, drawing from the assembled expertise in the room.

The workshop generated the expected dynamic exchange and dialogue between experts, critical thinkers and policymakers, with in-depth exploration of cascading climate risks and their implications for the EU, member states and wider stakeholders.

A select group of 35 invitees included representatives from:

- Directorates-General of the European Commission
- targeted member states of the European Union
- banks, donors and investors, and the private sector
- services and intergovernmental organizations of the European Union
- critical thinkers and experts in key sectors, including risk management and governance
- experts from the CASCADES consortium team.

Table 2. Summary of stages in the recommendations development process

Activity	Timeframe	Stakeholder input
CASCADES publications review and logging of recommendations	Jan 2022–Aug 2023	Consortium authors and co-authors beyond the consortium
Analysis of interactions between recommendations	Jan 2022–Aug 2023	Deliverable 6.4 team
Initial recommendations workshop – Venice	Mar 2022	Consortium representatives (n=31)
Robustness and coherence against CASCADES WP2 scenarios	Apr 2022	CASCADES Deliverable 2.2 authors
Analysis of CASCADES Strategic simulation exercise held at Chatham House in London	Oct 2022	Wide group of external stakeholders (n=60)
Target audience scoping interviews	Jan 2023	Target audience, including EU stakeholders
Target audience analysis for the recommendations	Jan 2023	CASCADES Work Package 6 team
Work package lead validation calls	Feb and May 2023	Work Packages 3–5 leads
Workshop on the geopolitical context of the recommendations	Mar 2023	Chatham House wider team
3-day stakeholder validation workshop held in Stockholm (see more details below)	Mar 2023	Wide group of 35 external stakeholders
Validation through bilateral meetings, panel discussion with audience questions, and wider dissemination events	Mar to Sep 2023	Expert reflections from panellists including EC, UK Gov, AU and aide group of external stakeholders (n=c.500)
Internal peer review of recommendations report	Jun 2023	Work Packages 3–5 leads and selected consortium members
Anonymous external peer review of recommendations report	Sep 2023	Wider stakeholders previously engaged in the recommendations process

Synthesis reporting

Once the recommendations shortlisting and validation was complete, the final shortlist was written up into this report. Validation reviews and calls were held with each relevant CASCADES work package lead, and an internal peer review process involved stakeholders from across the consortium. A final anonymous external peer review process was also conducted to gather reflections from stakeholders engaged in the recommendation generation and validation processes.

EU recognition of cascading climate risk

The *European Green Deal* does not mention cascading climate risk. It does, however, recognize climate change as a significant 'threat multiplier' whose challenges are complex and interlinked. The Green Deal instructs the EU to integrate climate policy implications into external policy and action, and to channel influence, expertise and financial resources to increase the climate resilience of its neighbours.

The *EU Strategy on Adaptation to Climate Change*, updated in 2021 (EC, 2021a), dedicates a section to 'Stepping up international action for climate resilience', and refers repeatedly and explicitly to cascading climate impacts. It recognizes that climate change can have 'knock-on' effects and that climate impacts elsewhere can spill over into the EU from elsewhere in the world. The strategy notes that the 'pervasiveness' of climate change demands a systemic approach to adaptation and coordinated international action.

In 2022, the Council of the European Union published its *Conclusions on Civil Protection Work in view of Climate Change*, which

> ... considers that, as a result of climate change, Member States and Union institutions must be prepared to tackle large-scale, multi-sectoral, cross-border disasters with cascading effects, which may occur simultaneously and more frequently, within and outside the Union.

The EU also funds scientific and policy research on CASCADES through its Horizon Europe programme. This report is an output of the Horizon-supported CASCADES project, which employs state-of-the-art quantitative and qualitative research and stakeholder engagement approaches to identify how the risks of climate change to countries, economies and peoples beyond Europe might cascade into that continent. Horizon Europe also supports RECEIPT, which maps Europe's vulnerability to remote climate events and builds 'storylines' to explain the potential impacts.

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