

What will the kids eat in the future?

Dr. Christoph Müller

Working group leader: *Land use and resilience*

27. January 2023



PIK – Potsdam Institute for Climate Impact Research

Founded in 1992

Total budget 2021: € 31.8 million

Employees 2021: 403



The main building of the Potsdam Institute for Climate Impact Research was opened in 1879 as the head office of the Royal Observatory for Astrophysics.

Publications 2021

507

Publications
of which

85%

were articles in
peer-reviewed
journals



430

Articles in
peer-reviewed
journals with

44%

PIK first
authorship

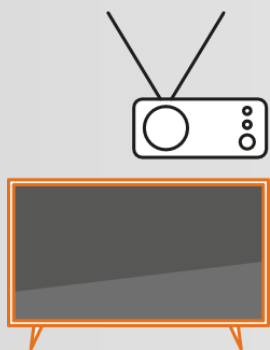
78

Papers in prestigious
journals such as

... PNAS, Science, Nature,
Lancet Planetary Health,
Nature Climate Change,
Nature Communications.

Year: 2021

PIK in the media 2021

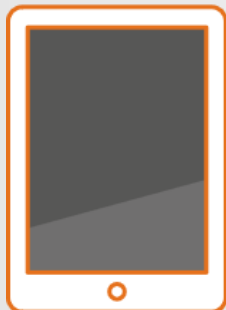


2,000

Features with PIK scientists on TV and radio including all repeats

20,000

Articles in German and international online media



3,000

Total circulation of PIK articles in German-language print media

>100

PIK researchers quoted internationally in the media

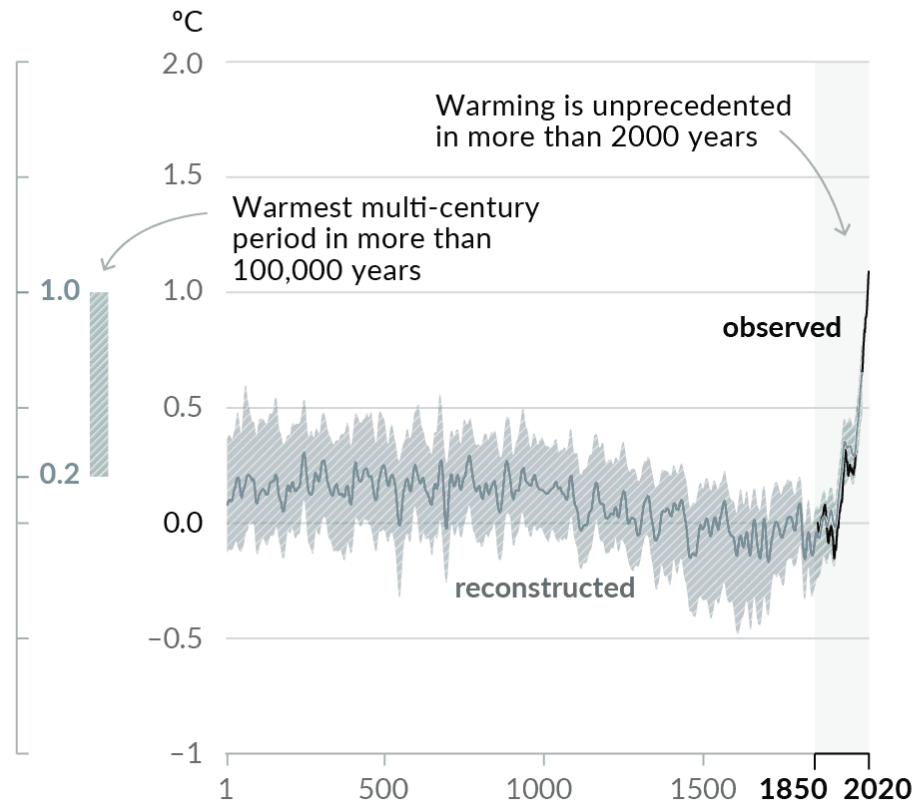


Year: 2021

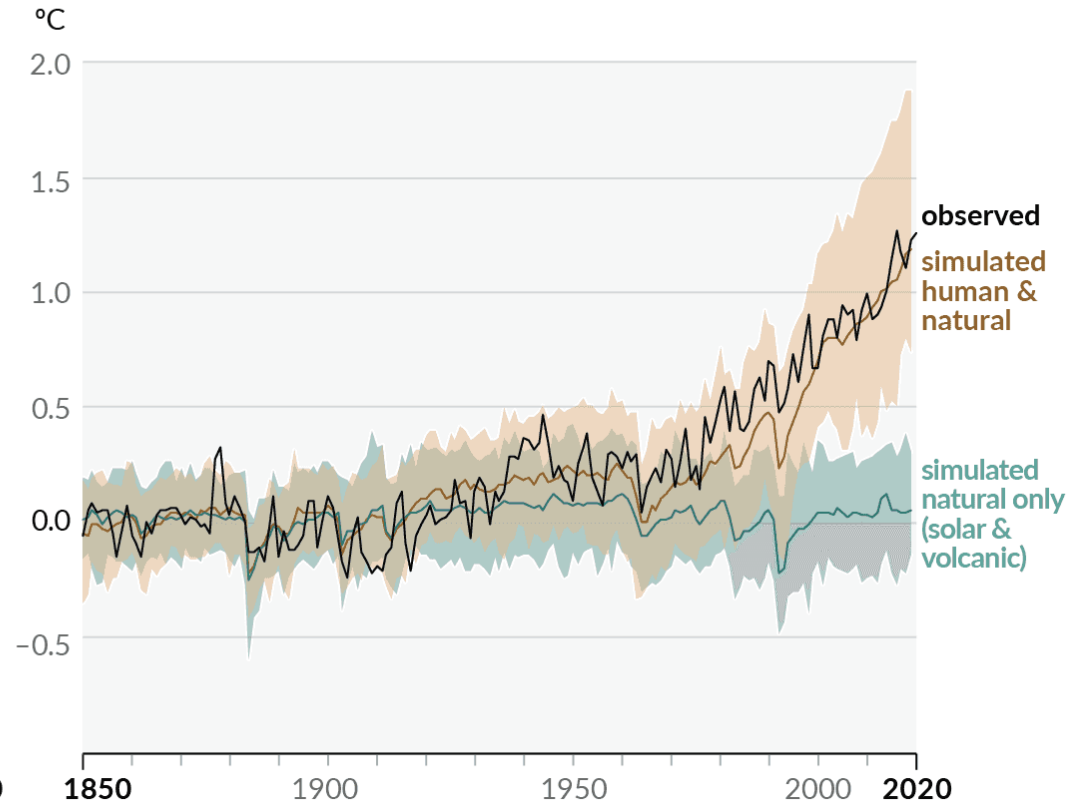
Climate Change Basics

Man-made climate change

(a) Change in global surface temperature (decadal average) as **reconstructed** (1–2000) and **observed** (1850–2020)

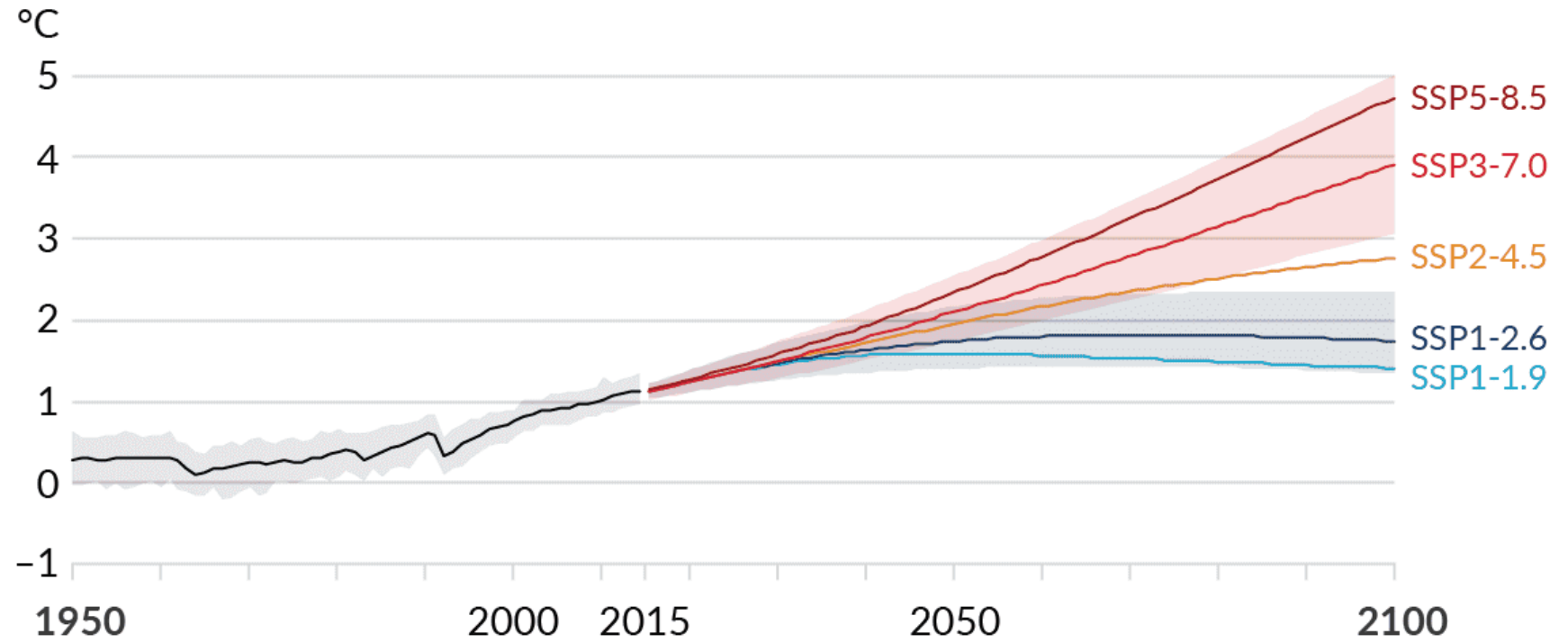


(b) Change in global surface temperature (annual average) as **observed** and simulated using **human & natural** and **only natural** factors (both 1850–2020)



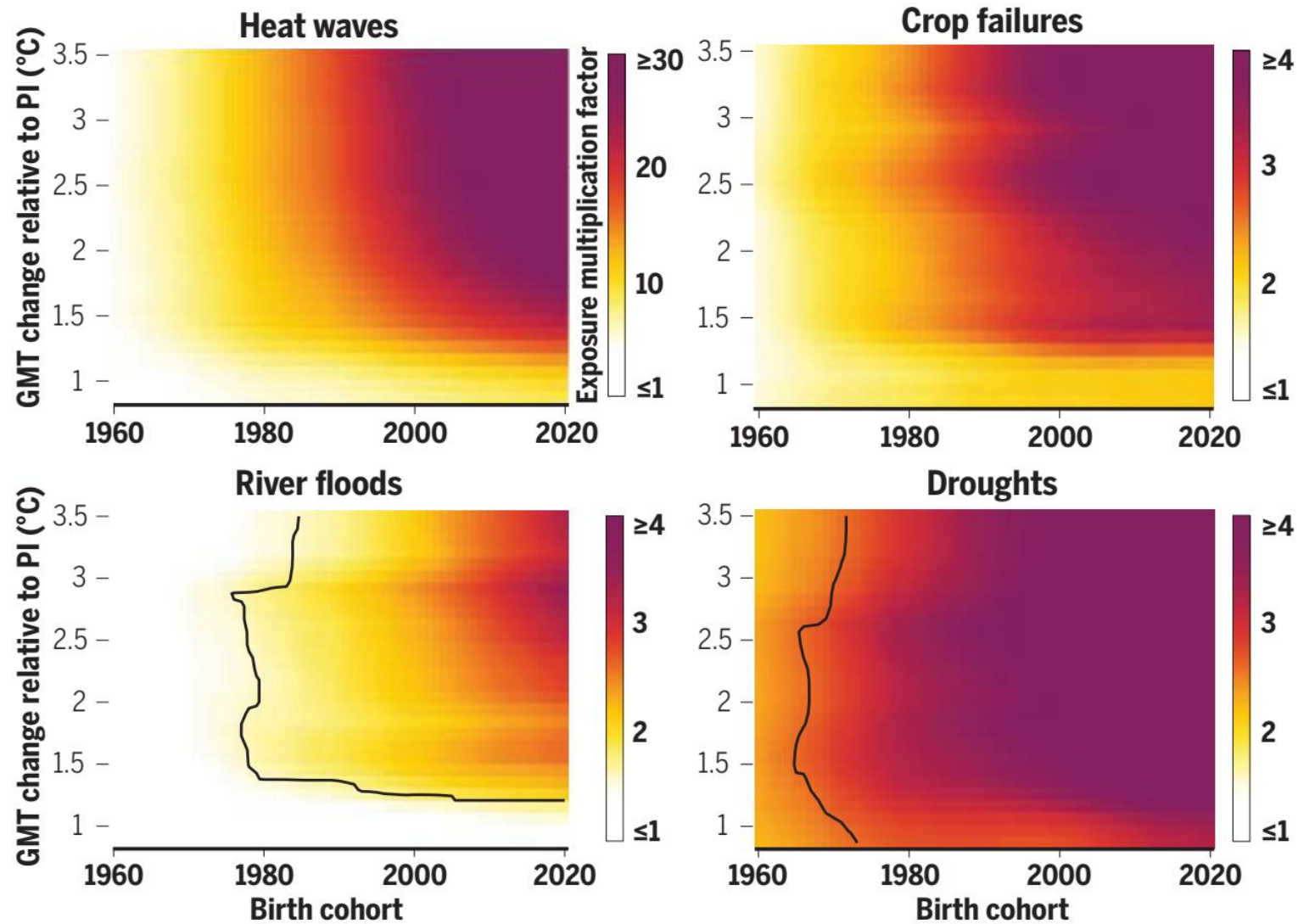
Changes in Global Mean Temperature (GMT)

Relative to 1850 - 1900

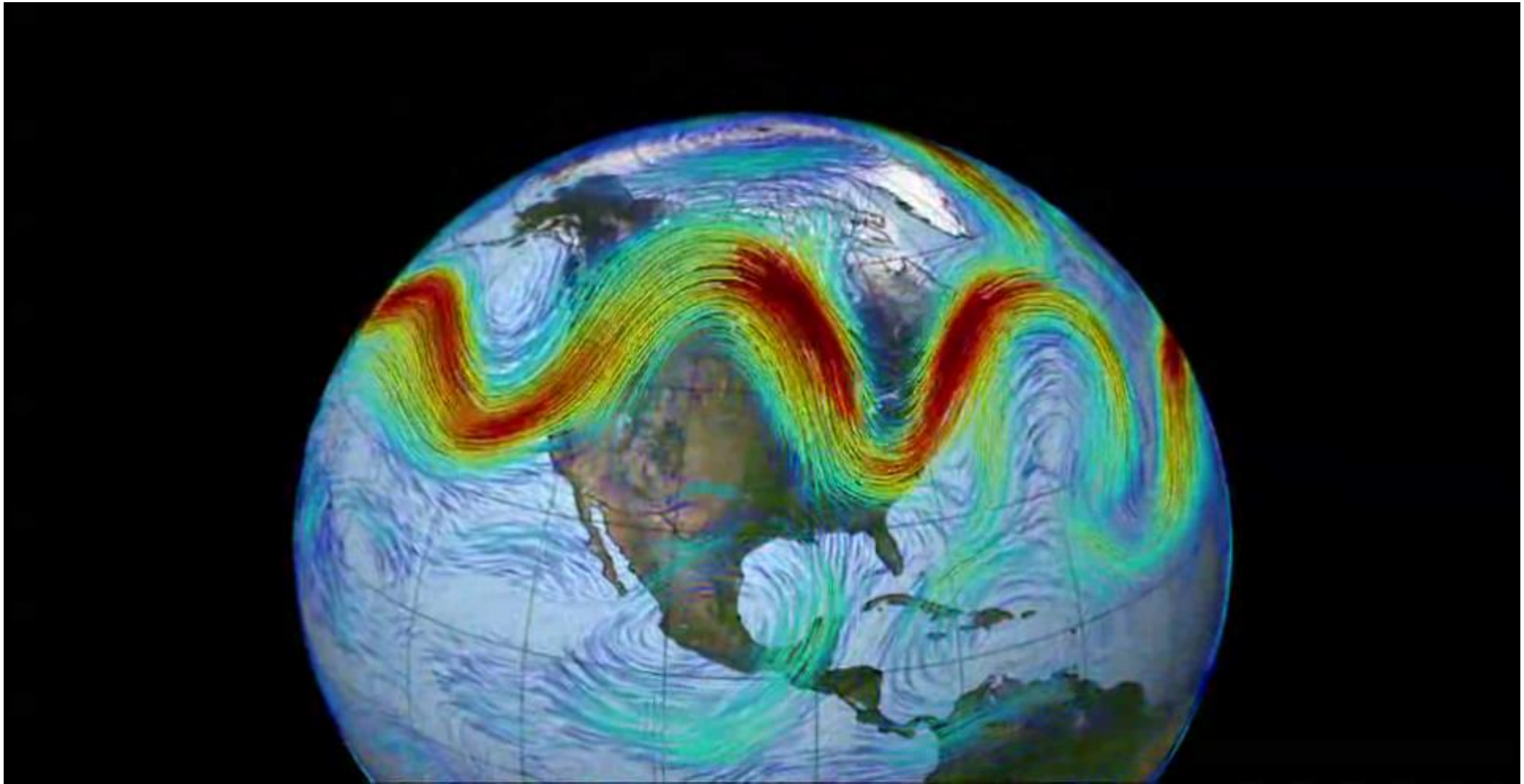


IPCC 2021, AR6, WG I

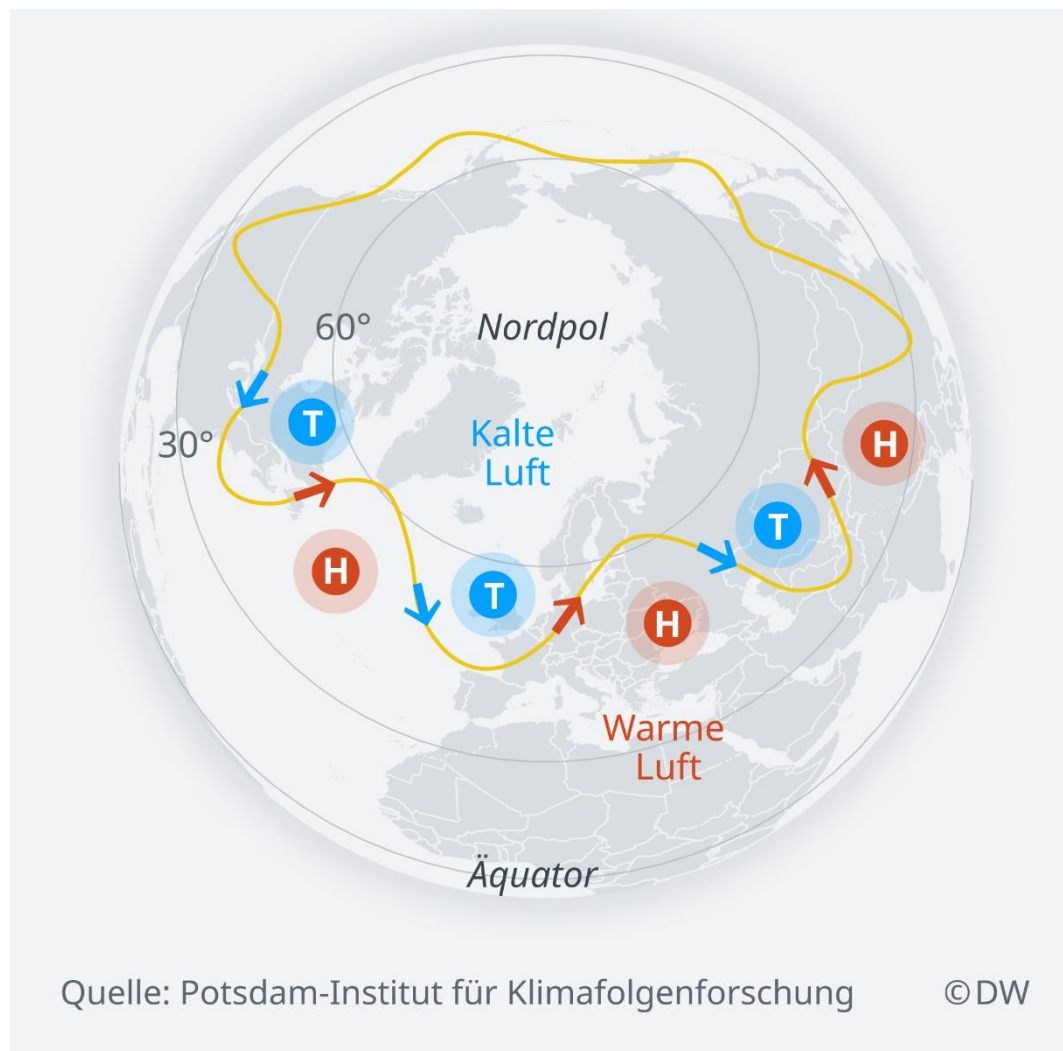
What climate impacts will the kids experience?



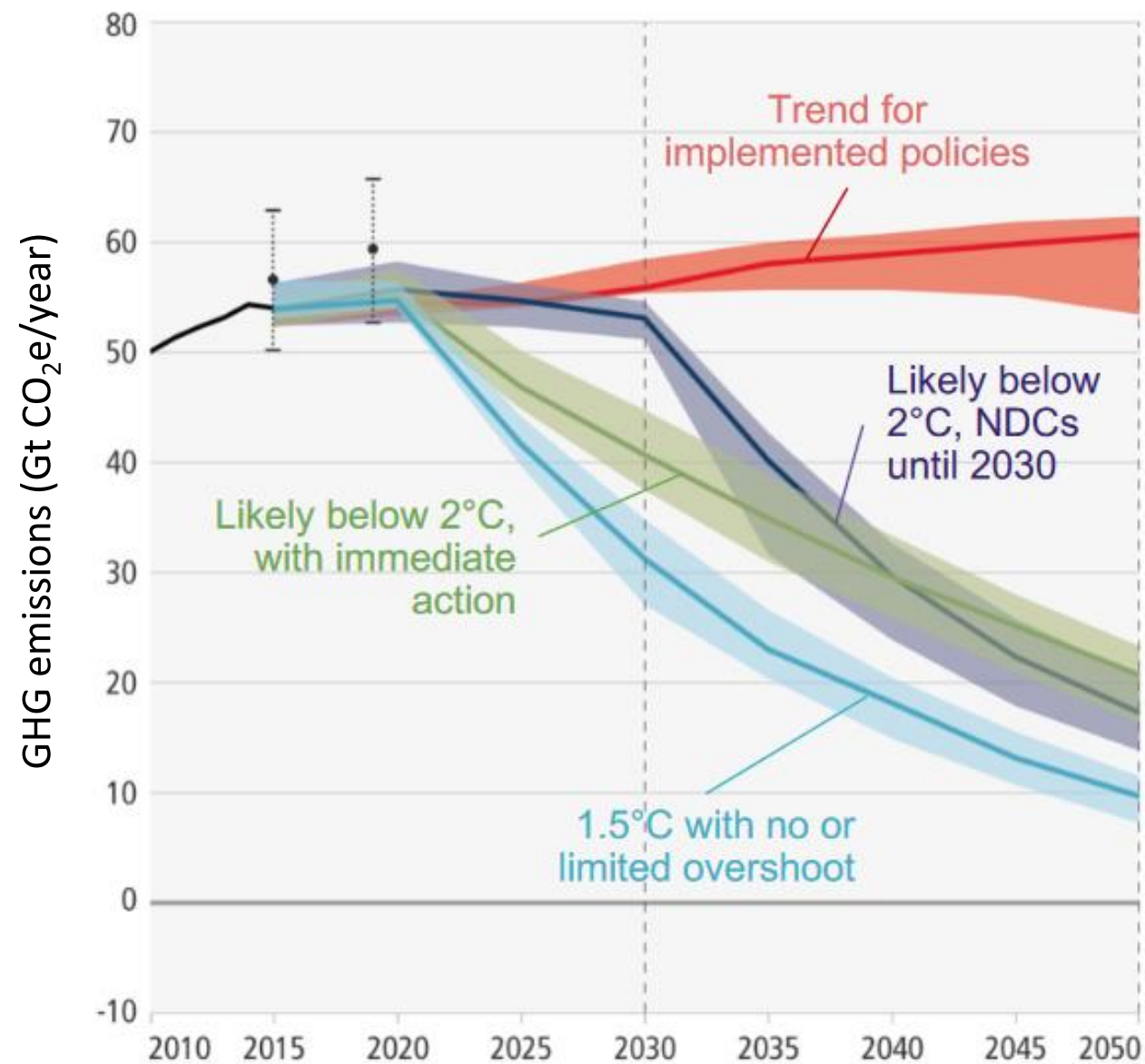
The jet stream and the west wind zone



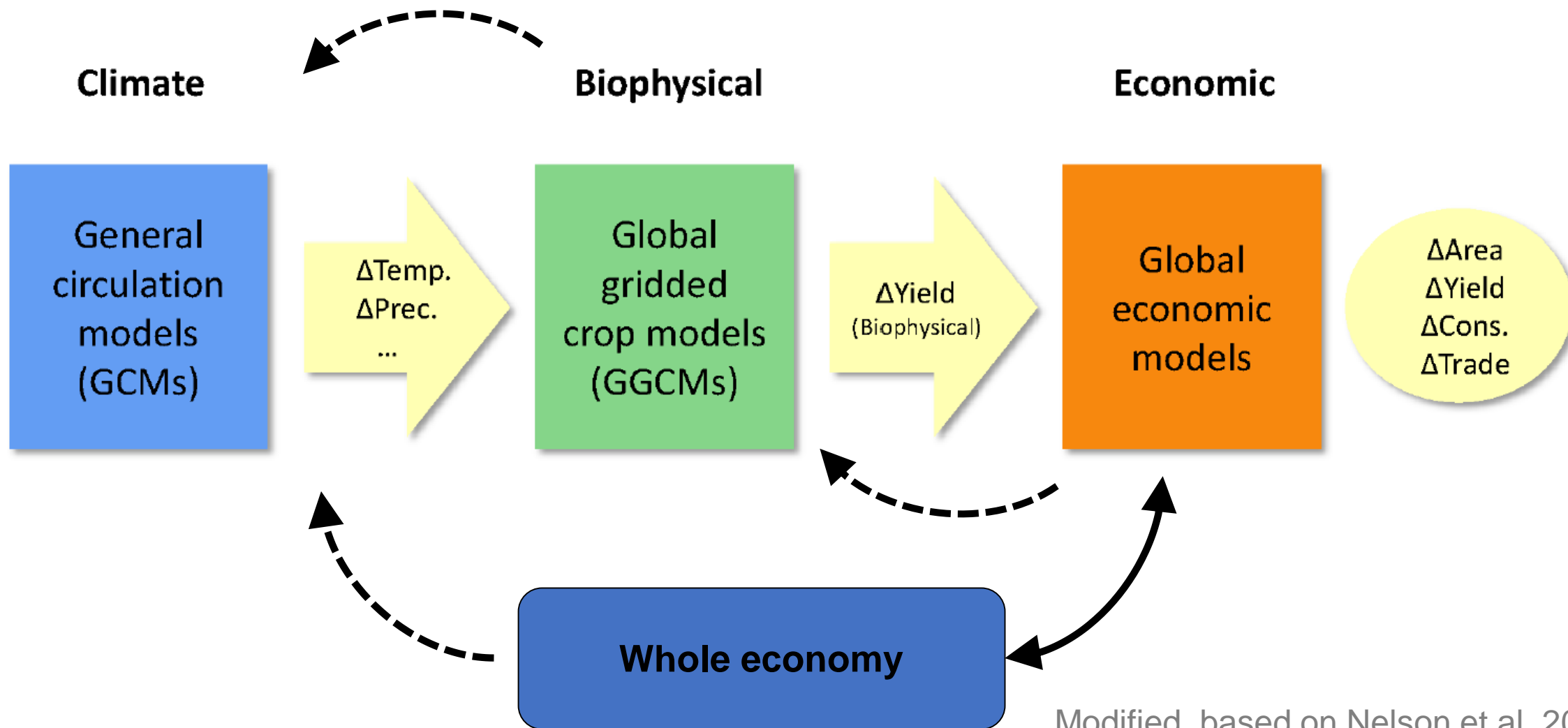
More extremes caused by blocked jet stream



Mitigation strategies: targets and realities...



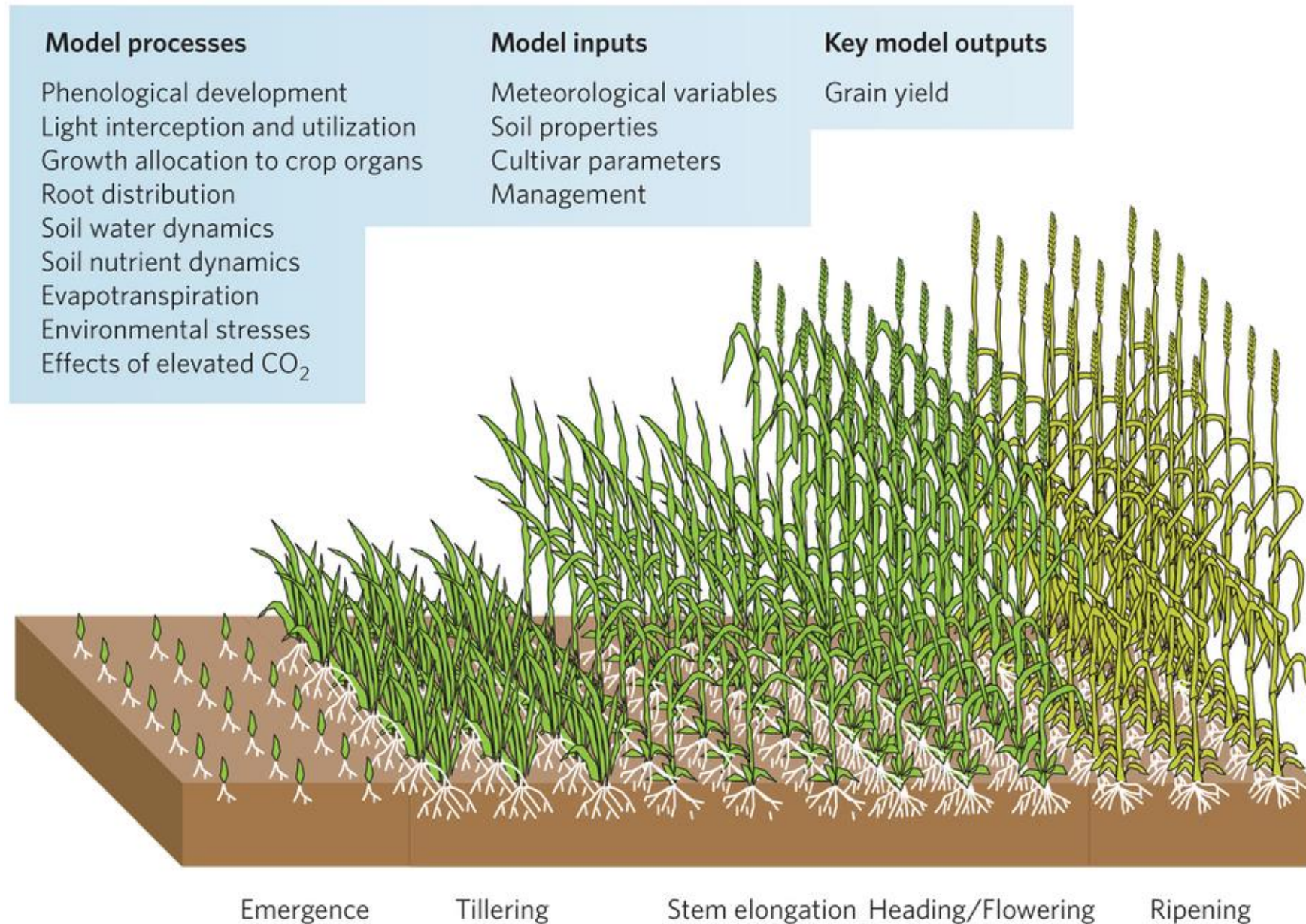
Climate change impact research for e.g. agriculture



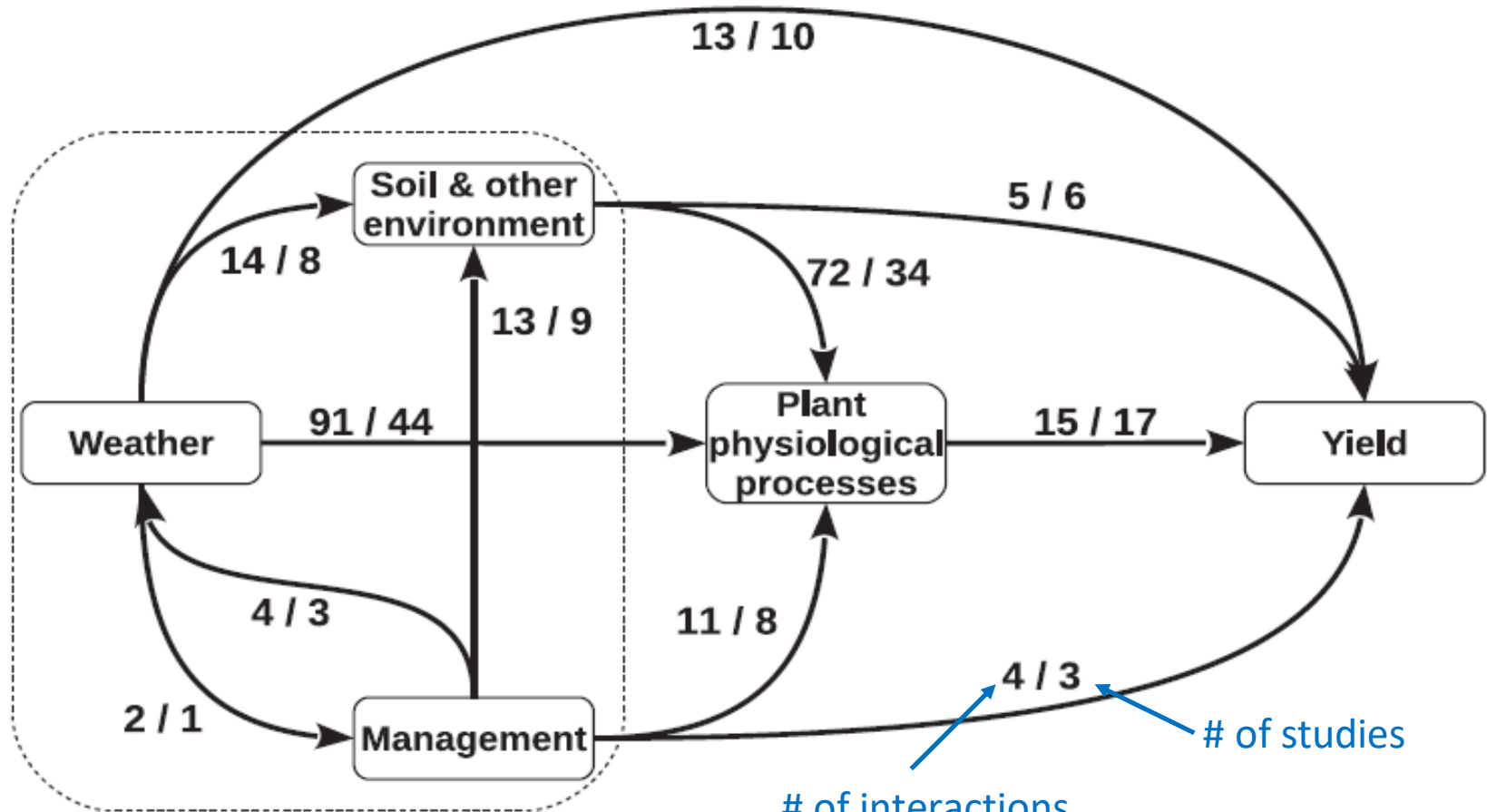
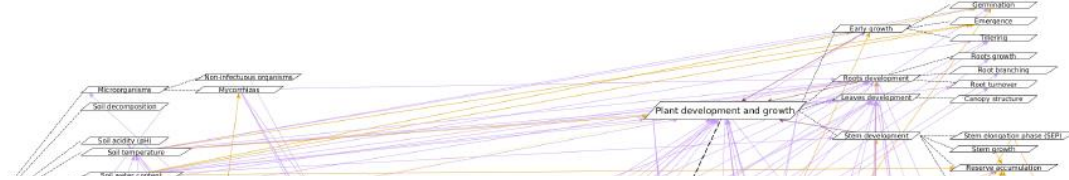
Modified, based on Nelson et al. 2014

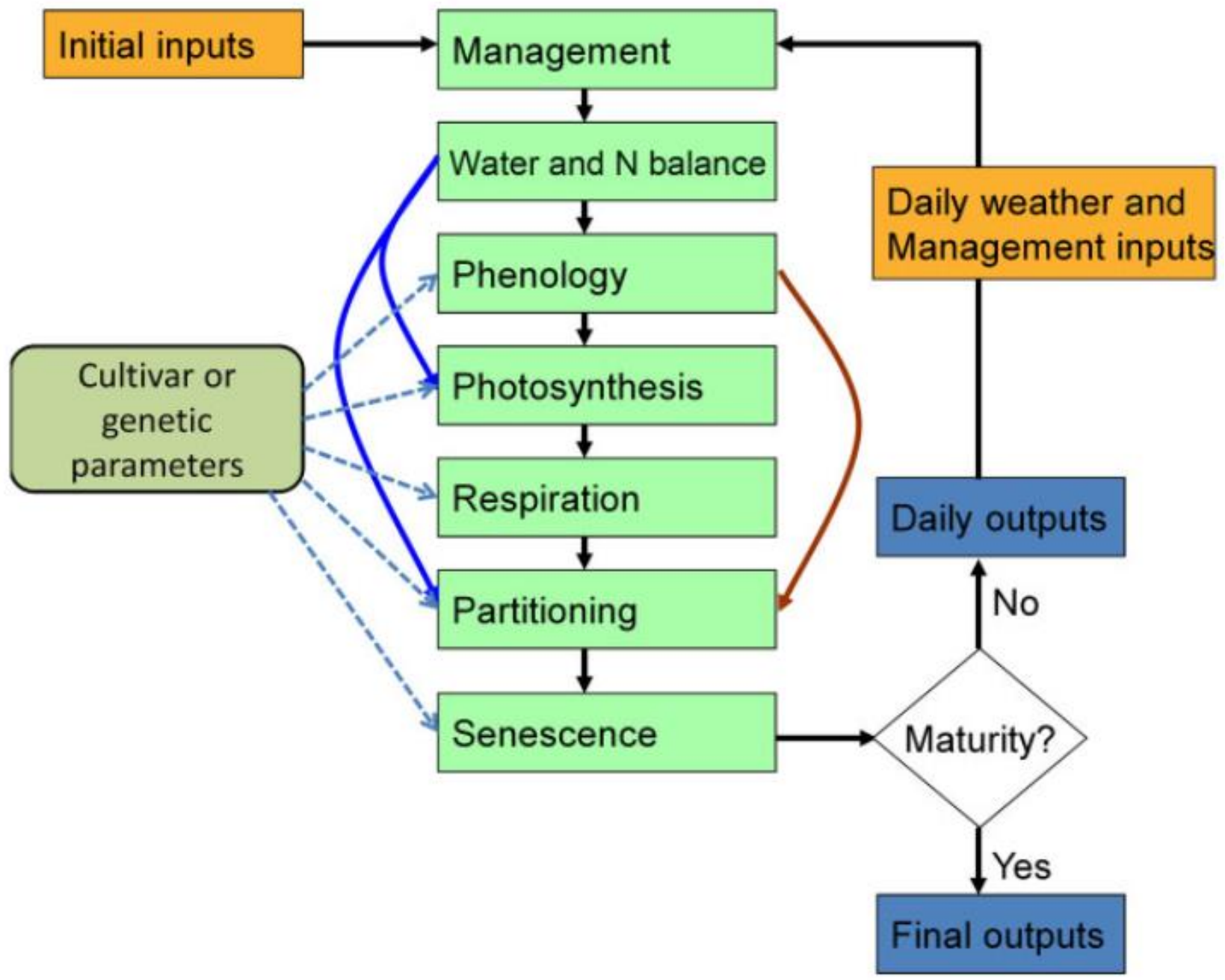
Modeling crop productivity

Crop modelling

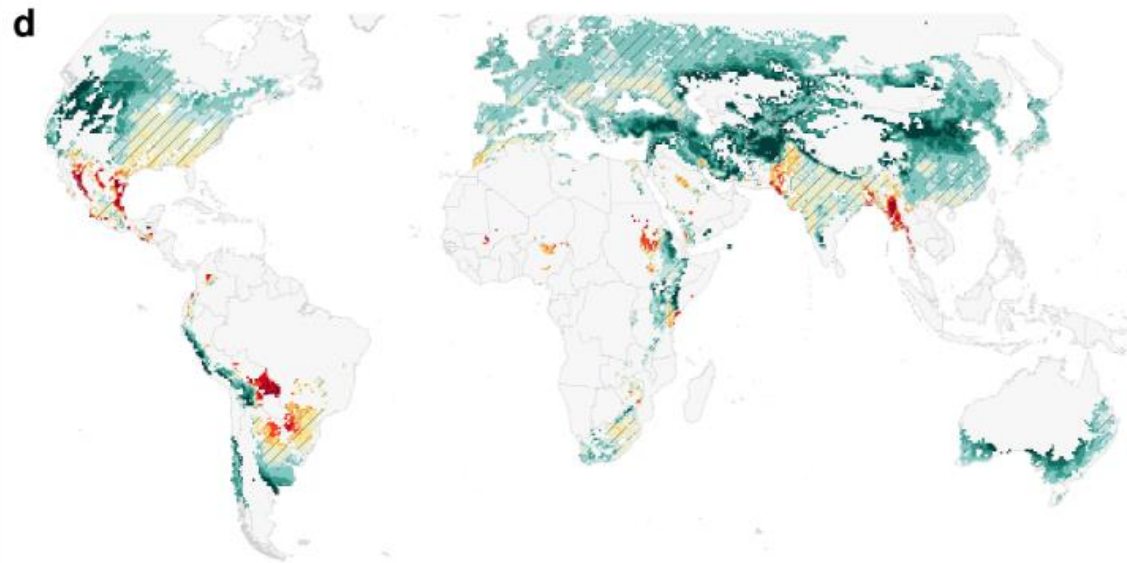
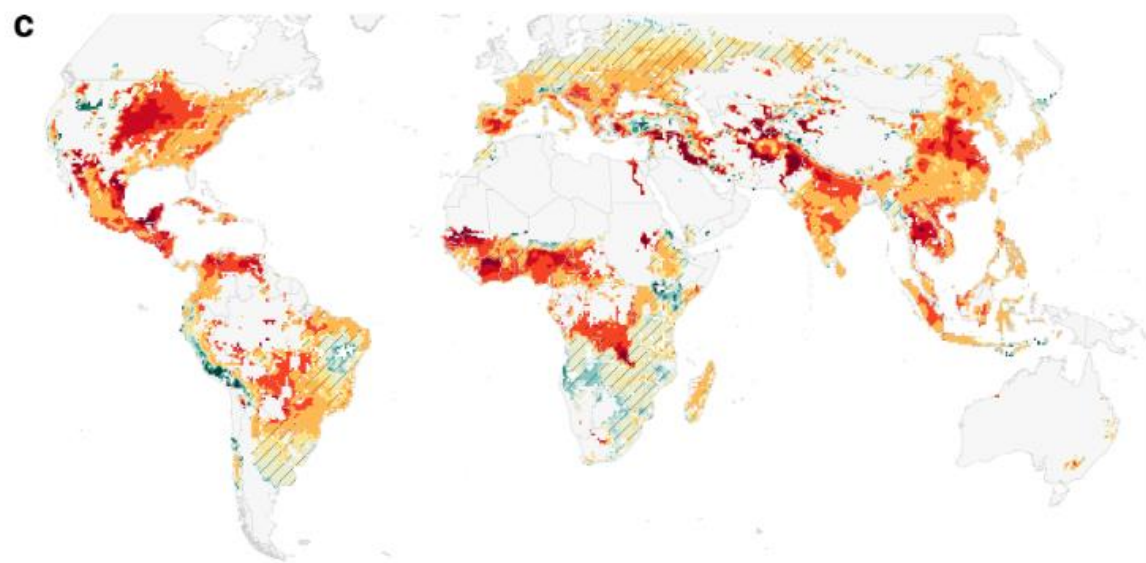
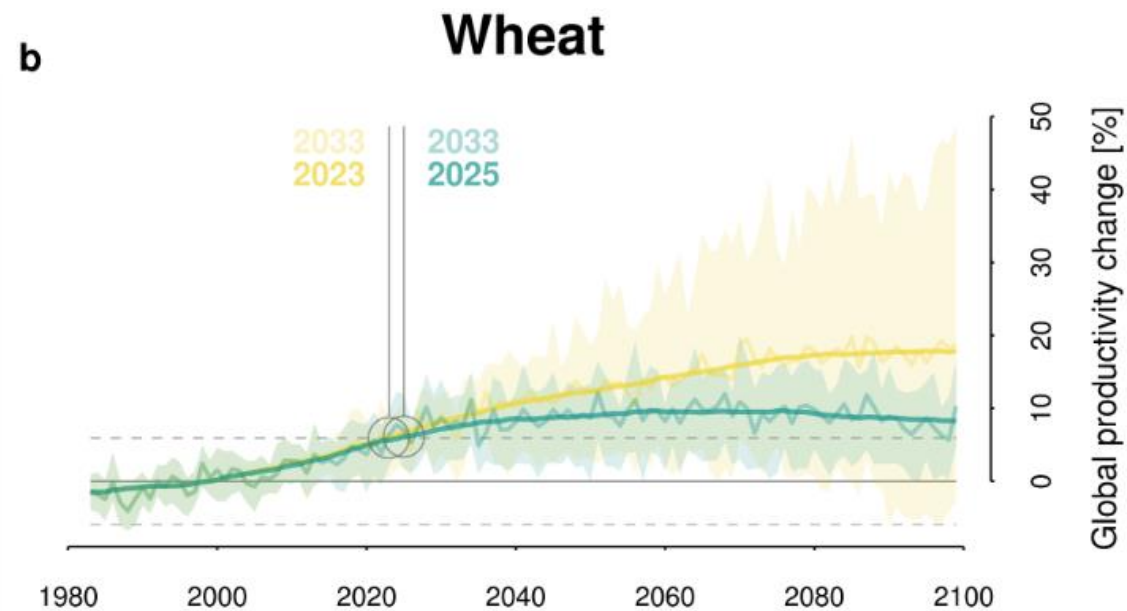
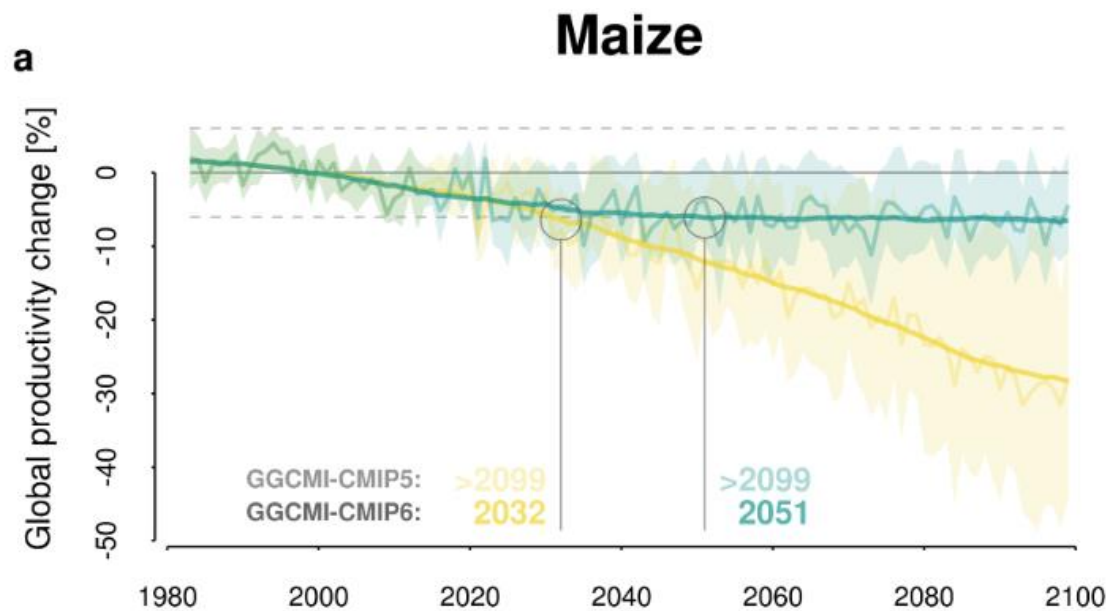


Carter et al. 2013

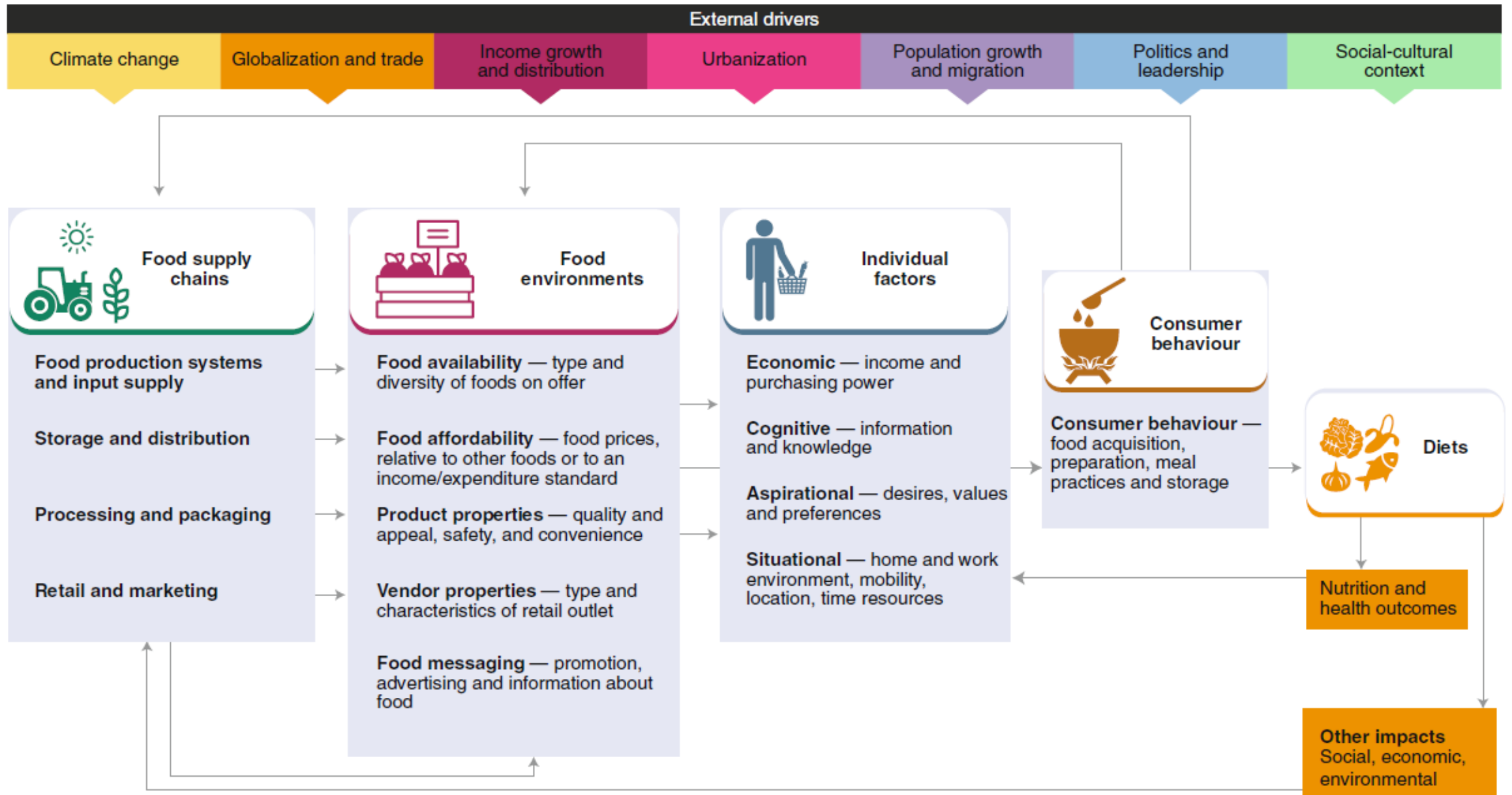




Climate Impacts will show early on

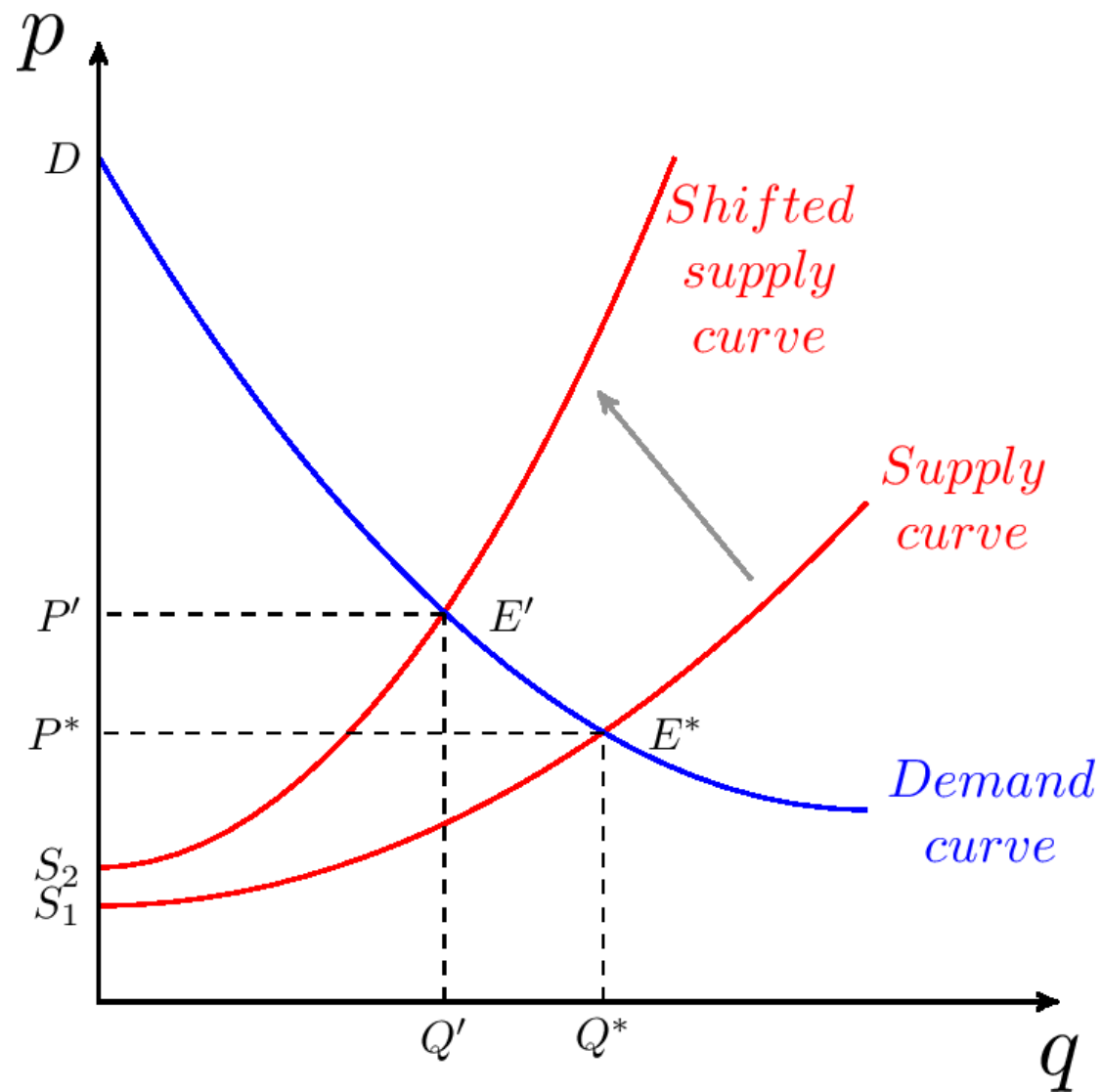


The food system that shapes our diets

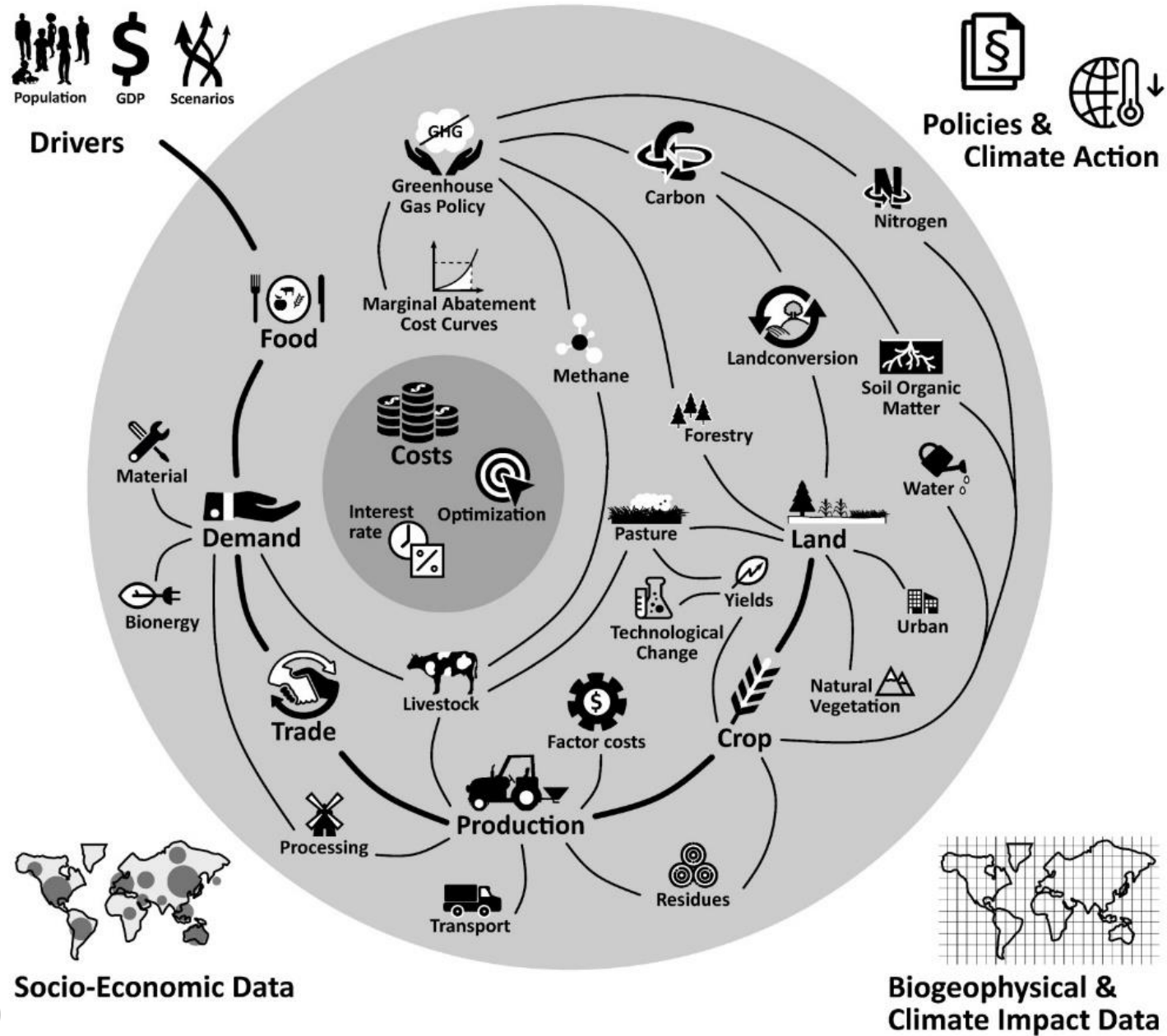


Beyond productivity: production

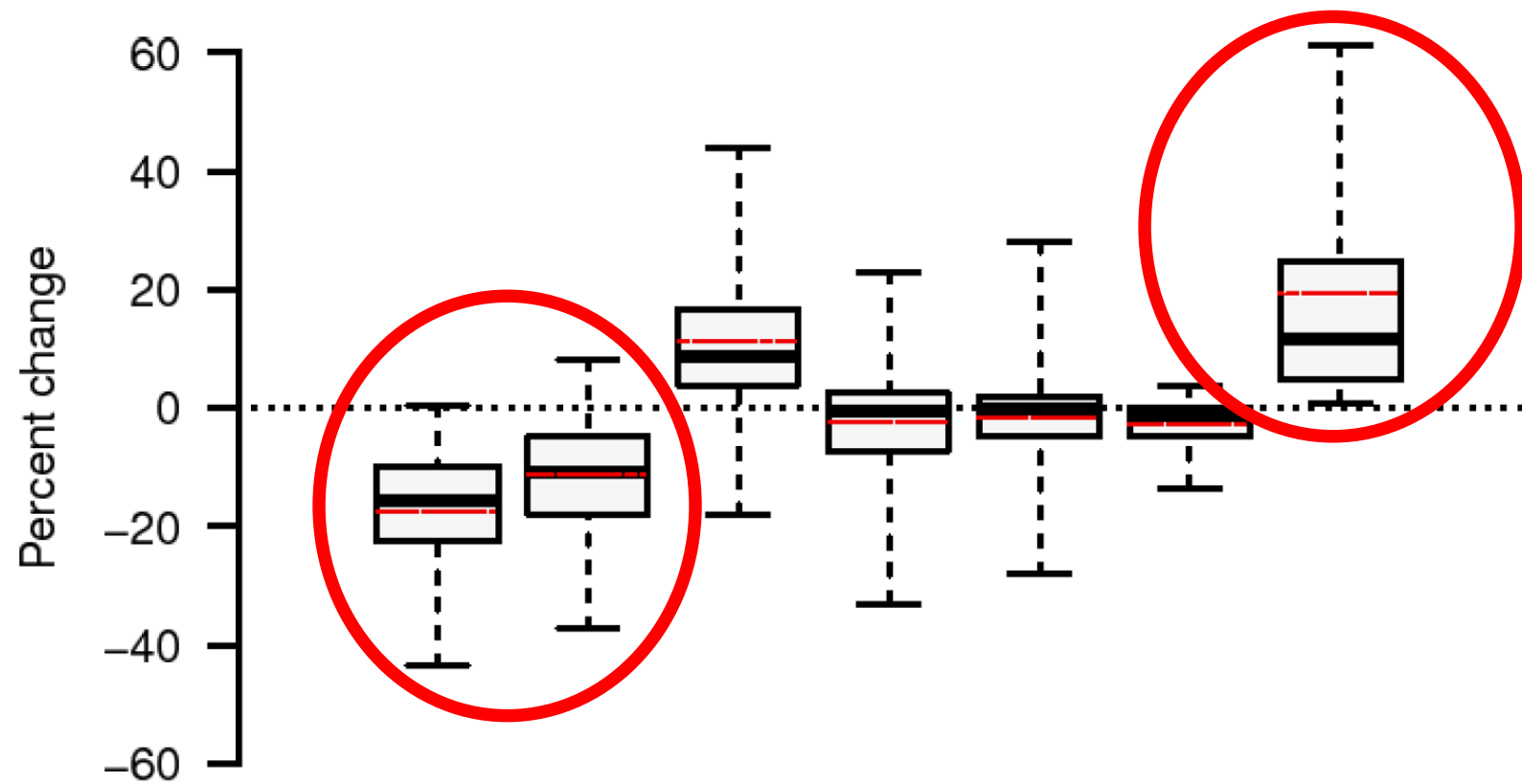
Economic agricultural modeling



The MAgPIE model



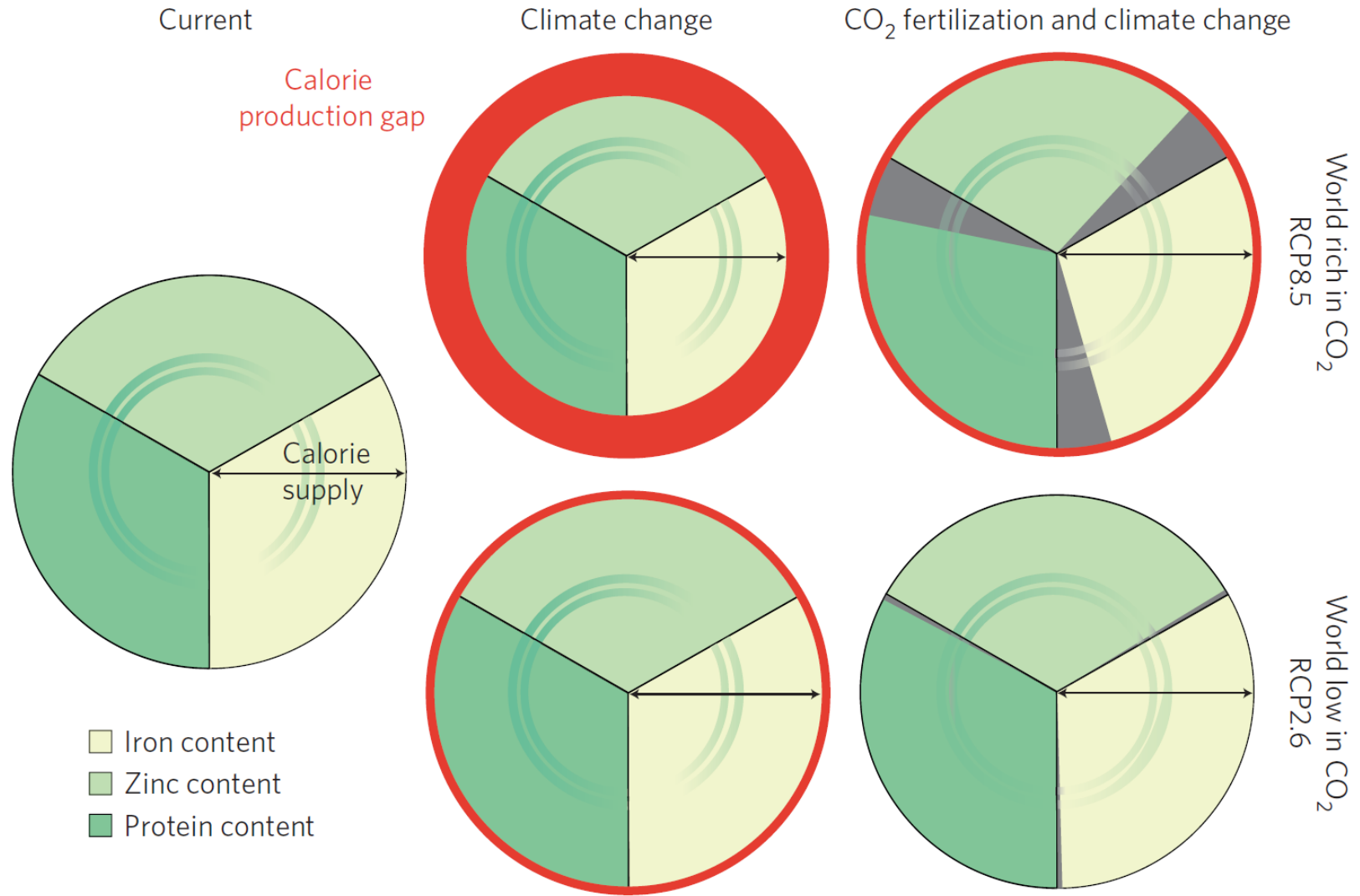
Production stabilizes because of economic responses



	YEXO	YTOT	AREA	PROD	TRSH	CONS	PRICE
n	2891	2891	2891	2891	2891	2891	2891
Mean	-0.17	-0.11	0.11	-0.02	-0.01	-0.03	0.2
SD	(0.13)	(0.17)	(0.25)	(0.25)	(0.26)	(0.06)	(0.24)

Beyond production: nutrition

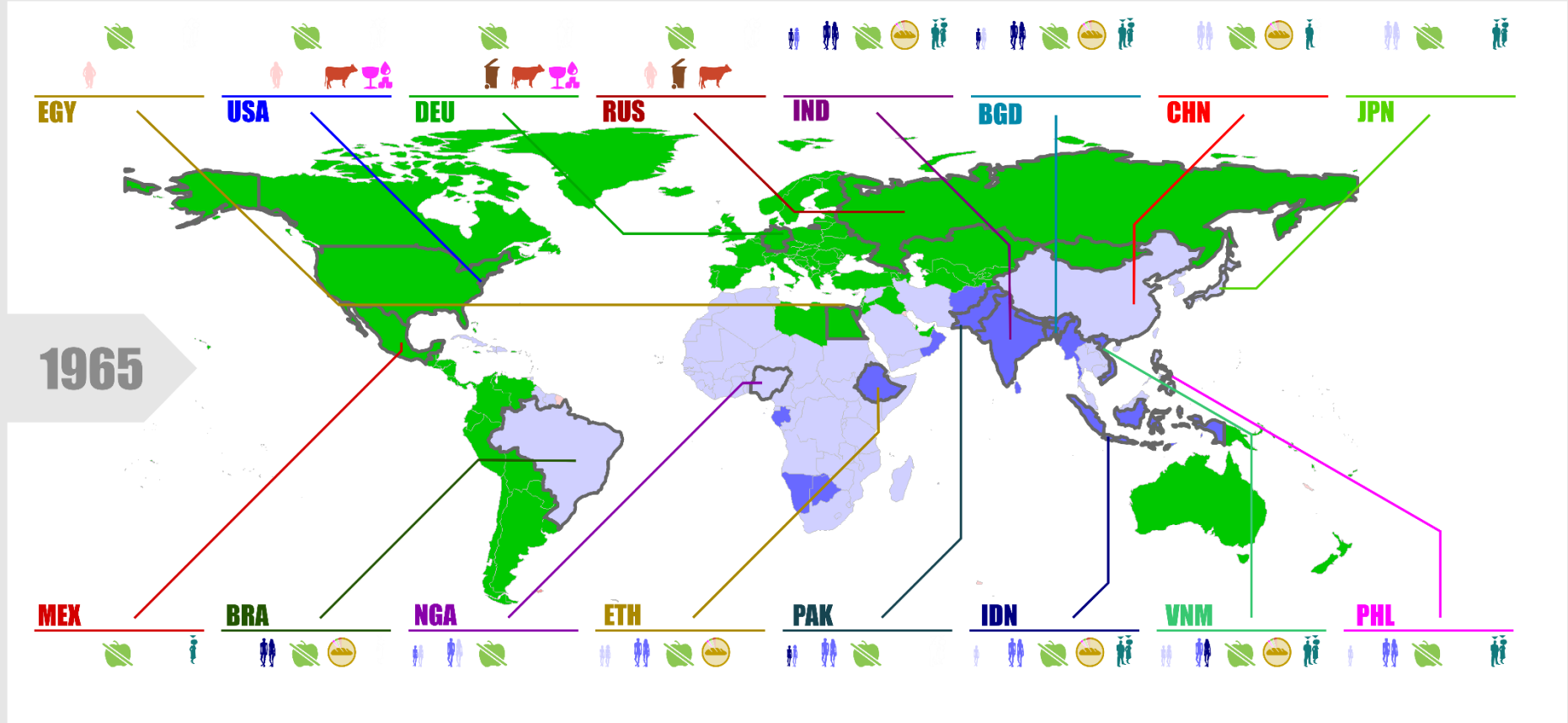
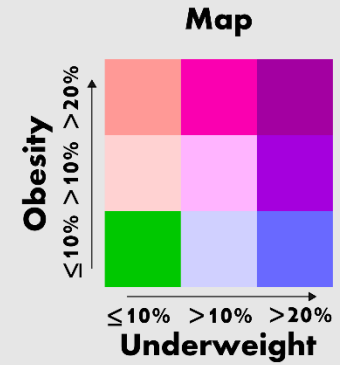
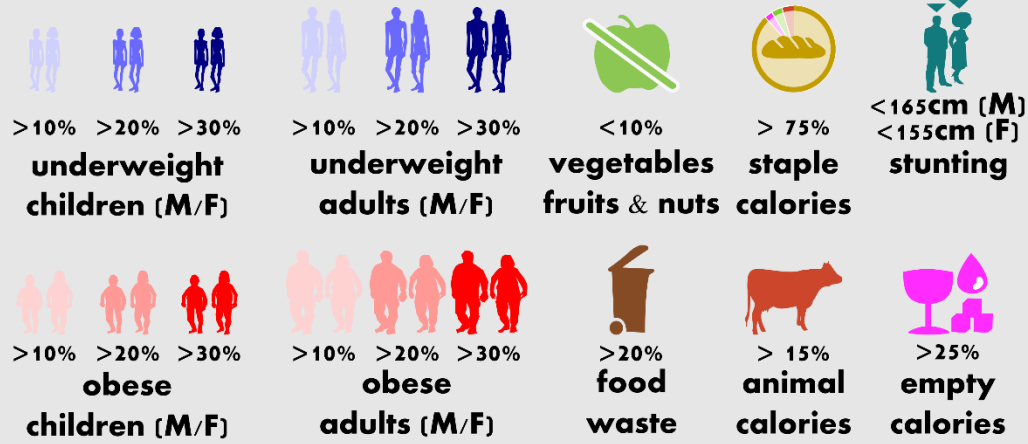
Fertilizing hidden hunger?



Myers et al. 2014, Müller et al. 2014

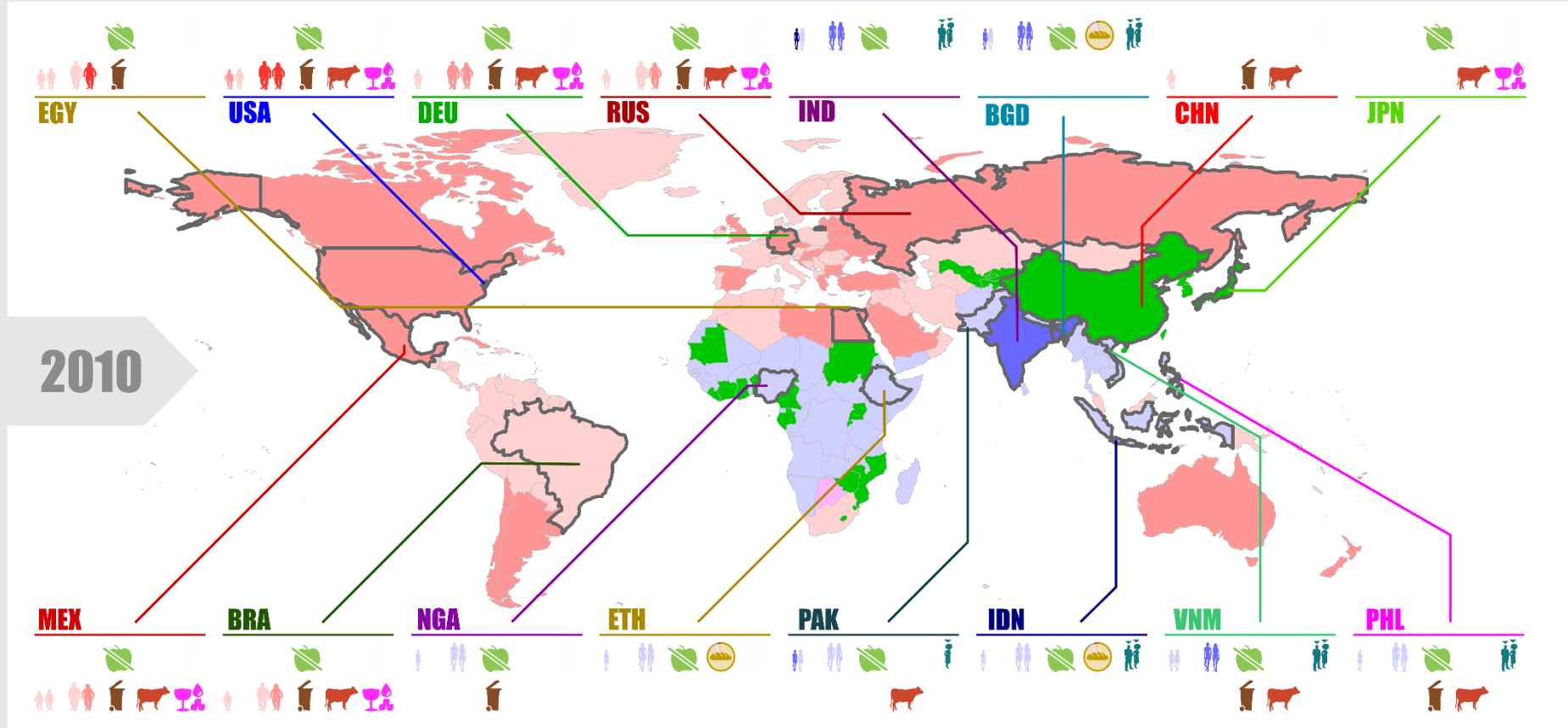
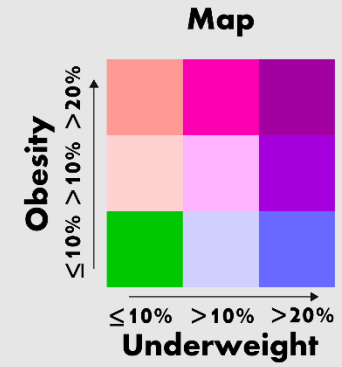
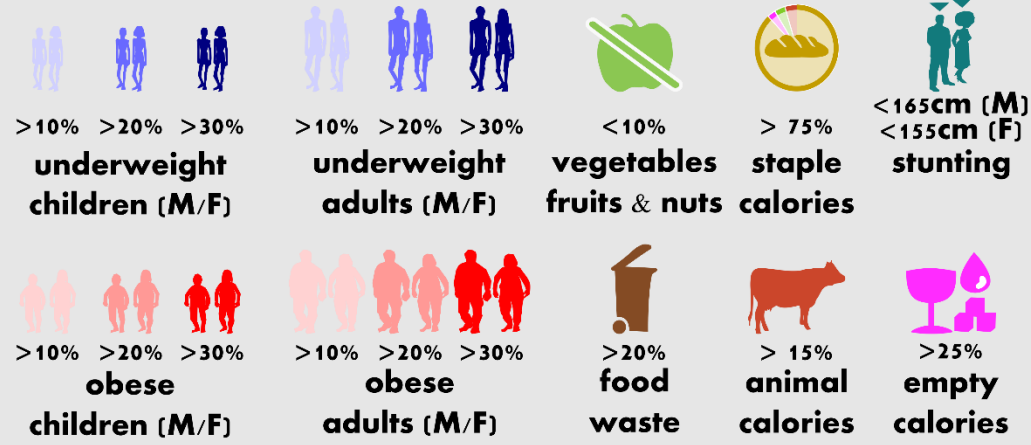
nutrition transition jeopardizes food security, health and the environment

**starved,
stuffed &
wasteful**



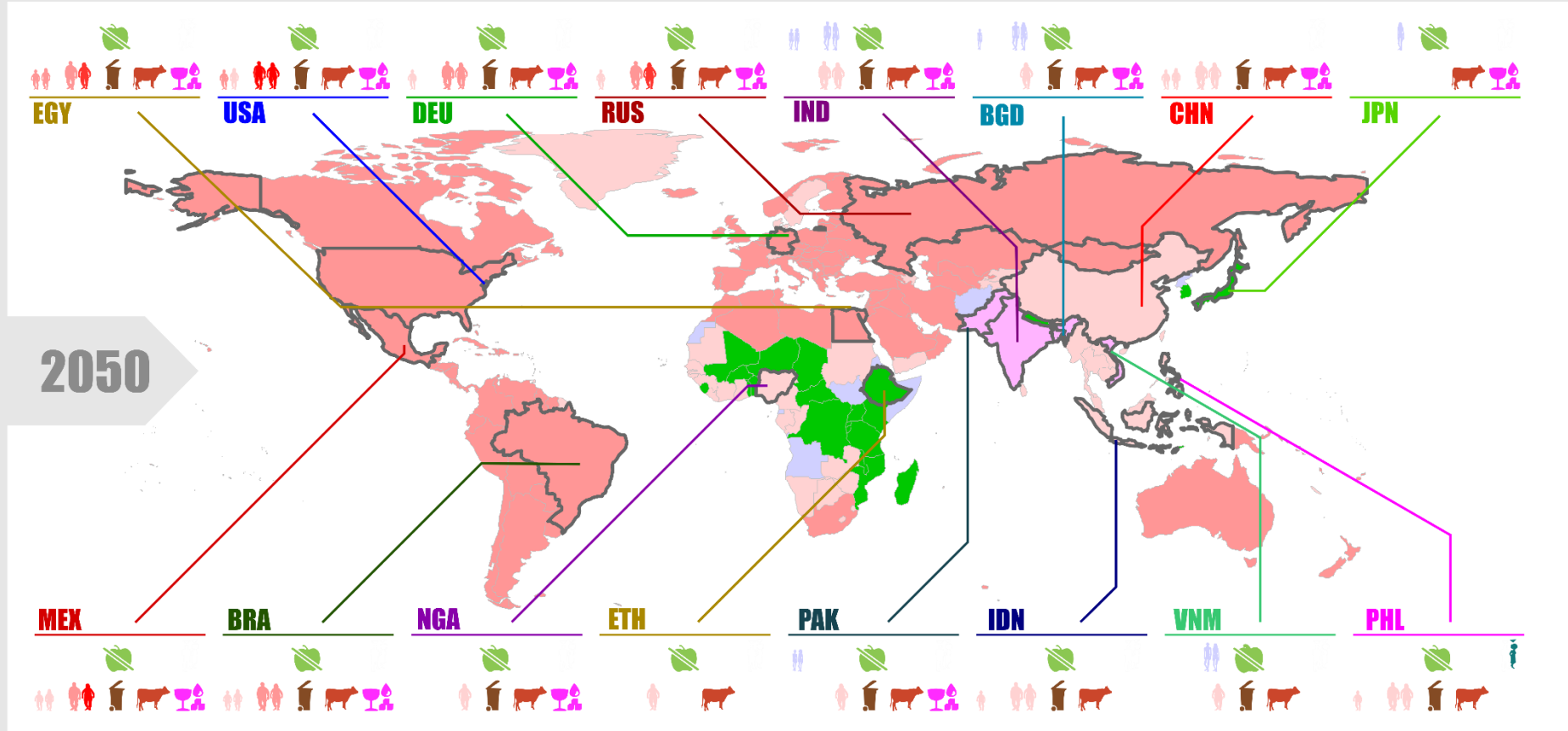
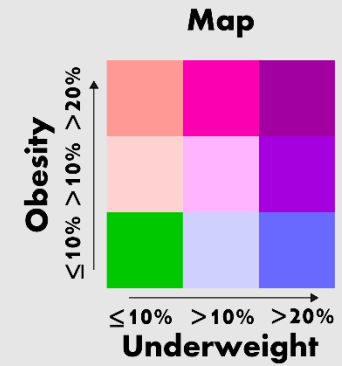
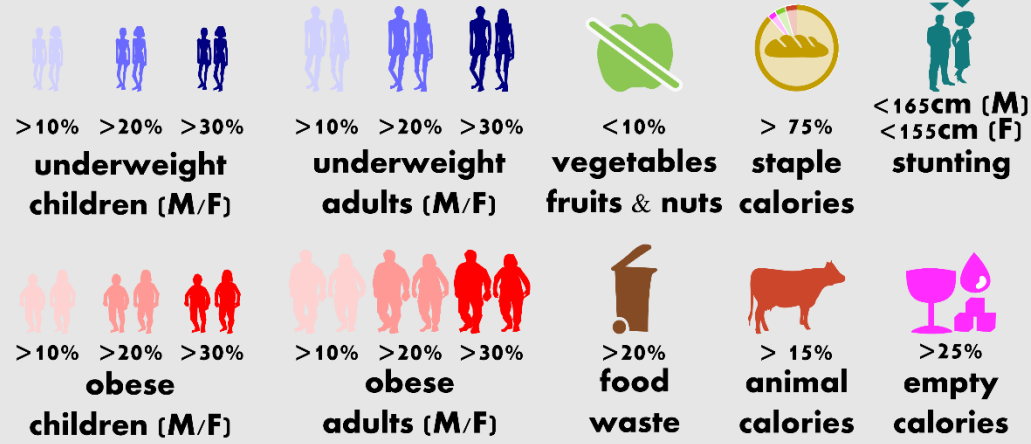
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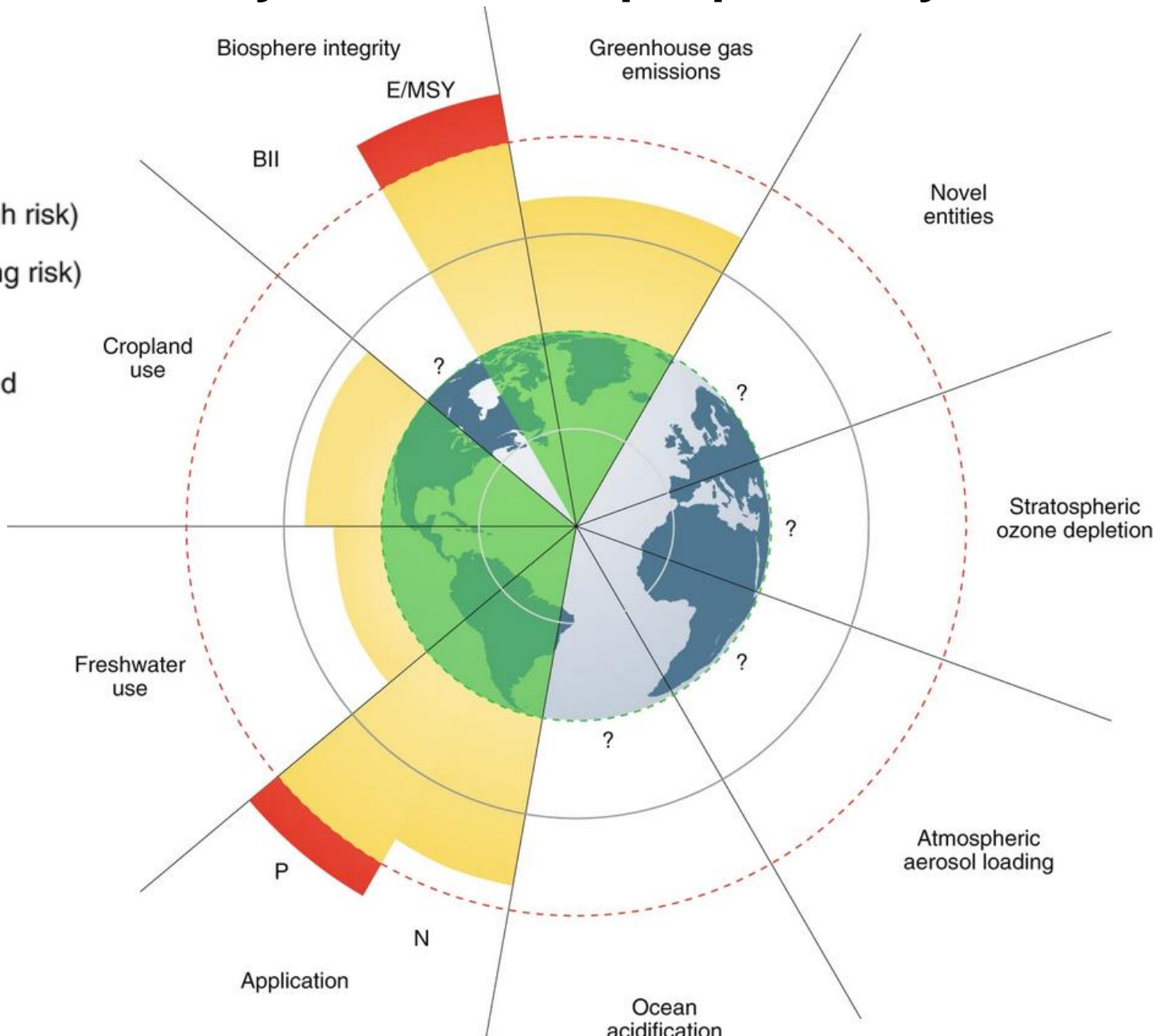
**starved,
stuffed &
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Beyond nutrition: sustainability

Global Food systems already exceed multiple planetary boundaries

- Beyond zone of uncertainty (high risk)
- In zone of uncertainty (increasing risk)
- Below boundary (safe)
- Food boundary not yet quantified



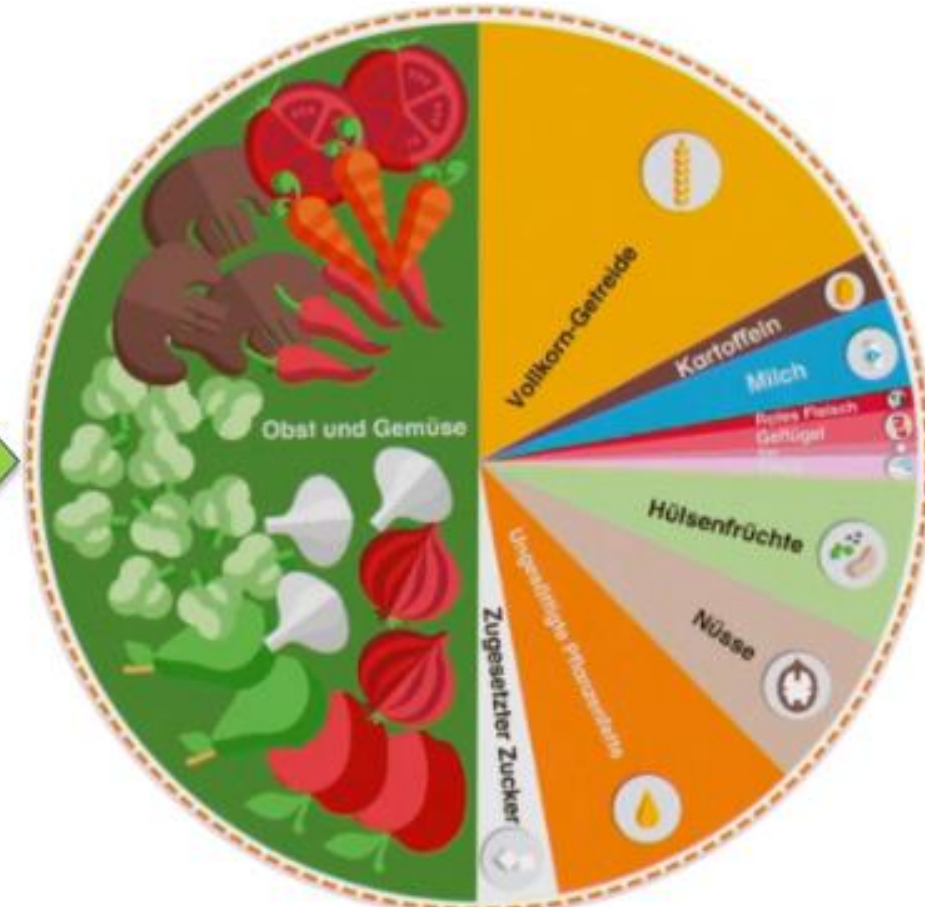
Rockström et al. 2020

Planetary health diets imply drastic changes in nutrition in Germany

Deutschland (heute)

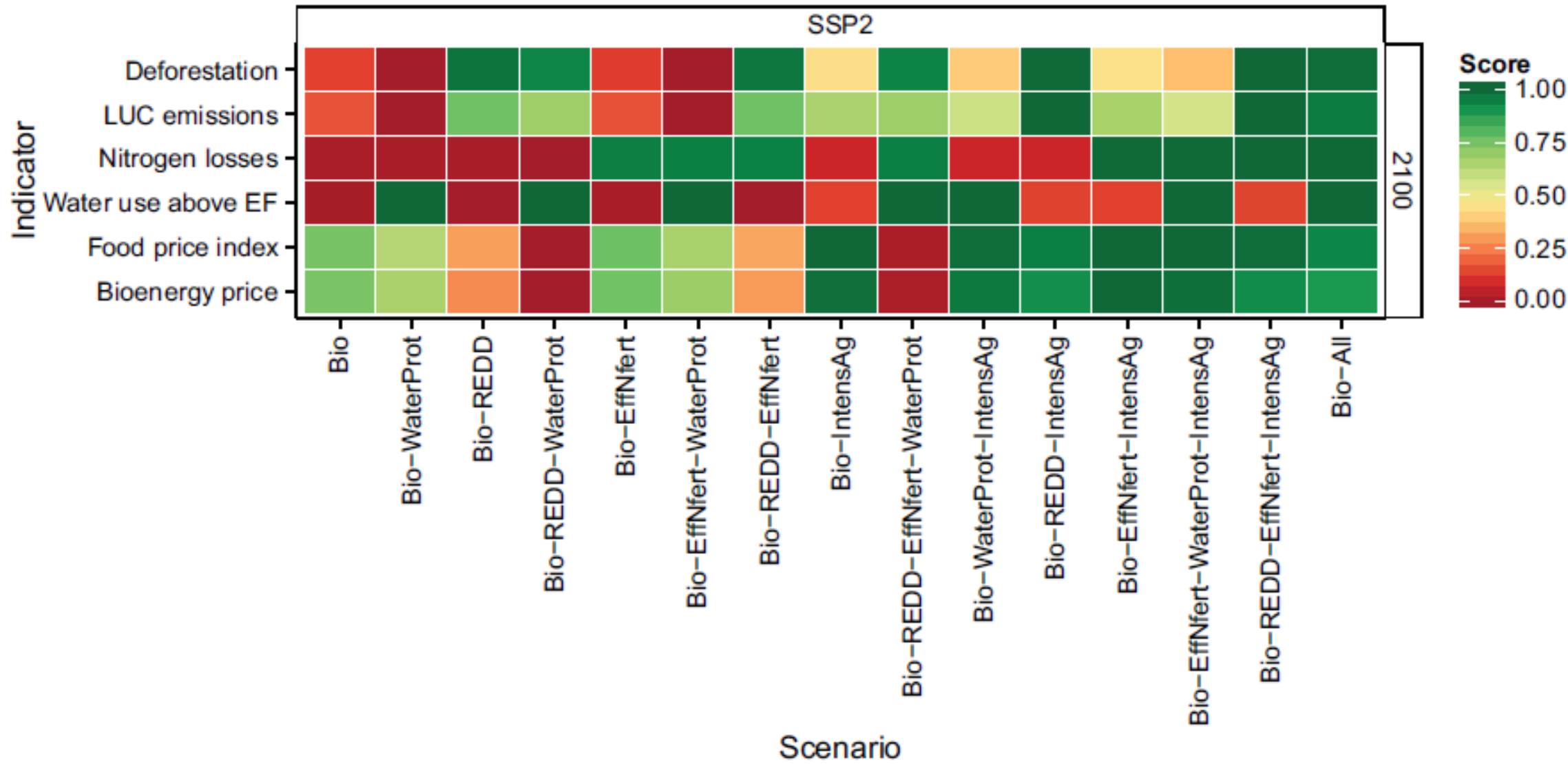


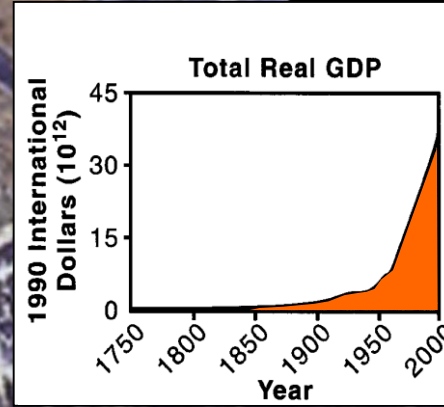
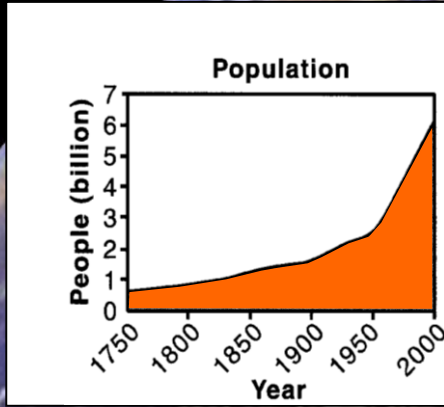
EAT-Lancet Empfehlung



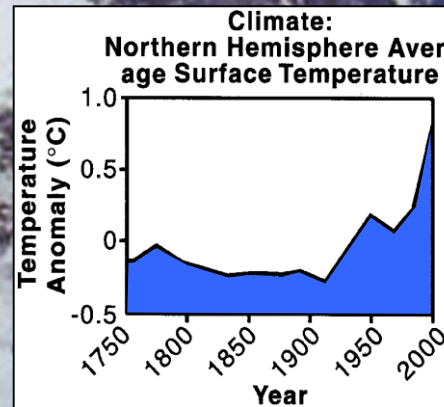
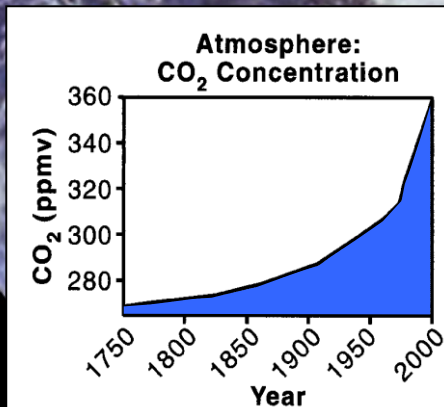
Quelle: www.daserste.de/information/wissen-kultur/w-wie-wissen/ernaehrung-136.html, Willet et al. 2019

Conflicting targets and SDGs

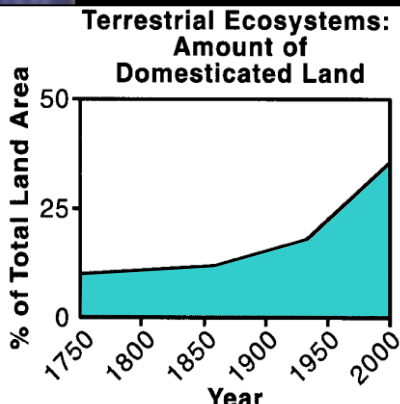
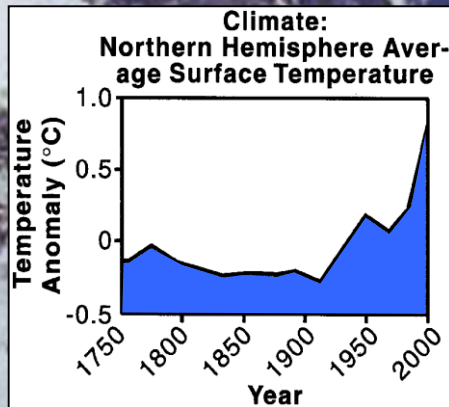
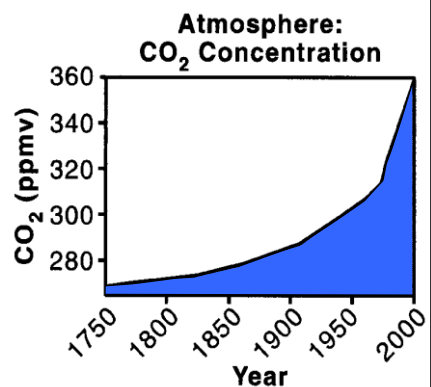
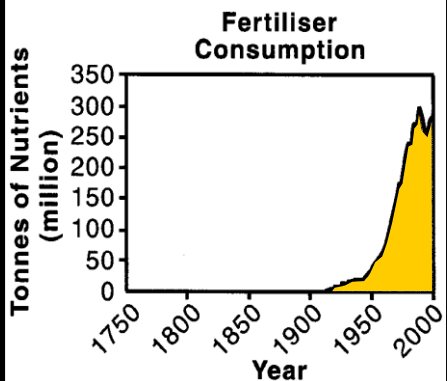
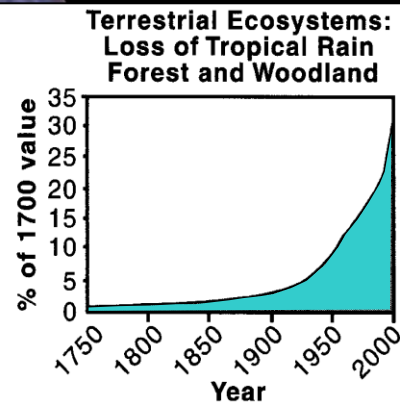
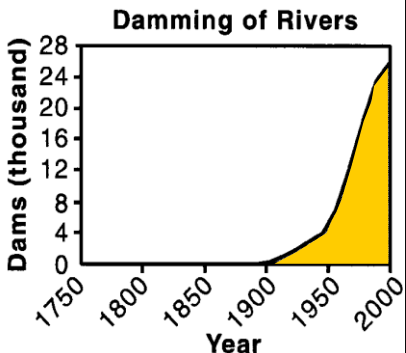
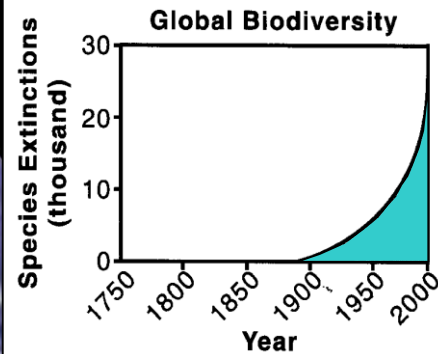
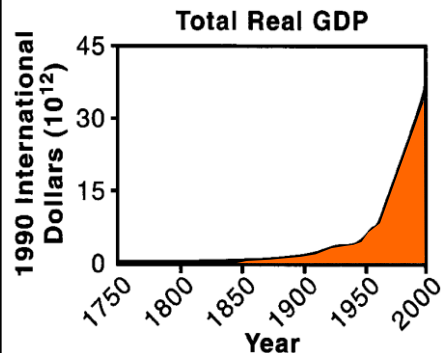
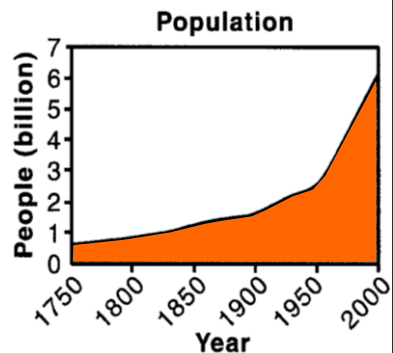
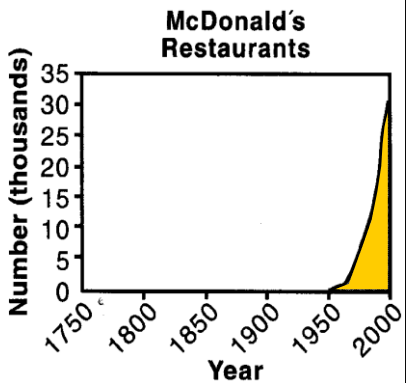




Climate change



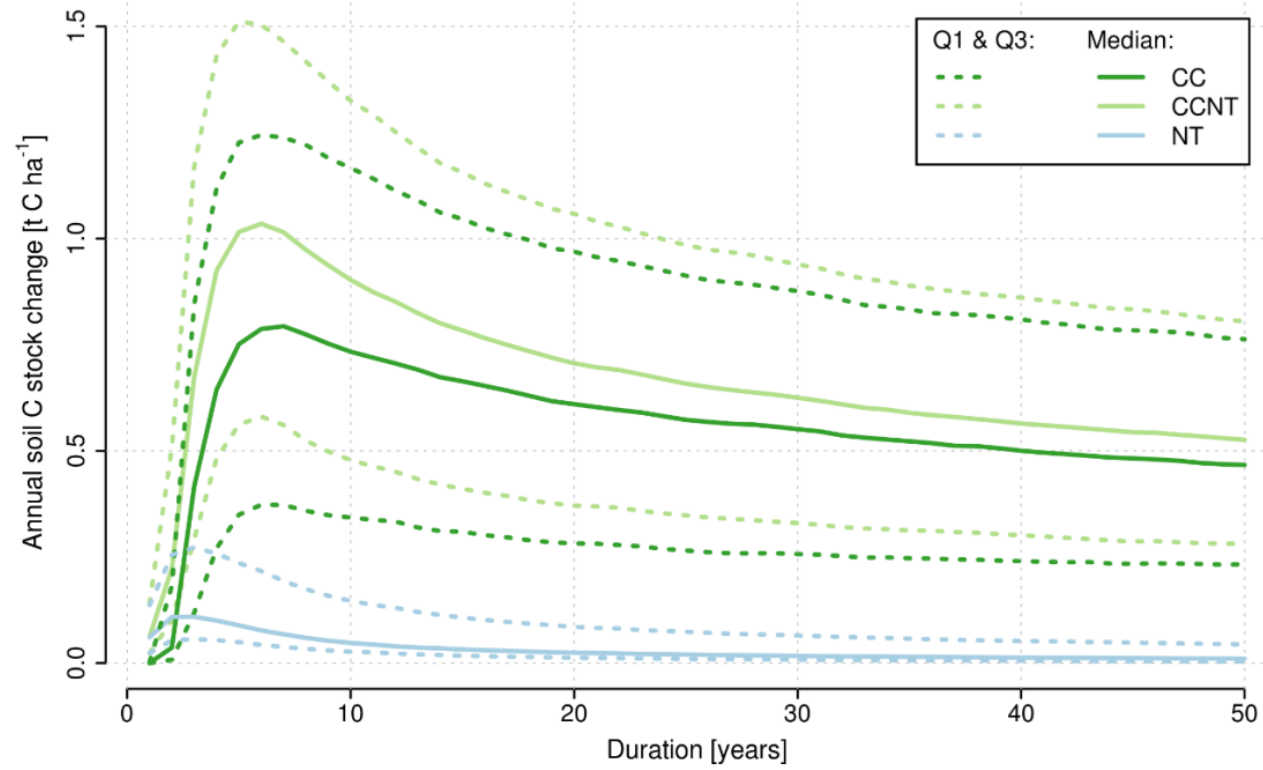
Global change



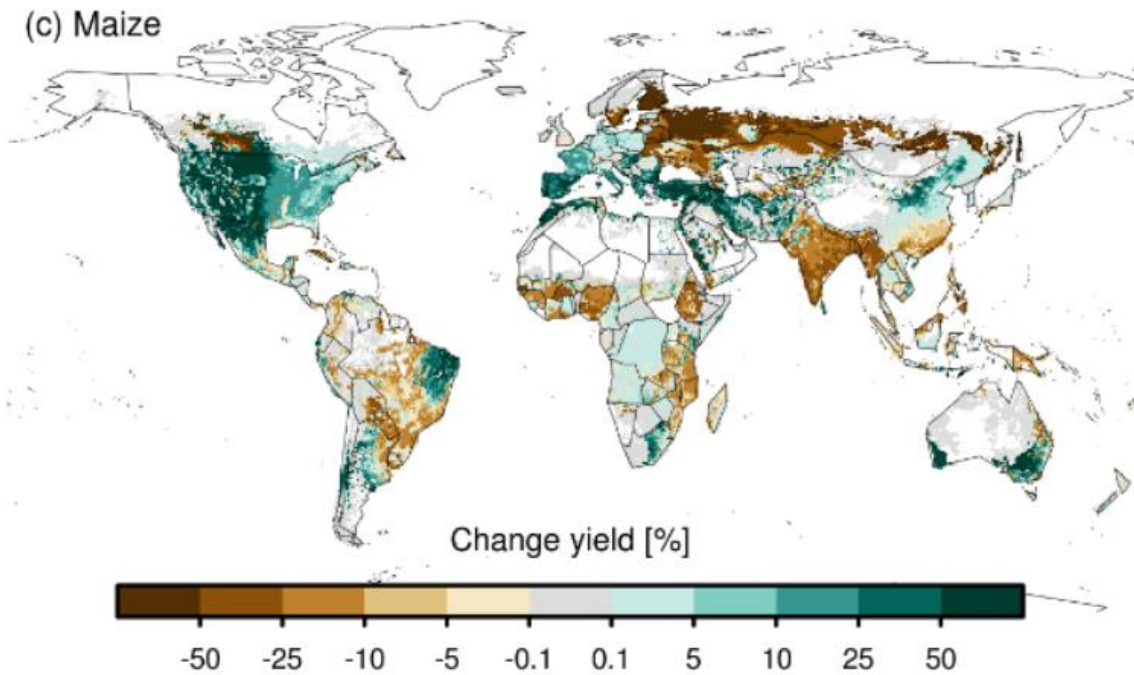
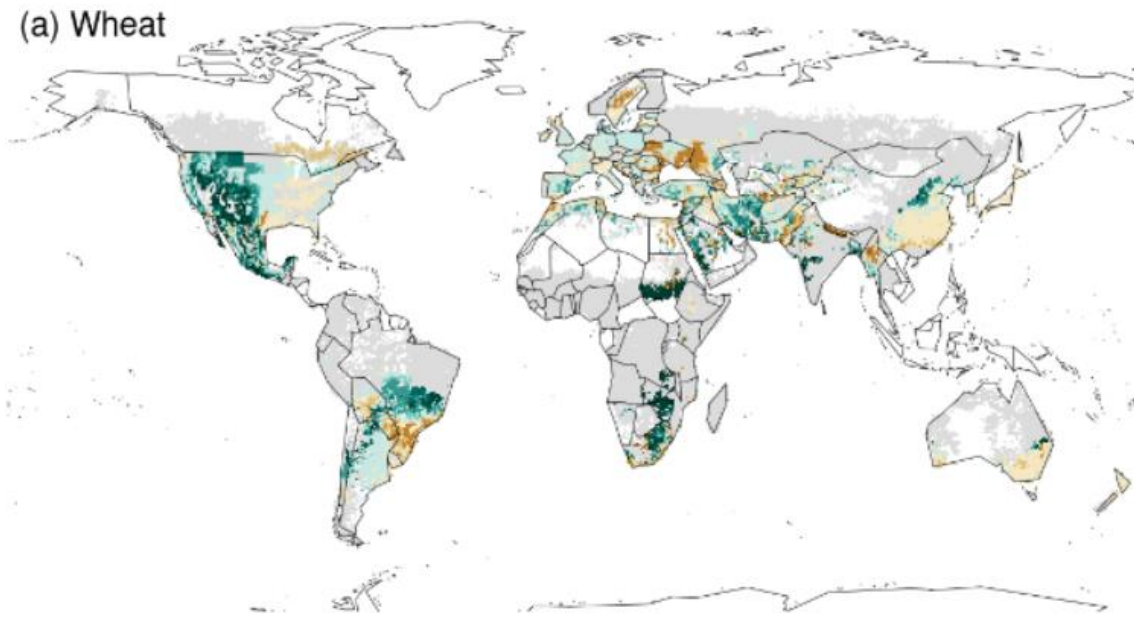
Agriculture is under pressure: from all sides!

- Mitigate climate change and looming impacts on agricultural productivity
- Food security for a growing and richer population
- Bio-economy: increasing demand for fuels and materials
- Conservation/environmental protection

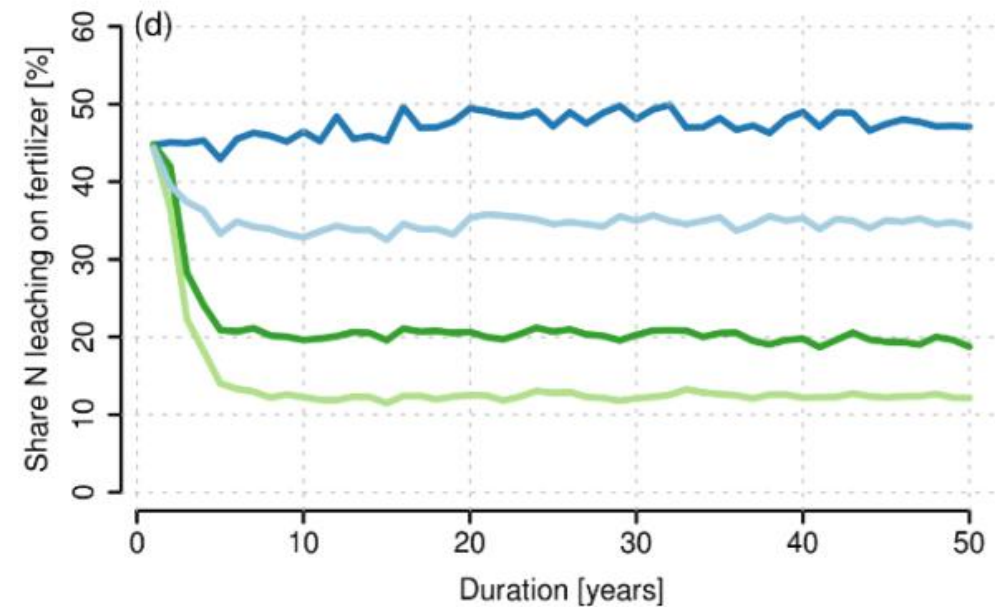
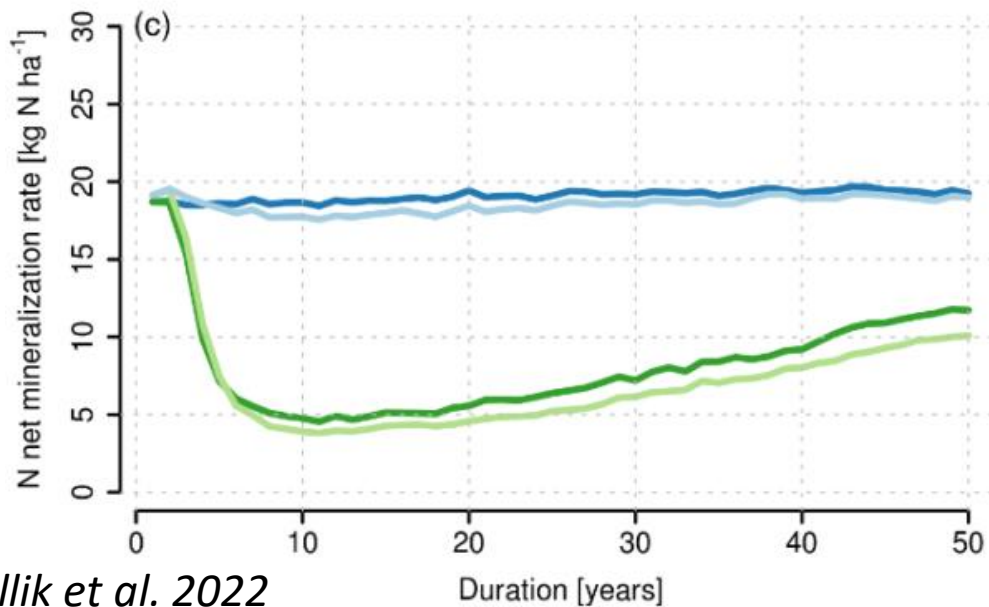
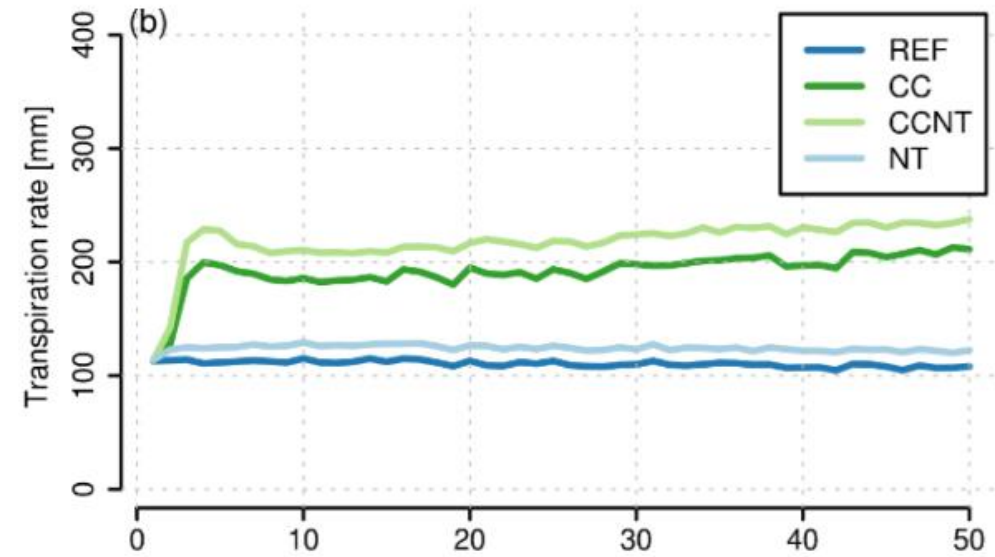
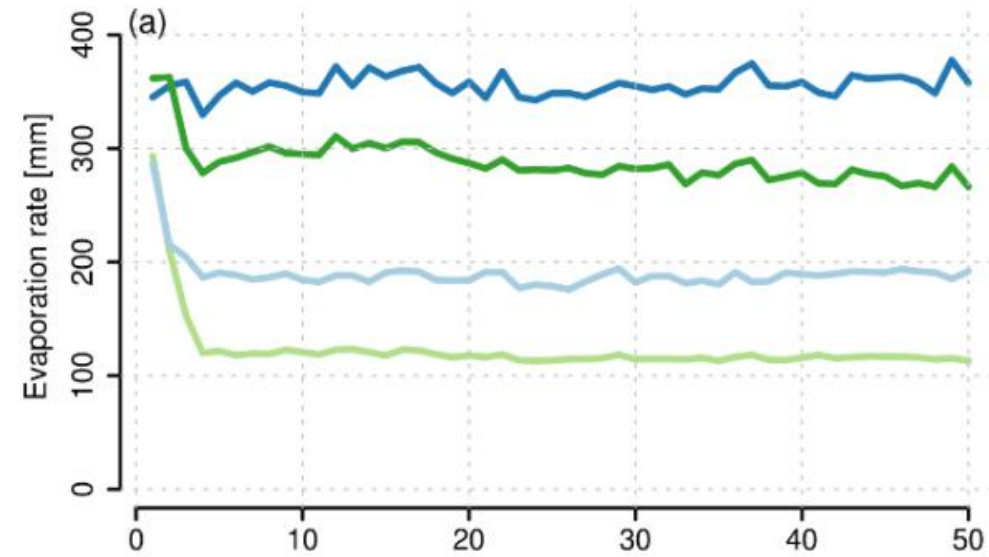
Conservation Agriculture?



Porwollik et al. 2022



Complexity is an obstacle – and a chance for finding local solutions



Problems

Economic incentives

- Prices do not reflect true costs (externalities)
- Unhealthy diets seem to be cheaper (bias)
- Impact experience is delayed (bias, temporal preference)

Assets

- Insufficient income
- Insufficient expertise
- With increasing wealth, economic incentives become less effective (convenience, opportunity costs)

Preferences

- Convenience is often more important than the price
 - Snacks, delivery services, pre-made meals
- Often there is knowledge about environmental impacts

Food environment

- advertisement
- Small households
- Full-time job, many leisure time activities
- supermarkets

Possible solutions

Economic incentives

- Environmental taxation with re-distribution
- Health effect taxation with re-distribution (e.g. sugar)
- Bring effects into the present (e.g. health insurance)

Assets

- Basic income for poorest countries of the world (financed by GHG tax)
- Cooking classes for pupils, students, retired people
- Work part time, home office

Preferences

- Promotion of a valuation of food, establishing nutrition cultures
- Nudging: sustainable options need to be the most convenient ones

Food environment

- Limitation of advertisements, especially for unhealthy items
- Multi-generation houses, community spaces
- Farmers' markets and direct marketing, nudging in supermarkets

And now: your turn





Menzel & D'Aluisio, 2007

Thank you for your attention!

