What can COVID-19 teach us about preparing for climate risks in Europe?

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Summary

- The COVID-19 pandemic is affecting many areas of decision-making and policy planning. Lockdowns, economic shocks and public recovery packages are affecting the way we plan for the future, and have shifted societal values and perceptions of risk. Societies across the world have rapidly developed a "new normal", whilst coping mechanisms and levels of cooperation vastly differ across the globe, significantly affecting impacts and costs. This context should be taken as a new starting point when planning for future crises.

- Like COVID-19, climate change impacts have the potential to disrupt society via interconnected global networks. Governments, businesses and large organizations trying to anticipate future disruption must take a "systemic" perspective when designing policies to reduce and manage these risks. This approach will have significant implications for how risks are mapped, assessed and managed.

- It is essential to understand how to respond to other high impact events in order to reduce risks and increase the overall system resilience and preparedness. These events are likely to occur more frequently in a world that is warming and increasing in connectivity and interdependence.

- Responses to the pandemic and the pandemic itself - as with climate change - have had the most detrimental effects on the most vulnerable groups. The ongoing fallout from COVID-19 demonstrates the need for greater multilateral and regional attention to resilience, particularly in terms of trade, fiscal stimulus policies and social safety-nets. But it is important to think of resilience as a process of evolution: current reforms and measures must lead to better preparation for not only future pandemics, but also for a range of events and compound events induced by a changing climate.

- Actions to approach climate change as a systemic rather than a localized risk include collaborative ways to identify and visualize direct and indirect impact cascades that cross economic sectors and regional boundaries, and redefine the goals of climate adaptation plans to address system-wide resilience.

- Scenario tools and social simulation techniques are useful tools to support stakeholders' preparedness and contingency planning. These tools should be deployed more widely to foster system-wide risk mitigation and management strategies.

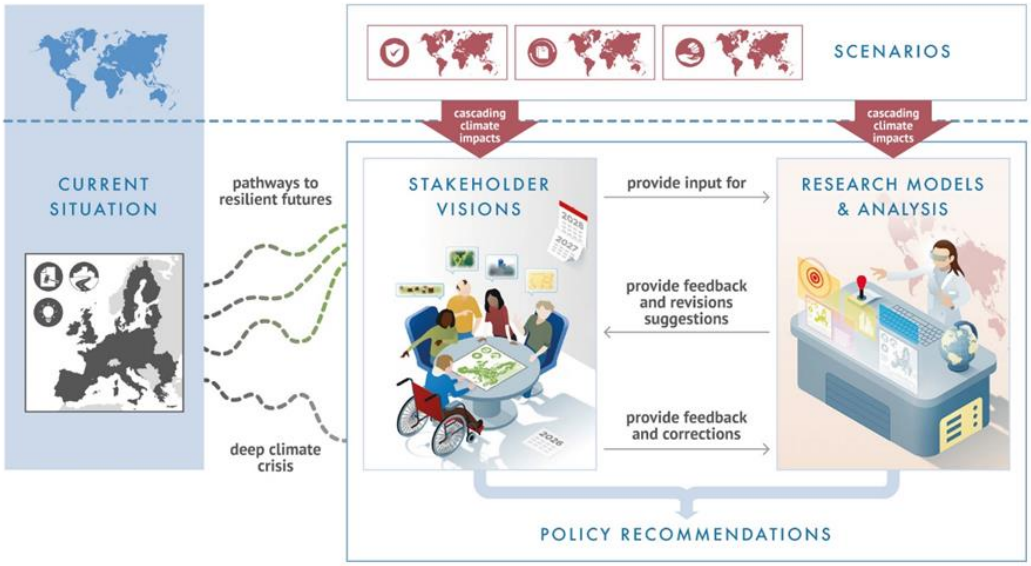
Introduction

The cascade of impacts set in motion by the COVID-19 pandemic has raised concern about the resilience of our interconnected world against major shocks and pressures that are foreseeable but uncertain in timing and effects. The current crisis shows that when governments, businesses and communities are taken by surprise, they can adapt or create new strategies on the fly, but these do not prevent large-scale impacts on health, income, wellbeing, the environment and social equality. The handling of the pandemic suggests that the world is ill-prepared for ongoing and accelerating societal and environmental risks induced by climate change. A pandemic is just one type of transboundary risk that may be exacerbated by climate change; other combinations of climate events with environmental degradation will similarly transgress political boundaries, with wide-ranging implications for our global systems and the need for increasing social-ecological resilience. This policy brief, from two European research projects analysing the global dimension of climate change impacts on Europe, presents a number of COVID-19 lessons for European climate change research and policy.

BOX 1: The Projects

CASCADES and RECEIPT are research projects that examine the socio-economic effects in Europe of climate change impacts occurring in regions outside its territories. The European Union is connected to the rest of the world via trade, food security, financial interests and diplomatic relationships, and may experience the adverse impacts of extreme events or strong trends in remote areas. The projects develop innovative methods to identify the network connections, map the relevant climatic features in global hotspots, and model the socio-economic impacts on European sectors. Both projects run from 2020-2024.

Figure 1: Integrating stakeholder knowledge and perspectives in the research process.



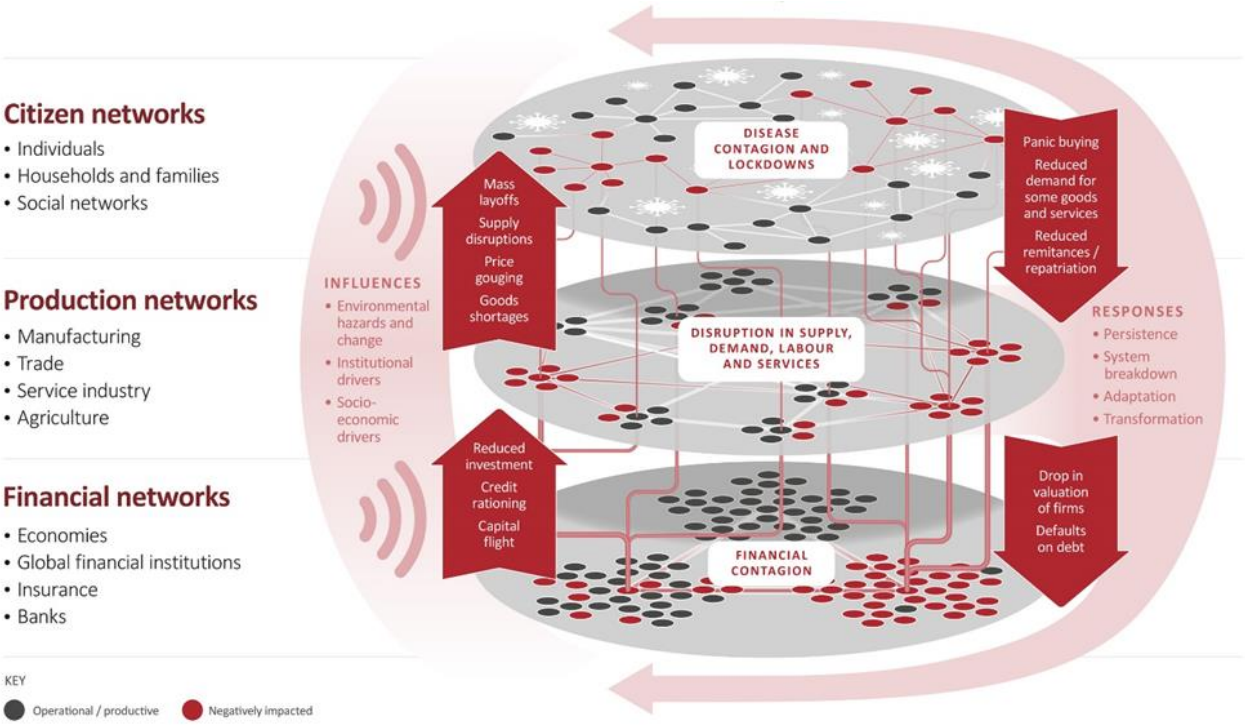
Attention for systemic risks

The interconnectedness of our global networked systems – for example in information, trade and banking – can increase resilience to short-term disruptions, enable fast responses to a changing situation and provide fallback options. However, the same interconnectedness may facilitate a rapid propagation of impacts from one region or sector to another when crises such as COVID-19 require immediate and bold measures. The rapid spread of the COVID-19 virus and the subsequent response impacts were facilitated by international trade and travel, and then through lockdowns and mobility restrictions affecting consumer demand, supply, company revenues, unemployment and national economies. Our level of connectivity has meant the effects in one region quickly impacted on others (see Box 2). Perceptions of uncertainty and unprecedented risks further amplified adverse impacts across the entire cause-effect chain. Forecasts of deeper recession and the prospect of rising public debts, for example, may trigger new sovereign debt crises, both in developing and industrialized countries.

Box 2. Connectivity and risk

Figure 2 illustrates how COVID-19 risks can (and did) transmit to and between interconnected networks, including those at the individual human level, the production and supply level, and on the often-invisible mechanisms of the national and global economies. Risks can emerge in one network and be transmitted to another via a number of ‘transmission factors’, examples of which are shown by the red arrows. Actual impact will be affected by external ‘Influences’ at the outset of a crisis and the pre-existing level of preparedness and resilience. The ‘Responses’ will then affect the system robustness against subsequent pandemic waves or other crises.

Figure 2: How impacts of a crisis can cascade globally through interconnected networks: the Covid-19 example



Many networks are designed to maximize efficiency or profits rather than to build long-term societal resilience: automated trading on international markets and just-in-time long-distance supply chains promote the overexploitation of resources and the concentration of market power in the hands of few. This dynamic increases the vulnerability of the overall system.[1]

Climate change impacts have the same potential for amplification through system interconnectivity, political responses, and social vulnerability. Most climate-driven disruptions of global socio-economic networks will not originate from a single climate event,[2] although exceptions exist.[3] Importantly, the cumulative effect of large numbers of scattered smaller or larger events can affect many societal stakeholders and sectors simultaneously. For example, simultaneous crop losses due to droughts in key production regions can drive up

[1] Klimek, P., Obersteiner, M. and Thurner, S (2015), 'Systemic trade risk of critical resources', *Science Advances,* 1(10): e1500522.
[2] Raymond et al. (2020), 'Understanding and managing connected extreme events', *Nature climate change,* 10(7): pp. 611-621.
[3] Lenton, T. et al. (2019), 'Climate tipping points – too risky to bet against', *Nature*, 27 November 2019, https://www.nature.com/articles/d41586-019-03595-0.

global food prices, potentially triggering social displacement[4] and unrest.[5] This cumulative impact can aggravate the hardship of those already significantly affected by climate change.

Insurance and financial asset managers recognise the major impacts of floods, which affect stocks, real estate and assets in global portfolios. Positive or negative revaluation of entire asset classes due to exposure to climatic hazards can affect the performance of the portfolios of investors,[6] e.g. via the change in the value and spreads of sovereign bonds.[7] Climate-related financial risks have reached the radar of European policymakers (Action Plan on Financing Sustainable Growth[8]) and financial supervisors.[9] International security and foreign policy will be increasingly affected by the political repercussions of local economic and environmental damage and the resulting societal tensions.

Linked collections of climate change impacts should be understood as "systemic risks".[10] Systemic risks are characterized by the potential for cross-sectoral impacts to reverberate across geographical and political boundaries.[11] They are likely to materialize as a result of a "chain-sequence of interconnected failures"[12] whereby the impacts accumulate, impairing or triggering the breakdown of entire systems.[13] Risks will be greatest where there are high levels of interdependency between conditions that amplify risk, secondary disasters and critical nodes such as infrastructure, major trading hubs and key financial hubs.

In order to increase overall system resilience and preparedness for cascading impacts of climate change, we need to understand how these cascading impacts affect systems and how systems can adapt. Visualizing the risks and impacts of interventions can support policy actions to limit systemic risks and understand the dependencies on internal and external interactions.

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[4] United Nations Climate Change (2017), 'Climate Change Is A Key Driver of Migration and Food Insecurity', *UNFCCC,* 16 October 2017, https://unfccc.int/news/climate-change-is-a-key-driver-of-migration-and-food-insecurity.

[5] Gaupp, F., Hall, J., Hochrainer-Stigler, S. and Dadson, S. (2020), 'Changing risks of simultaneous global breadbasket failure', *Nature Climate Change,* 10(1): pp. 54–57, https://doi.org/10.1038/s41558-019-0600-z.

[6] Battiston, S., Mandel, A., Monasterolo, I., Schütze, F., & Visentin, G. (2017), 'A climate stress-test of the financial system', *Nature Climate Change* 7(4): pp. 283-288.

[7] Battiston, S., Jakubik, P., Monasterolo, I., Riahi, K., & van Ruijven, B. (2019), 'Climate risk assessment of the sovereign bond portfolio of European Insurers', *Financial Stability Report,* pp. 69-89.

[8] European Commission, Directorate-General for Financial Stability, Financial Services and Capital Markets Union (2018), 'Action Plan: Financing Sustainable Growth', *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Region,* https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52018DC0097.

[9] Network for Greening the Financial System (2019), 'A call for action: Climate change as a source of financial report', https://www.ngfs.net/sites/default/files/medias/documents/ngfs_first_comprehensive_report_-_17042019_0.pdf.

[10] Aglietta, M., and Espagne, E. (2016), 'Climate and Finance Systemic Risks, more than an Analogy?', *The Climate Fragility Hypothesis*, http://www.cepii.fr/PDF_PUB/wp/2016/wp2016-10.pdf.

[11] Folke C et al. (2011), 'Reconnecting to the Biosphere', *Ambio* 40(7): p. 719.

[12] Pescaroli, G., and Alexander, D. (2015), 'A definition of cascading disasters and cascading effects: Going beyond the "toppling dominos" metaphor', *GRF Davos Planet@Risk,* 3(1): pp. 58-67.

[13] UNDRR (2019), 'Global Assessment Report on Disaster Risk Reduction 2019', https://gar.undrr.org/report-2019.

Box 3: How CASCADES and RECEIPT are approaching climate risk

New modelling and visualization approaches can make system complexity manageable to support decisions. Simulations and storylines that support policy makers and sectoral stakeholders with action-oriented insights have been designed. Climate risk storylines[14] can map the cause-effect cascades between remote climate events to European socio-economic sectors, including relevant cross-sectoral impacts and response options. Policy simulations[15] are designed to collaboratively diagnose, analyse, and solve a specific real-life problem that requires strategic decision-making. These are powerful approaches to visualize climate risk and response options. They establish an effective science–policy interface to support stakeholder deliberation with solid scientific evidence, and enrich research methods with the practical knowledge and experience of policy makers and practitioners. Both approaches combine formal science and human perspectives on risk, responsibilities and response options.

[14] Shepherd, T. G. et al. (2018), 'Storylines: An alternative approach to representing uncertainty in climate change', *Climate Change* (151): pp. 555-571, https://doi.org/10.1007/s10584-018-2317-9.
[15] Magnuszewski, P., and Jarzabek, L. (2020), 'Reflections from our first stakeholder workshop', *Cascades,* 22 April 2020, https://www.cascades.eu/reflectionsfromourfirststakeholderworkshop/.

Defining the new normal

The near-future economic and political conditions wrought by COVID-19 are uncertain, but affect efforts and opportunities to increase climate change resilience for decades to come. Stakeholder reports collected by CASCADES and RECEIPT provide evidence of rapidly changing prospects and strategies to cope with the impacts caused by the pandemic.

BOX 4: Stakeholder reports on recent experiences with COVID-19 impacts

CASCADES and RECEIPT conducted stakeholder interviews from December 2019 to March 2020 to identify the experiences of each sector to the impacts from climate events outside Europe. During these interviews, the respondents made a number of specific observations that revealed the impact of COVID-19 on a company or sector, and shared concerns that are relevant to address climate risks:

- "It's like in insurance, you are protecting yourself up to a certain limit and I think almost everyone would say that an event like COVID is very improbable so we are not going to plan for our supply chain to be protected for two or three months of shortage. That would be so expensive that you would be out of the market soon because the protection would make your products too expensive." (Electronic sector)
- "We are not prepared for something like COVID. Fashion companies and unions are talking to the government and we hope they [will help] us." (Textile sector)
- "The biggest lesson of corona for us was that we need to learn how to be flexible. We don't know what will happen in the next few months." (Textile sector)
- "We have seen clumsy global and regional cooperation, the response has been largely characterized by national/subnational governance only." (Government representative)
- "The way shocks highlight vulnerabilities are quite similar between what is happening now with COVID and what would happen with a range of climate shocks. Some of the solutions like basic health care, social protection etc., are quite similar." (International development sector)
- "Social protection systems are typically targeted at poverty and are quite slow in responding to sudden shocks." (International development sector)

The COVID-19 fallout has shed light on the ability and willingness of people to respond drastically to crises.[16] The shock to national, regional and global economies will hamper investments to increase societal resilience against future (climate) pressures. Development aid, when linked to national GDP, will be negatively affected. Debt levels, particularly in those countries facing the double

[16] Botzen, W. et al. (2020), 'Lessons for climate policy from behavioral biases towards COVID-19 and climate change risks', *World Development (*137): 105214.

hit of lockdown and declining export revenues, will soar.[17] Conversely, the recovery measures put in place, estimated to reach US$9 trillion globally,[18] could contribute to future resilience and socio-economic sustainability. And multilateral debt and financing packages could lead to more sustainable growth models. COVID-19 raised the awareness of our reliance on international networks to exchange food, goods, people and capital. It also reinforced political trends to retreat from globalization in Europe, North America and Latin America.

The uncertainty of the near future's 'new normal' must be reflected in credible reference scenarios that analyse the potential impacts of future climate and socio-economic conditions. It is also necessary to explore the potential impact of the portfolio of recovery measures on future investments in resilience.

17 Adam, C. et al. (2020), 'After the lockdown: macroeconomic adjustment to the COVID-19 pandemic in sub-Saharan Africa', Oxford Review of Economic Policy 36(1): pp. 338-358,, https://doi.org/10.1093/oxrep/graa023.

18 Evans, S., and Gabbatiss, J. (2020), 'Coronavirus: Tracking how the world's 'green recovery' plans aim to cut emissions', *CarbonBrief,* 16 June 2020, https://www.carbonbrief.org/coronavirus-tracking-how-the-worlds-green-recovery-plans-aim-to-cut-emissions.

Resilience against systemic crises

Resilience can be broadly understood as a system's ability to return to its original state or move to a new, more desirable state after being disturbed.[19] A gradual evolution of the definition of 'resilience' in relation to human societies has occurred in recent years.[20] It was initially understood as coping with the negative impacts of change, while it has now evolved into a state where preparation for these impacts creates opportunities for broader societal progress. Resilience can be framed as a "portfolio of dividends": a collection of risk management options and investments which work across different sectors, regions, generations, etc. to minimize overall risk.[21]

In this portfolio, we can reduce the overall resilience of the global system by spreading investments and targeting the 'weak links of the chain'. For instance, economic, ecological and/or political fragility in countries that supply raw materials, labour or food, imposes a risk for nations that rely on these procurements. The Sustainable Development Goals (SDGs), endorsed by nearly all nations worldwide, promote equality, wellbeing, and the protection of nature. It has been argued that if the SDGs had been fully embraced and implemented, the world would have been in a much better position to respond to COVID-19. Perhaps the pandemic may not have even occurred.[22]

Several think tanks and financial institutions have recommended the delivery of COVID-19 recovery packages that move forward systemic investments on vital infrastructure (to meet emission targets and climate adaptation strategies), build social resilience and welfare mechanisms, and improve governance and coordination. There is now a groundswell of initiatives, including from governments, civil society and multilateral institutions to use this moment as an opportunity to reset the global economy and spur 'green recovery'. These initiatives are based on the understanding that investments in resilience and growth areas such as transport infrastructure, circular economy, digital transformation,[23] and renewable energy will create jobs and prepare for future competitiveness by investing in and up-skilling the global population. Far reaching reforms in areas such as taxation, subsidy reform and environmental regulation will need to accompany such investment to make it sustainable.

BOX 5: Examples of COVID-19 compounding social and environmental vulnerability

[19] Christopher, M. and Peck, H. (2004), 'Building the resilient supply chain', *International Journal of Logistics Management* 15(2): pp. 1-14, http://doi.org/10.1108/09574090410700275.
[20] Keating A., et al. (2017), 'Development and testing of a community flood resilience measurement tool', *Nat. Hazards Earth Syst. Sci.*(17): pp. 77-101, 10.5194/nhess-17-77-2017; Walker, B. (2020), 'Resilience: what it is and is not', *Ecology and Society* 25(2), https://www.ecologyandsociety.org/vol25/iss2/art11/.
[21] Mechler R. and Hochrainer-Stigler, S. (2019), 'Generating Multiple Resilience Dividends from Managing Unnatural Disasters in Asia: Opportunities for Measurement and Policy', *Asian Development Bank Economics Working Paper Series* 601, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3590874.
[22] Ottersen, O.P., Engebretsen, E. (2020), 'COVID-19 puts the Sustainable Development Goals center stage', *Nat Med* (26**): pp.** 1672–1673, https://doi.org/10.1038/s41591-020-1094-y.
[23] European Commission (2020), 'Shaping Europe's digital future', https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/shaping-europe-digital-future_en.

COVID-19 lockdown measures and supply chain interruptions led to cascading effects around the world and are projected to increase food insecurity.[24] The World Food Programme has estimated that by the end of 2020, an additional 130 million people could face famine. Low-paid workers and those from a socially disadvantaged background were the first to lose their jobs. Millions of migrant workers in the Arab Gulf countries, Jordan and Lebanon for example, have faced job losses and repatriation, or have been stranded without income, leading to knock-on effects for families in South and South-East Asia who depend on remittances.[25] In the US, black women were twice as likely as white men to say that they had either been laid off, furloughed, or had their hours or pay reduced because of the pandemic.[26] In India, some clothing production factories made all their production workers redundant overnight without compensation or warning.[27] In other regions, agricultural commodities could not be moved from farms to markets, processing plants or ports, and food was left rotting in the fields.

These cases illustrate the cascade of social impacts worldwide from the pandemic, with the potential to undermine societal resilience. There are also vast regions in which COVID-19 has simply compounded already dire conditions for those suffering from climate-related disasters. In East Africa, for example, hundreds of thousands of people displaced as a result of intense storms in early 2020 then suffered from harvest failures as locust swarms blighted crops in the region (harvests were also impacted in South Asia, the Middle East and some of Southern Europe).[28]

[24] Gaupp, F. (2020), 'Changing risks of simultaneous global breadbasket failure', *Nature Climate Change* 10(1): pp. 54-57, https://www.nature.com/articles/s41558-019-0600-z.
[25] Karasapan, O. (2020), 'Pandemic highlights the vulnerability of migrant workers in the Middle East', *Brookings*, 17 September 2020, https://www.brookings.edu/blog/future-development/2020/09/17/pandemic-highlights-the-vulnerability-of-migrant-workers-in-the-middle-east/.
[26] Ward, M. And Sonnemaker, T. (2020), 'All the visceral ways black women in America have been hurt by the coronavirus unemployment crisis', *Business Insider,* 1 June 2020, https://www.businessinsider.com/black-women-hurt-by-coronavirus-pandemic-survey-lean-in-data-2020-4.
[27] Holl, A. (2020), 'Fünf Europ Feminismus für Weiße in Europa', *Der Standard*, 25 July 2020, https://www.derstandard.at/story/2000118955552/fuenf-euro-feminismus-fuer-weissein-europa.
[28] Nature (2020), 'Why locusts congregate in billion-strong swarms — and how to stop them', *Nature*, Editorial 26 August 2020, https://www.nature.com/articles/d41586-020-02453-8.

Risk management and ownership

COVID-19 reveals the enormity of the challenge of managing systemic and compound crises coherently. Institutional mechanisms were not aligned, national and global disaster risk reduction communities were not prepared, and access to reliable and verifiable data has been poorly facilitated.[29] Likewise, responsibilities within many current governmental structures to identify, track and build resilience to external climate risk are unclear. Civil society organizations around the globe have nevertheless been able to mobilize their constituencies to monitor systemic and compound risks[30] and to address the gaps left by the state.

Effective risk management requires a clear and endorsed 'ownership' of the risk: an organizational unit that takes responsibility to implement risk mitigation measures. For complex and systemic risks with multiple drivers and stakeholders – such as COVID-19 or climate change – this is challenging. Therefore, resilience measures need to be developed and incentives built in to enable networks of government, market actors and civil society to co-generate timely, flexible, and actionable solutions.

[29] Mechler, R. et al. (2020), 'Loss and Damage and limits to adaptation: recent IPCC insights and implications for climate science and policy', *Sustainability Science,* https://link.springer.com/article/10.1007/s11625-020-00807-9.

[30] E.g. NGOs in South Asia preparing for COVID-19 and the expected onset of the monsoon-related flooding season; Shaw, R. et al. (2020), 'Governance, technology and citizen behavior in pandemic: Lessons from COVID-19 in East Asia', *Progress in Disaster Science*6, pp. 1-11, https://doi.org/10.1016/j.pdisas.2020.100090.

Conclusion and recommendations

Based on the lessons learned, CASCADES and RECEIPT draw three recommendations from COVID-19 relevant to climate change:

1. Acknowledge the systemic nature of climate change impacts

Most climate risk assessments and adaptation strategies focus on nations and sectors, addressing clearly identified risks, actors and options to reduce risk. However, the systemic and transboundary nature of many climate change drivers and impacts requires transformation and better preparation for the unavoidable impacts of climate change. Complex interactions and impact cascades will shape the overall risk profile. Actions to approach climate change as a systemic rather than a localized risk include:

- Understanding and mapping the direct and cross-regional impacts of potential climate extremes (including compound events) to guide effective risk mitigation strategies. Example: modelling and developing scenarios of plausible compound events affecting key regions (e.g. reduced water availability, extreme temperatures and population increase) with local stakeholders to analyse regional risks (such as conflict dynamics and migration), and trans-regional impacts;
- Redefining the goals of climate adaptation plans, including a wider definition of resilience and the targeted scope of these actions. Example: developing or sharpening legal or fiscal interventions that increase the resilience of global trade, finance, development cooperation and food security networks (such as EU regulations on corporate transparency, dedicated stress-tests and policy directing sustainable international collaboration);
- Reorganizing risk management procedures and institutions to establish responsibility for systemic risks. Example: exploring mandates for risk mitigation strategies at international and cross-sectoral level, by designing appropriate risk contingency programs involving public and private institutions.

2. Accept limitations to predictability of impacts, and embrace adaptive risk management strategies

In a highly interconnected world, a quantitative analysis of the propagation of external hazards to societal impacts is a challenge. While probabilistic assessments of local and near-term climate-related impacts is generally feasible, the ability to map indirect and cascading effects proves to be limited. We need to develop adaptation strategies that allow decision-making under uncertain conditions, to be able to adjust to new insights, new developments and new risk management options over time. For instance, the concept of ‘dynamic

adaptation policy pathways'[31] is designed to incorporate deep uncertainty into decision making, by identifying short-term actions and a framework to guide future actions towards the desired goal, whilst allowing for adaptation over time to meet changing circumstances.

Actions to involve adaptive risk management strategies include:

- Visualizing dynamic and responsive pathways and storylines to anticipate unknown events and prioritize options and measures. Example: digesting lessons learned from COVID-19 and other systemic crises into a representative portfolio of cause-effect chains;
- Exploring adaptation strategies to unprecedented but plausible risk pathways for critical services, supplies and infrastructure. Example: co-developing adaptive risk strategies for selected services and institutions (such as urban water management, power supply and critical infrastructure).

3. Build up resilience at various, interconnected levels

Resilience against system shocks is desired but difficult to achieve. A redefinition of strategic economic objectives can be helpful: from an economic efficiency-focused paradigm towards a forward looking multiple-dividends approach, that takes into account social and intergenerational equity.

Incentives for building resilience can be developed by:

- Redefining performance metrics to have a long-term focus and to target stability. Example: understanding the SDGs as performance indicators applicable to economies at different scales – including the level of citizens, private business organizations, sectors and multi-level governments;
- Redesigning international and national solidarity mechanisms that help to recover from shocks of various kinds. Example: enabling rapid access to science, technology and innovation through regional and international 'knowledge exchange hubs' to enable the rapid pooling and transfer of R&D and competitive procurement that could reduce costs for all countries.

31 Haasnoot, M. et al. (2013), 'Dynamic adaptive policy pathways: A method for crafting robust decisions for a deeply uncertain world', *Global Environmental Change* 23(2): pp. 485-498, https://www.sciencedirect.com/science/article/pii/S095937801200146X.

- Jointly utilizing COVID-19 recovery packages and Green Deal resources to meet the interconnected goals of fiscal and financial stability, social resilience and environmental quality. Example: improving health care systems, social protection and labour laws, strengthening EU corporate tax policy and making fiscal measures supporting carbon-intensive businesses conditional on alignment with EU climate targets and objectives of the EU Green Deal programme.[32]

32 Battiston, S., Billio, M., and Monasterolo, I. (2020), 'Pandemics, climate and public finance: how to strengthen socio-economic resilience across policy domains' in Billio, M. and Varatto, S. (eds) (2020), *A New World Post COVID-19 Lessons for Business, the Finance Industry and Policy Makers*, Venezia Edizioni Ca'Foscari-Digital Publishing.

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For more information:

CASCADES is an interdisciplinary project devoted to the analysis of cross-border impacts of climate change. It applies state-of-the-art quantitative and qualitative research and stakeholder engagement approaches to identify critical areas of concern for European societies and EU policy and explore different solutions. For more information, please see the CASCADES website: www.cascades.eu

The RECEIPT project maps connections between European socio-economic activities and remote climatic hazards. The aim is to provide quantitative information on the European risks from remote climatic events. For more information, please visit the RECEIPT website: https://climatestorylines.eu