

Climate related systemic risk – lessons learned from COVID-19

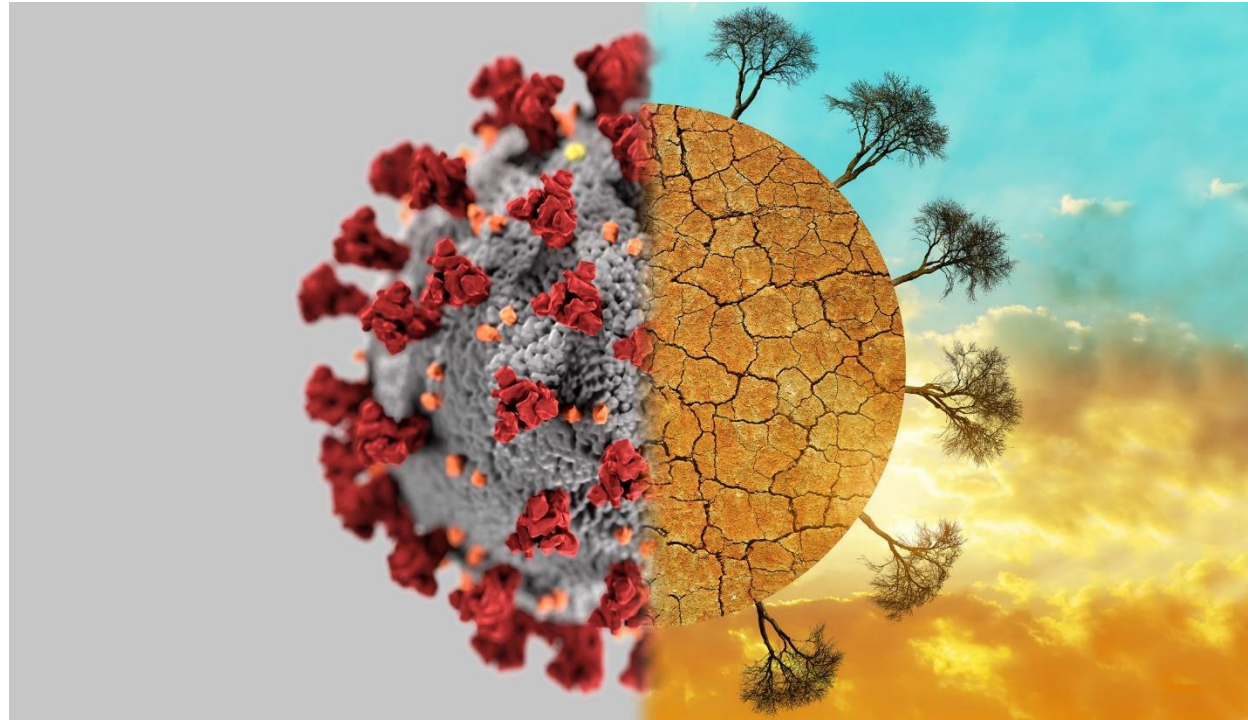


image: sml.snl.no/coronavirus & stock.adobe.com

Introduction – or: Why are we here?

Markus Reichstein & Dorothea Frank



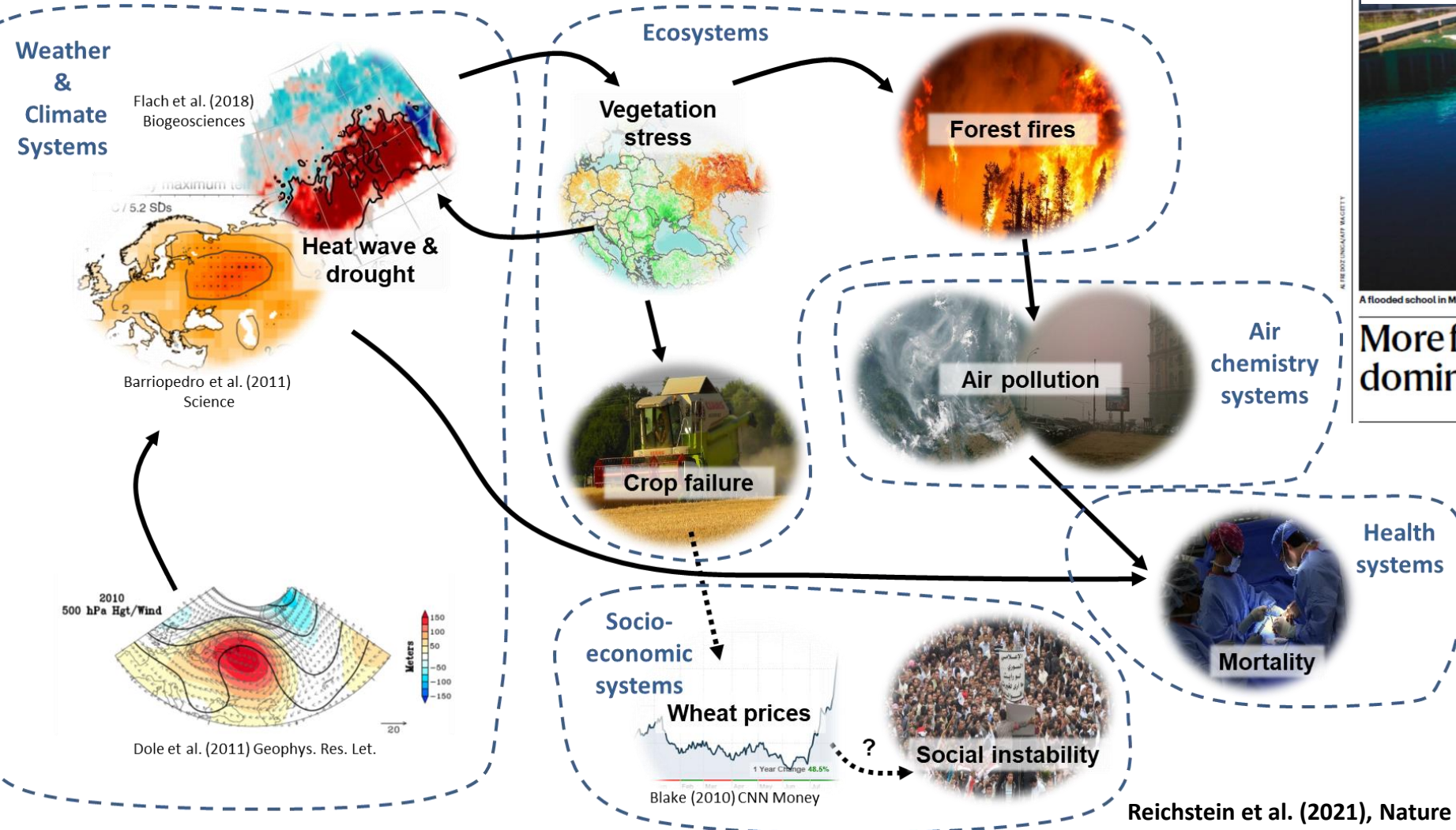
HERRENHAUSEN CONFERENCE, OCTOBER 9-11, 2019

HERRENHAUSEN PALACE, HANOVER, GERMANY

EXTREME EVENTS –
BUILDING CLIMATE
RESILIENT SOCIETIES



Cascading effects from heat and drought



Setting the agenda in research

Comment

Without new models, better metrics and more investment, cascades of extreme events could derail the United Nations Sustainable Development Goals.



A flooded school in Mozambique after Cyclone Eloise in January. Disrupted education can harm lives, livelihoods and economies for decades.

More floods, fires and cyclones – plan for domino effects on sustainability goals

Reichstein, M.; Riede, F.; Frank, D.: More floods, fires and cyclones — plan for domino effects on sustainability goals. *Nature* 592, pp. 347 - 349 (2021), <https://www.nature.com/articles/d41586-021-00927-x>

Reichstein et al. (2021), *Nature* [SI Fig.]



INTERVIEW

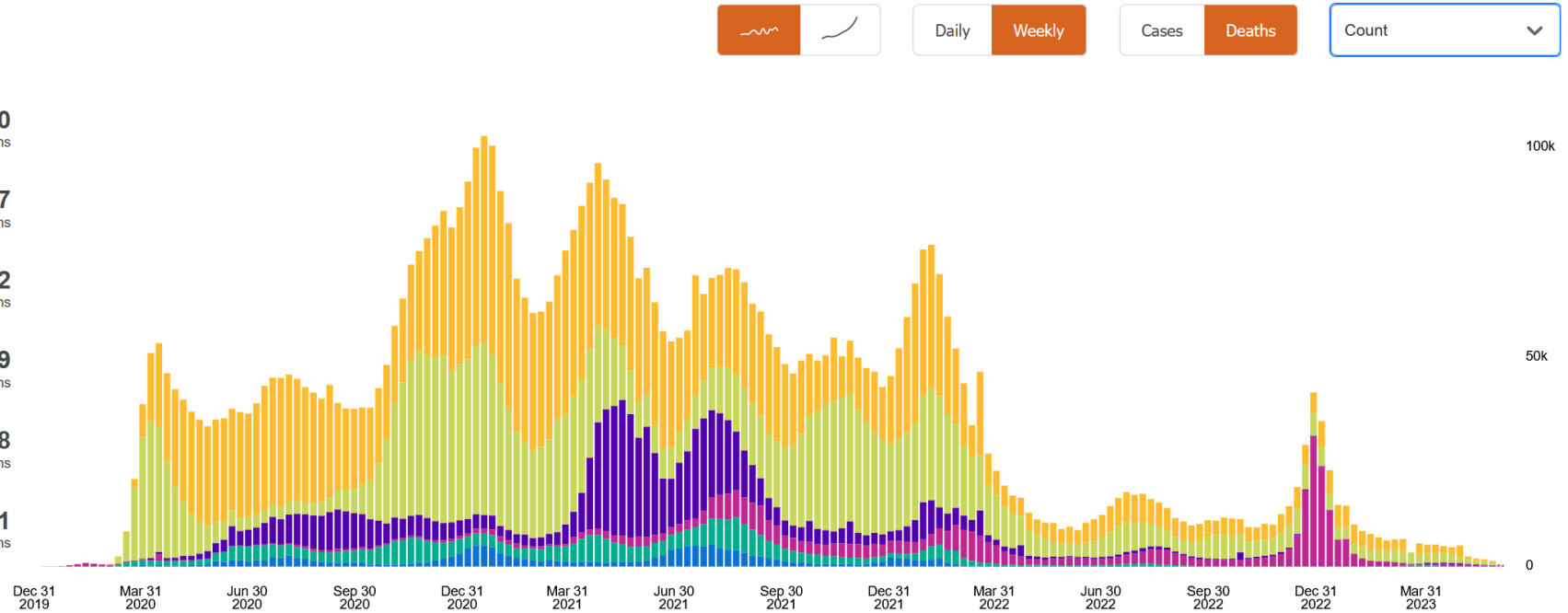
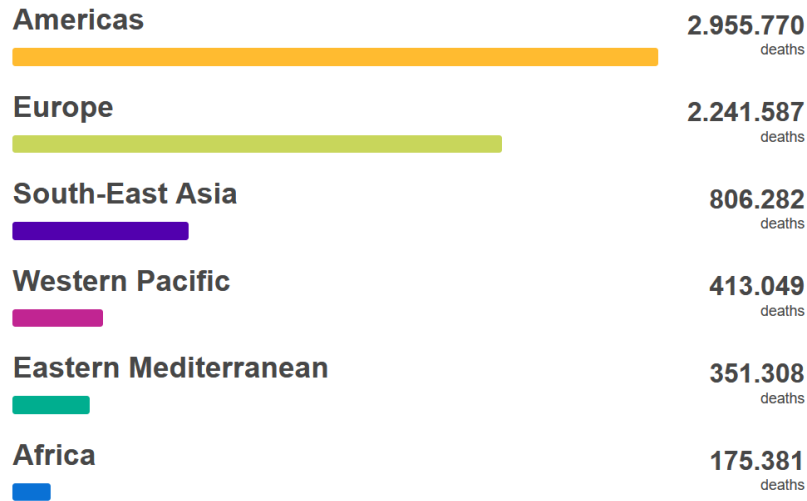
"Eine Naturkatastrophe ist wie ein Virus"

17. Dezember 2019 / Benjamin von Brackel



COVID-19: measured direct effects

Situation by WHO Region



Source: World Health Organization
Data may be incomplete for the current day or week.

Globally 767.984.989 confirmed cases, 6.943.390 reported deaths

(yet inconsistent with excess mortality)

<https://covid19.who.int/>

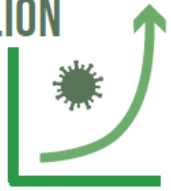
COVID-19 pandemic as blueprint for systemic risks



COVID-19

IS THREATENING DECADES OF PROGRESS IN GLOBAL HEALTH

INFECTED MORE THAN
500 MILLION
PEOPLE
WORLDWIDE
(MID-2022)



LED TO
15 MILLION
DEATHS



(2020-2021)

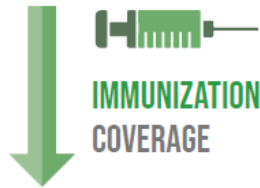
DISRUPTED ESSENTIAL
HEALTH SERVICES IN
92% OF
COUNTRIES
(END 2021)



HALTED
PROGRESS ON
UNIVERSAL
HEALTH
COVERAGE



GLOBAL
LIFE
EXPECTANCY



IMMUNIZATION
COVERAGE



PREVALENCE OF
ANXIETY /
DEPRESSION



DEATHS FROM
TUBERCULOSIS
& MALARIA



**Germany: 10% more
domestic violence in
2022**

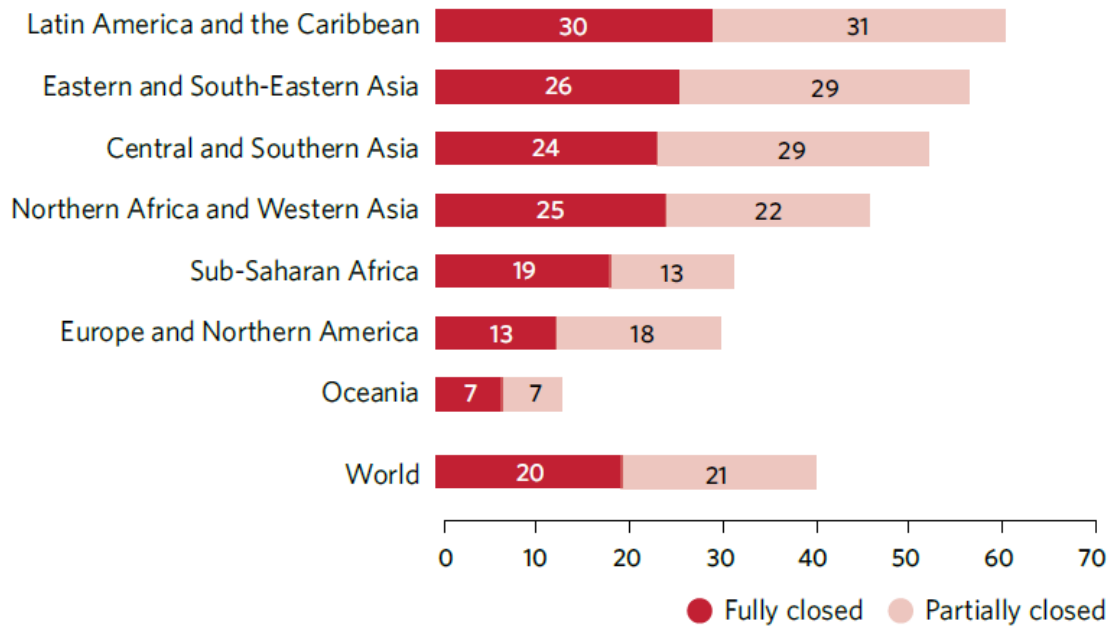
<https://unstats.un.org/sdgs/report/2022/>

cf. also Easterlin & O'Connor 2023, PNAS

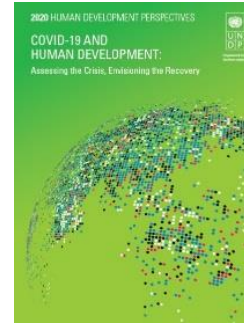
COVID-19 pandemic as blueprint for systemic risks



Duration of school closures (loss of in-person classes), March 2020-February 2022 (weeks)



<https://unstats.un.org/sdgs/report/2022/>



Domino effect of school closures



<https://hdr.undp.org/content/covid-19-and-human-development-assessing-crisis-envisioning-recovery>

24 MILLION LEARNERS

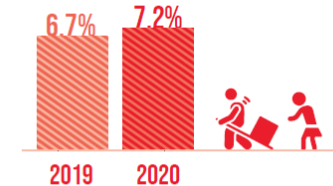
(PRE-PRIMARY TO UNIVERSITY LEVEL)

MAY NEVER

RETURN TO SCHOOL



WORKING POVERTY RATE ROSE FOR THE FIRST TIME IN TWO DECADES



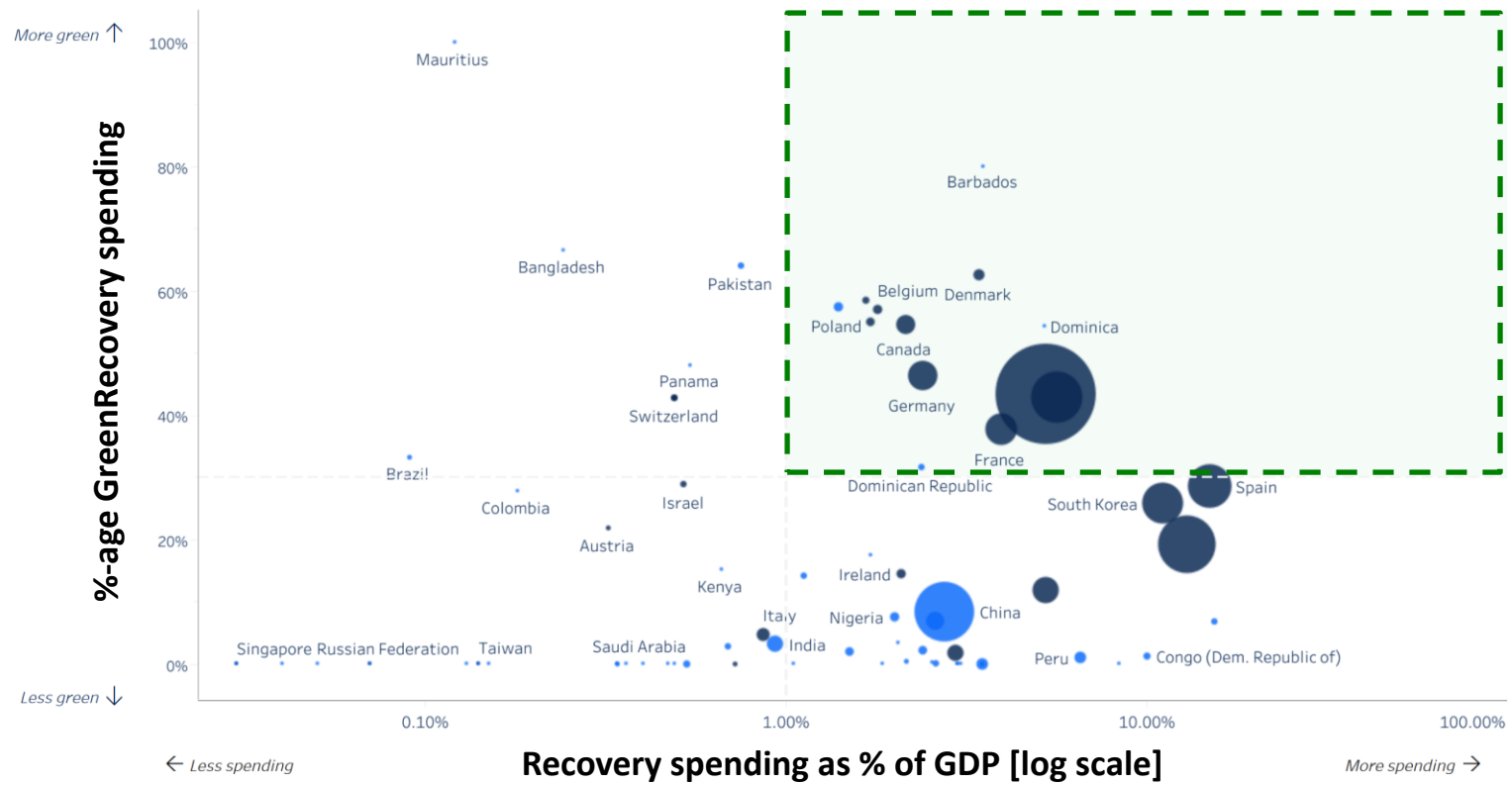
PUSHING AN ADDITIONAL
8 MILLION WORKERS
INTO POVERTY

Enormous rescue and resilience spending

Total Spending
\$18.16 Trillion

Recovery Spending
\$3.11 Trillion

Green Spending
31.2% of recovery spending, \$0.97 Trillion

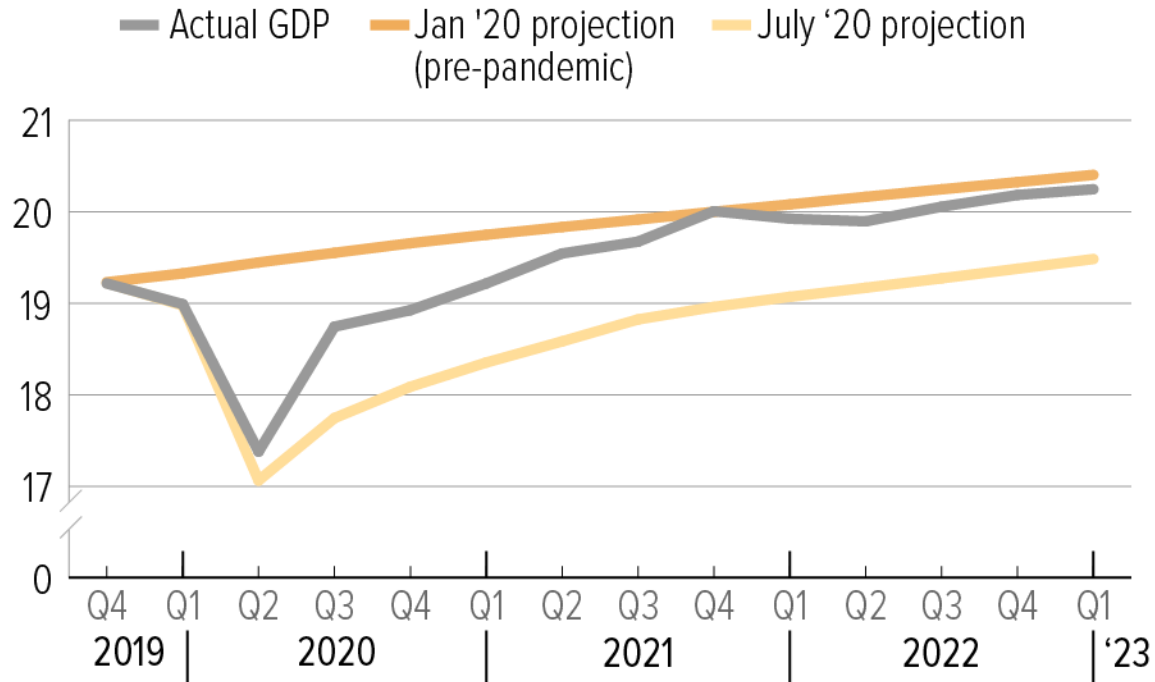


O'Callaghan et al. (2022) - <https://recovery.smithschool.ox.ac.uk/tracking/>

Faster than expected recovery (US)

GDP Has Grown Faster Than CBO Projected in Mid-2020

Gross domestic product, in trillions of 2012 dollars

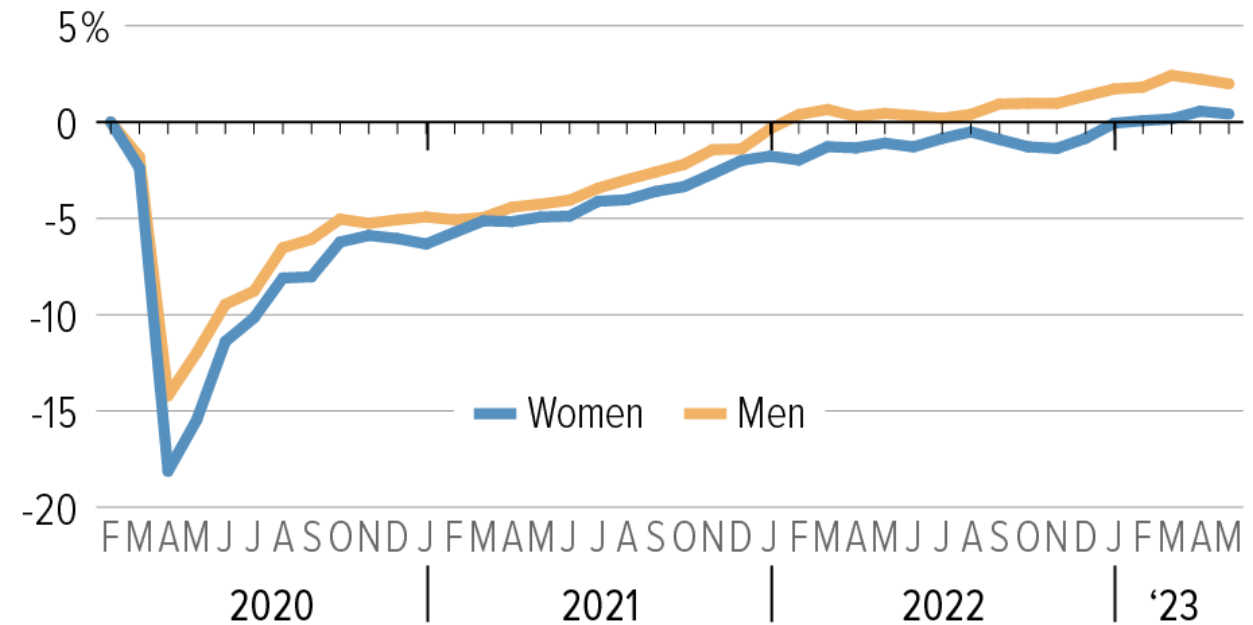


Source: CBPP analysis of Congressional Budget Office and Bureau of Economic Analysis data

CENTER ON BUDGET AND POLICY PRIORITIES | CBPP.ORG

Women's Employment Above Pre-Pandemic Level

Change in employment since February 2020



Note: Data are for people ages 16+ and are seasonally adjusted.

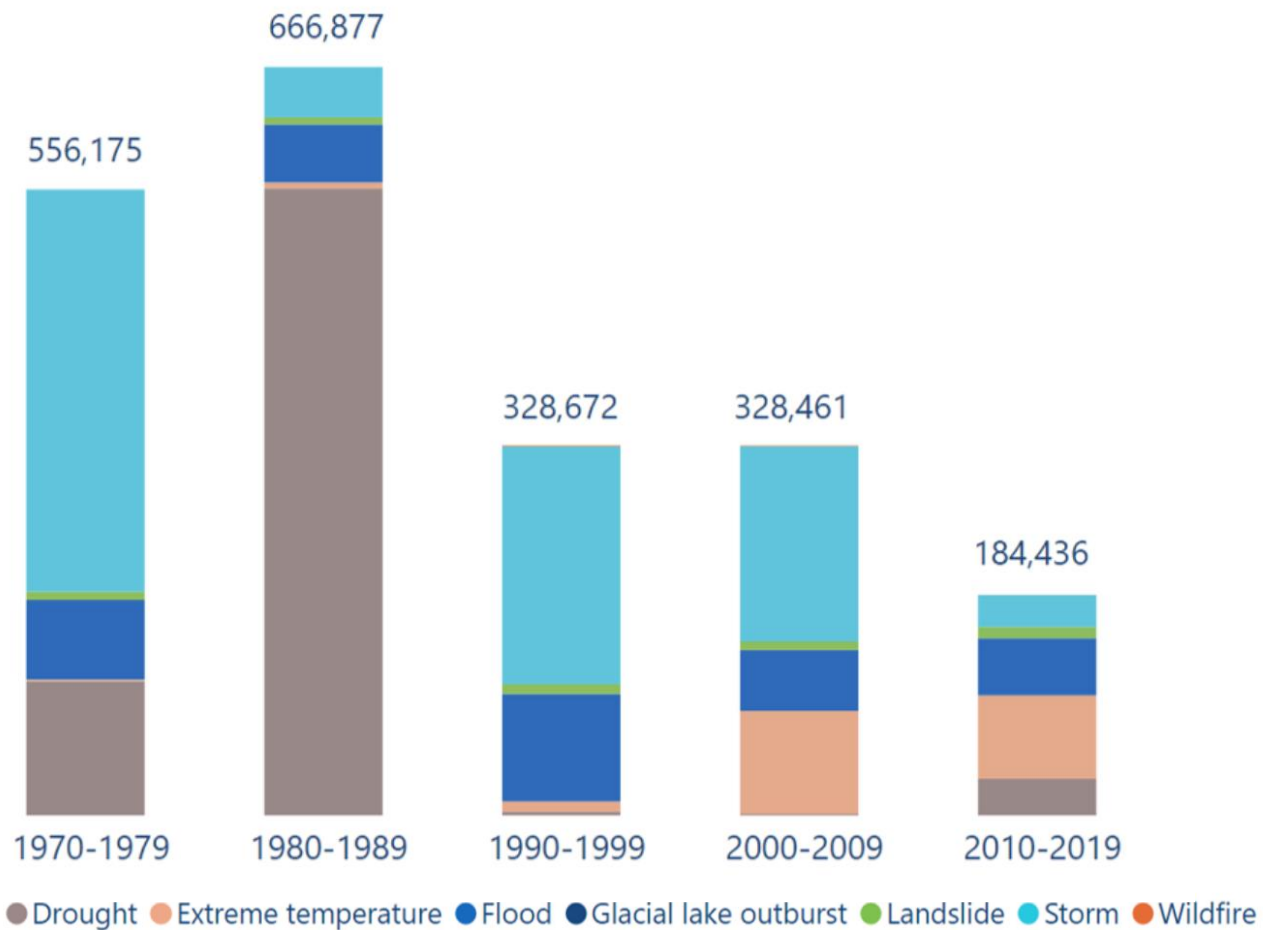
Source: CBPP Analysis of Bureau of Labor Statistics Data

CENTER ON BUDGET AND POLICY PRIORITIES | CBPP.ORG

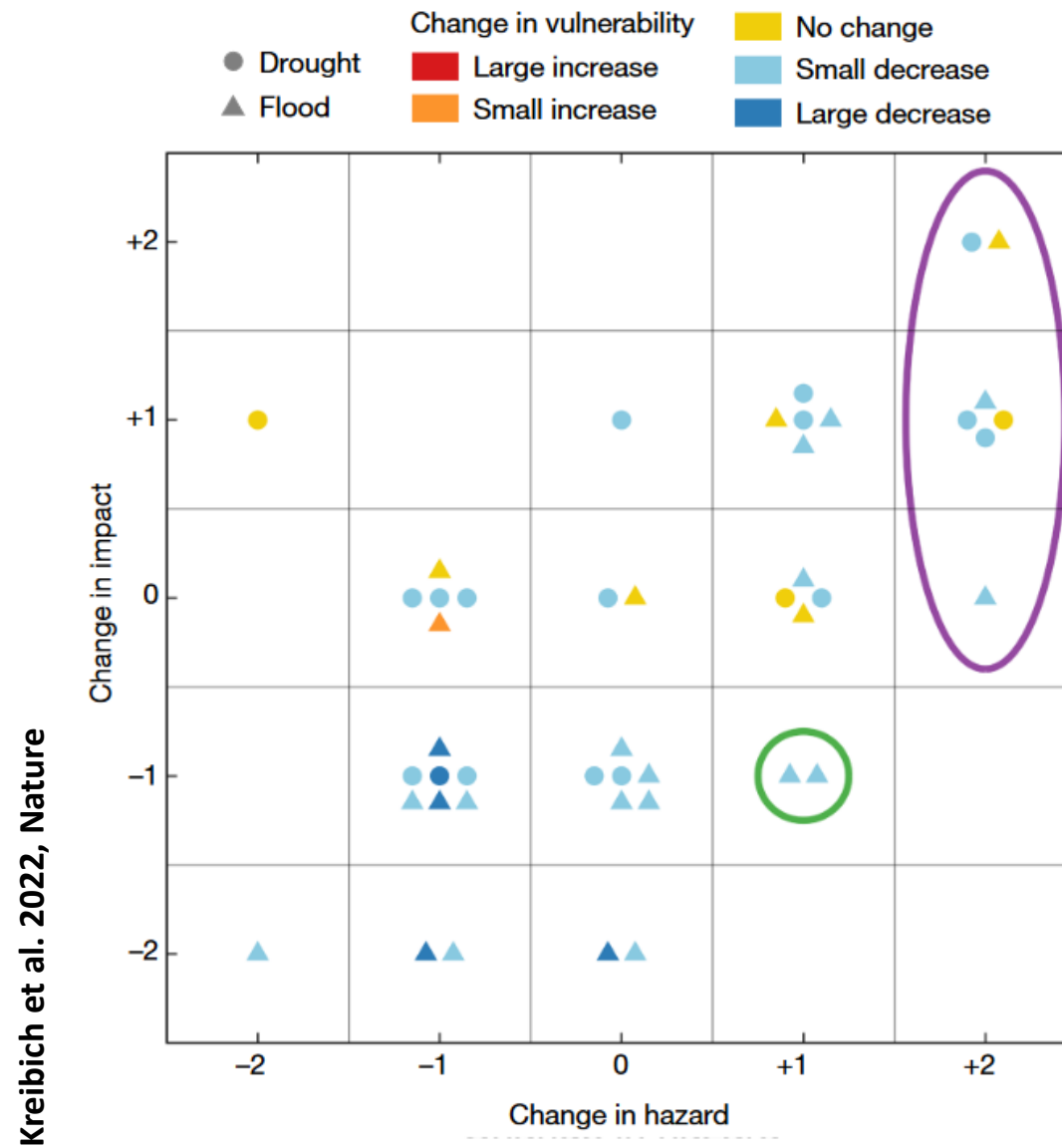
<https://www.cbpp.org/gdp-has-grown-faster-than-cbo-projected-in-mid-2020-1>; <https://www.cbpp.org/womens-employment-still-below-pre-pandemic-level>

Progress related to disaster preparedness?

Number of reported deaths by decade



WMO (2023) <https://public.wmo.int/en/media/press-release/economic-costs-of-weather-related-disasters-soars-early-warnings-save-lives>



Kreibich et al. 2022, Nature

The Covid-19 pandemic

much previous system knowledge

Oct 18, 2019

Event 201, a high-level pandemic exercise
by Johns Hopkins Center for Health Security, World Economic
Forum, Bill and Melinda Gates Foundation <https://www.jhsph.edu/news/2019/10/18/2019-10-18-publications-pandemic-exercise.pdf>

in order to diminish large-scale economic and societal consequences (*examples*):

- **Governments, international organizations, and businesses should plan now for how essential corporate capabilities will be utilized during a large-scale pandemic.**


During a severe pandemic, public sector efforts to control the outbreak are likely to become overwhelmed.

work together to

- **enhance internationally held stockpiles of medical countermeasures to enable rapid and equitable distribution during a severe pandemic**
- **maintain travel and trade**
- **assign a greater priority to developing methods to combat mis-and disinformation**


RI
Recommendations of post-Ebola panels

- **Strengthening of epidemic preparedness and public health systems in countries**
- **Need for reform of WHO and global health governance**
- **More effective engagement with communities, NGOs and private sector**
- **Timely sharing of data and samples**
- **R&D systems where no market incentives**



29 June 2018

Peter Piot, Director of the London School of Hygiene & Tropical Medicine <https://youtu.be/en06PYwvpbl>

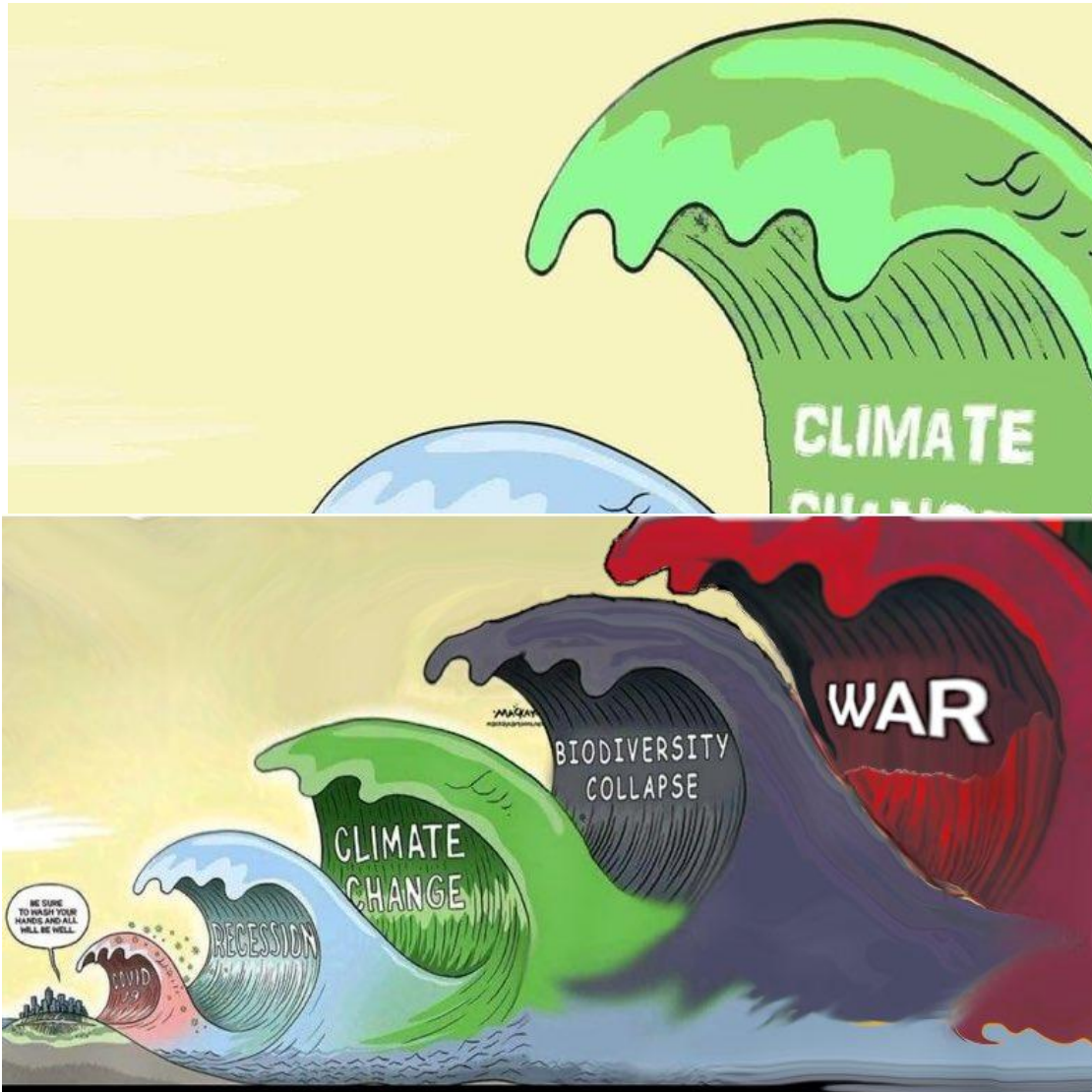


White Paper
Outbreak Readiness and Business Impact
Protecting Lives and Livelihoods across the Global Economy
In collaboration with Harvard Global Health Institute
2019

January 2019
... in the coming decades, pandemics will cause average annual economic losses of 0.7% of global GDP – ...

Frank and Reichstein, here...

Climate risk...



<https://mackaycartoons.net/2020/03/>; @mackaycartoons

"One of the biggest issues is you cannot self-isolate from climate, that is not an option. We cannot retreat in and wait out climate change, it will just get worse, ... when you look at climate change from a human mortality perspective, it will be the equivalent of a coronavirus crisis every year from the middle of this century, and every year, not just a one-off event. So it is an issue that needs to be addressed now." (Mark Carney, Bank of England 2020, UN envoy, <https://www.bbc.com/news/business-55944570>)

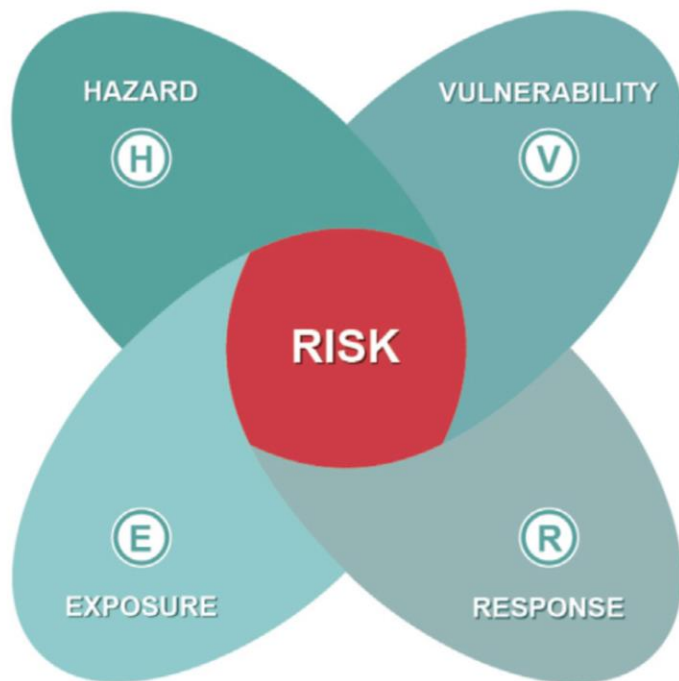
	Temperature rise scenario, by mid-century	
	2.0°C increase	2.6°C increase
<i>The likely range of global temperature gains</i>		
Simulating for economic loss impacts from rising temperatures in % GDP,		
World	-11.0%	-13.9%
OECD	-7.6%	-8.1%
North America	-6.9%	-7.4%
South America	-10.8%	-13.0%
Europe	-7.7%	-8.0%
Middle East & Africa	-14.0%	-21.5%
Asia	-14.9%	-20.4%
Advanced Asia	-9.5%	-11.7%
ASEAN	-17.0%	-29.0%
Oceania	-11.2%	-12.3%

Swiss Re Institute (2021) The economics of climate change: no action not an option.

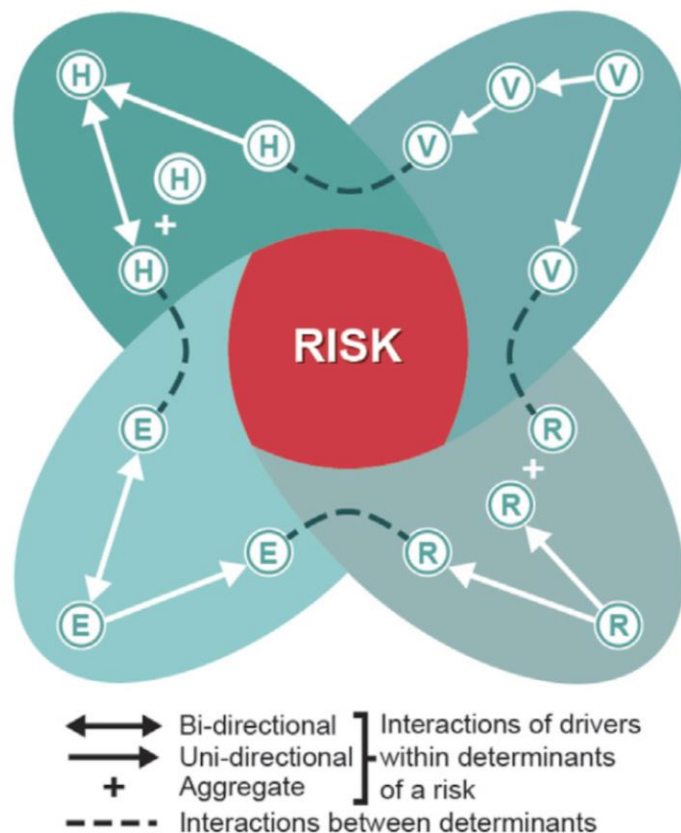
No “beauty contest” between COVID-19 and climate...

... but learning about complex, systemic risk

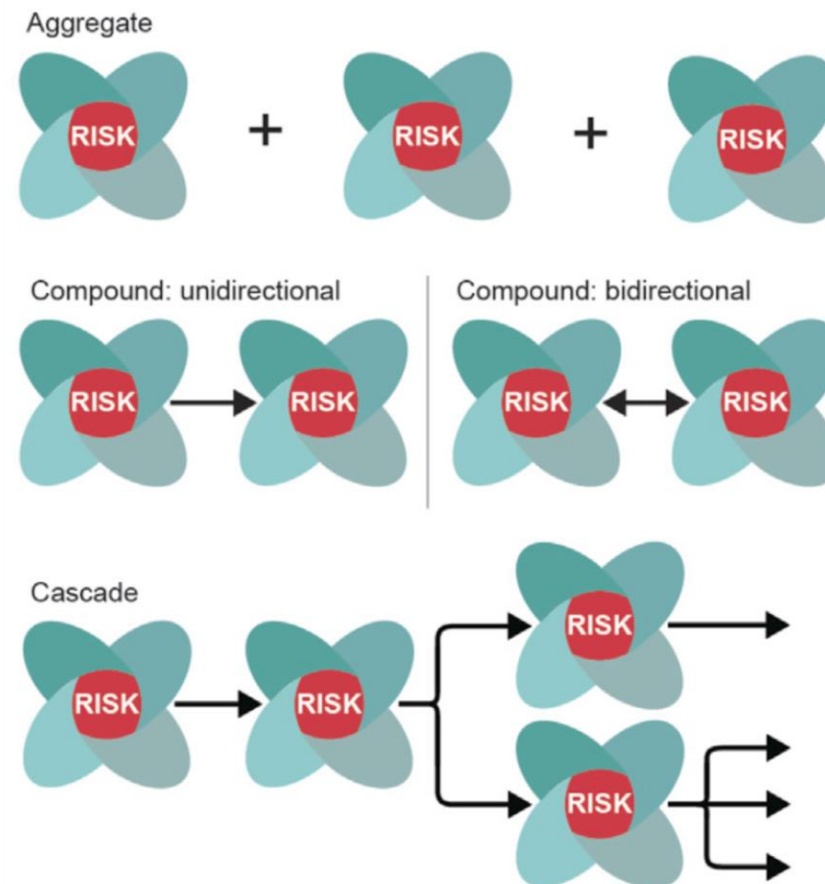
A Category 1: Interaction between determinants of a risk



B Category 2: Interactions of drivers within and between determinants of a risk



C Category 3: Interacting risks



Simpson et al. 2021, One Earth

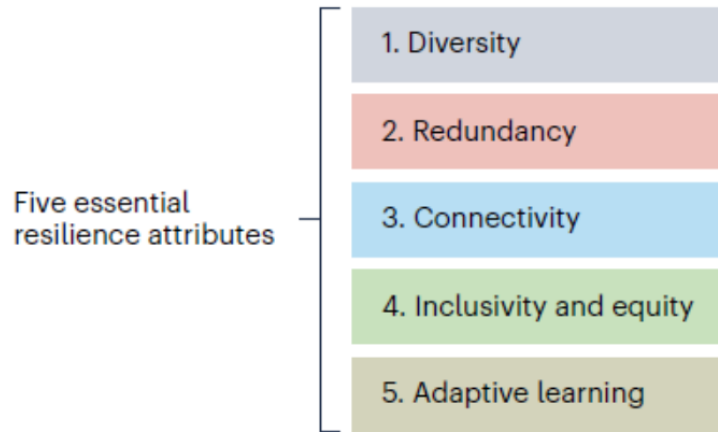
- What are the key gaps related to our *scientific knowledge* with respect to systemic risks and their mitigation and how can they be closed?
- What are the top priorities for *improving preparedness* against systemic risk and how can they best be addressed?



<https://www.shutterstock.com/de/image-vector/research-chart-keywords-icons-382263067>



Challenge: going well beyond the state-of-the-art



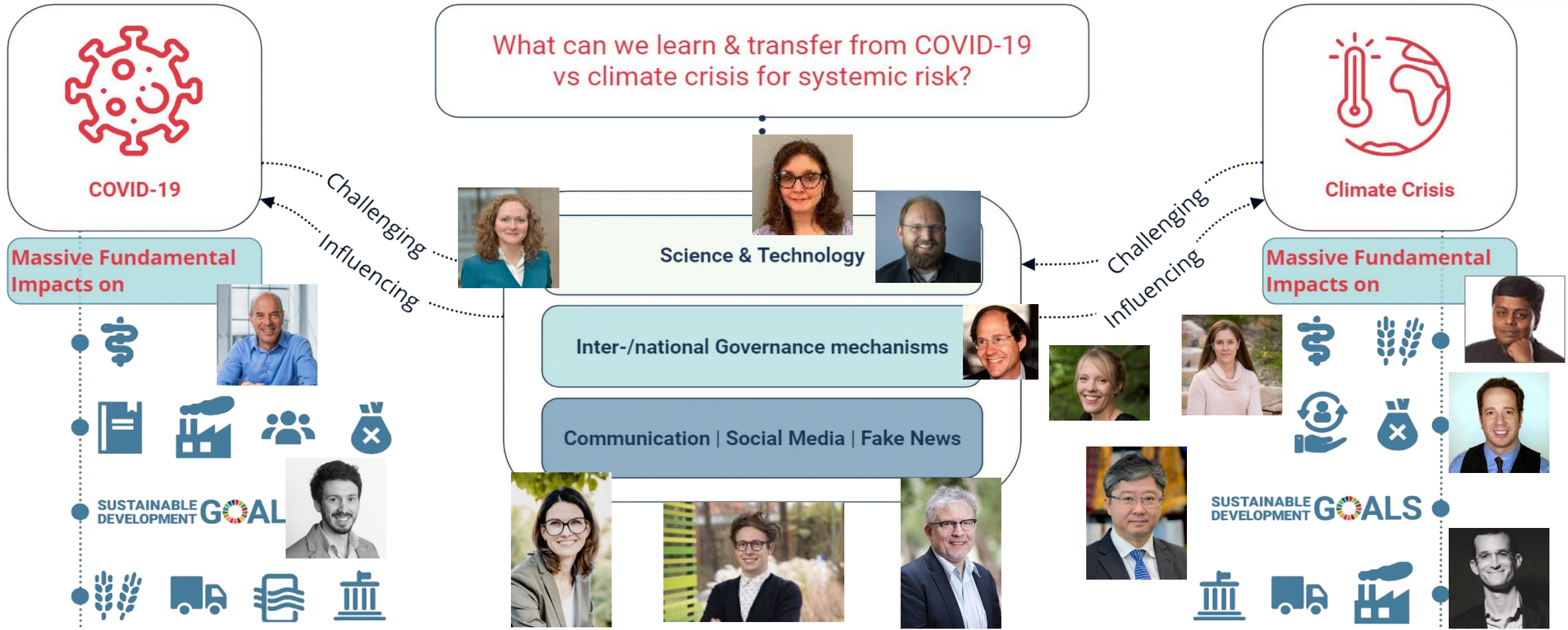
Improving preparedness against systemic risks requires a multi-faceted approach that involves various stakeholders, including governments, international organizations, businesses, and communities. Here are some top priorities for enhancing preparedness and addressing systemic risks:

1. Risk Assessment and Monitoring: ... timely identification and assessment of risks
2. Strengthening Resilience and Redundancy: ... robust and flexible systems that can absorb and recover from shocks is key to improving preparedness.
3. Enhancing International Cooperation: ... international agreements, frameworks, and platforms can foster collaboration and coordination in risk management and response.
4. Building Strong Governance and Regulation: ... compliance with risk management standards.
5. Investing in Research and Development: ... collaboration between academia, industry, and government can drive innovation and enhance preparedness against systemic risks.
6. Promoting Information Sharing and Communication: ...
7. Strengthening Financial Systems: ... regulatory bodies, central banks, ... systemic risks in the financial sector.

Rockström et al. 2023, Nature Sust.



Climate crisis and systemic risk – lessons learned from COVID-19



- Both crises:**
- Need a global approach
 - Show exponential growth components
 - Have direct short-term & long-term (lagged) impacts
 - Threaten reaching the Sustainable Development Goals
 - Procrastination of counter-measures aggravates the situation
 - The poor are disproportionately affected

<https://www.weforum.org/press/2019/01/un-secretary-general-fragmented-response-to-global-risk-a-recipe-for-disaster/>

If I had to select one sentence to describe the state of the world, I would say we are in a world in which global challenges are more and more integrated, and the responses are more and more fragmented, and if this is not reversed, it's a recipe for disaster.¹⁰⁸

Let's contribute to that this is not becoming true!

António Guterres, United Nations Secretary-General, WEF summit