

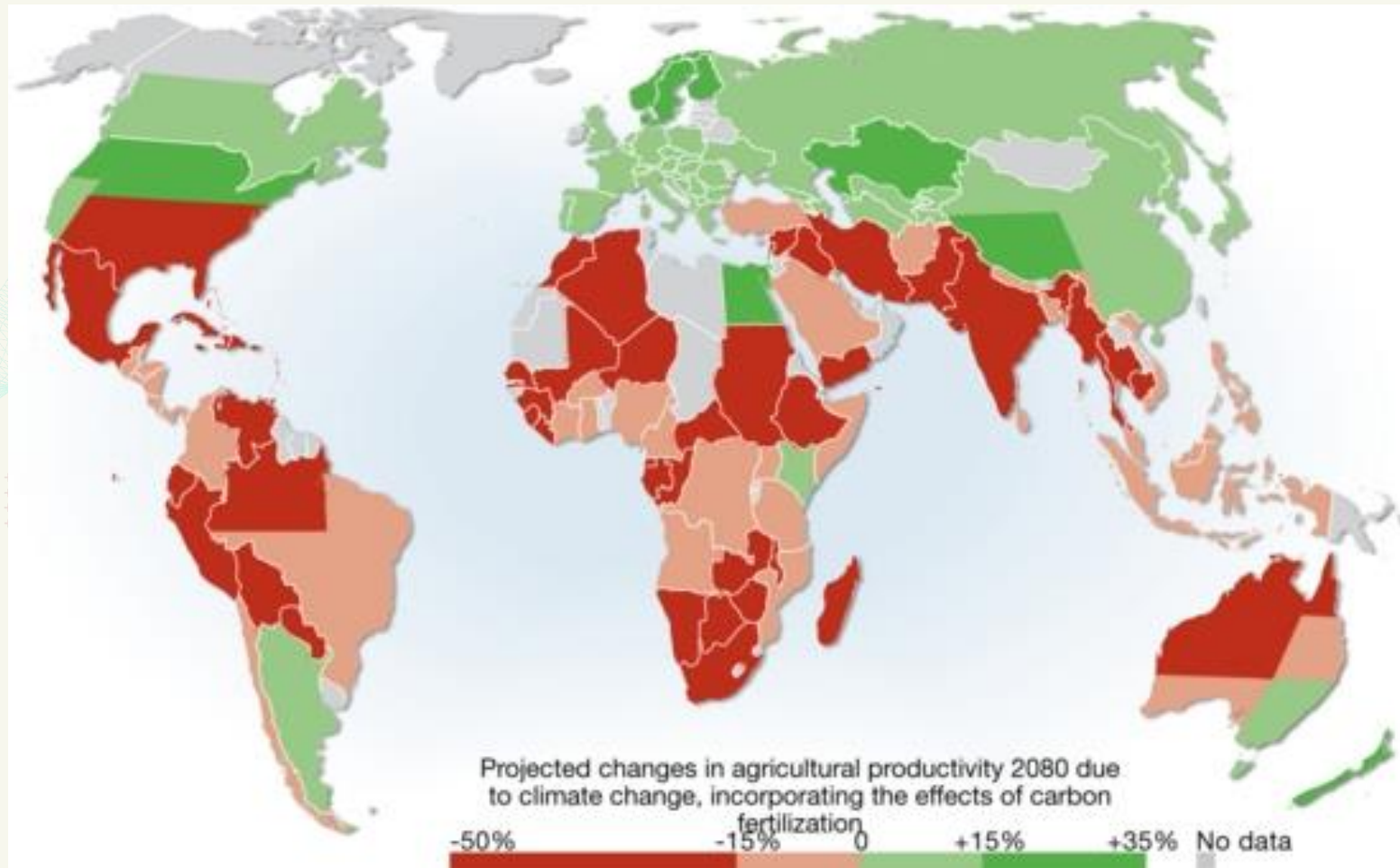
Food production and food security in a changing climate

Thomas Elmqvist

Program Director, EASAC

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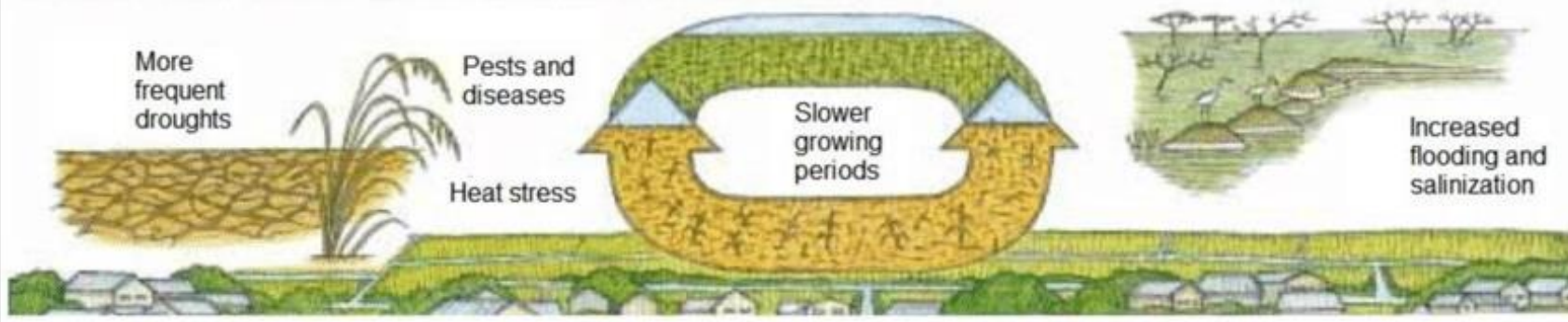
Impact of climate change on food production

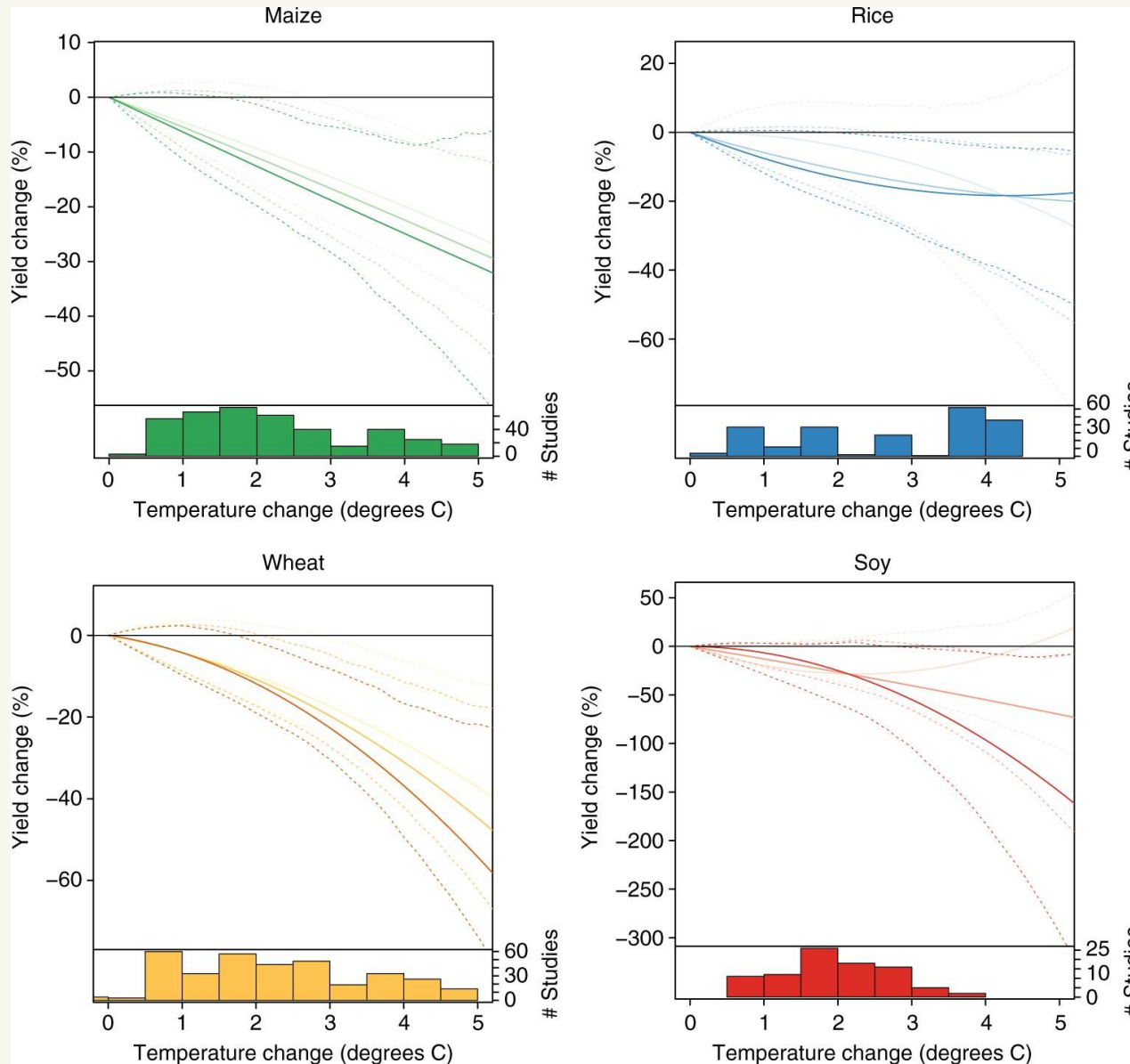


POSSIBLE BENEFITS OF CLIMATE CHANGE ON AGRICULTURE



POSSIBLE DRAWBACKS OF CLIMATE CHANGE ON AGRICULTURE





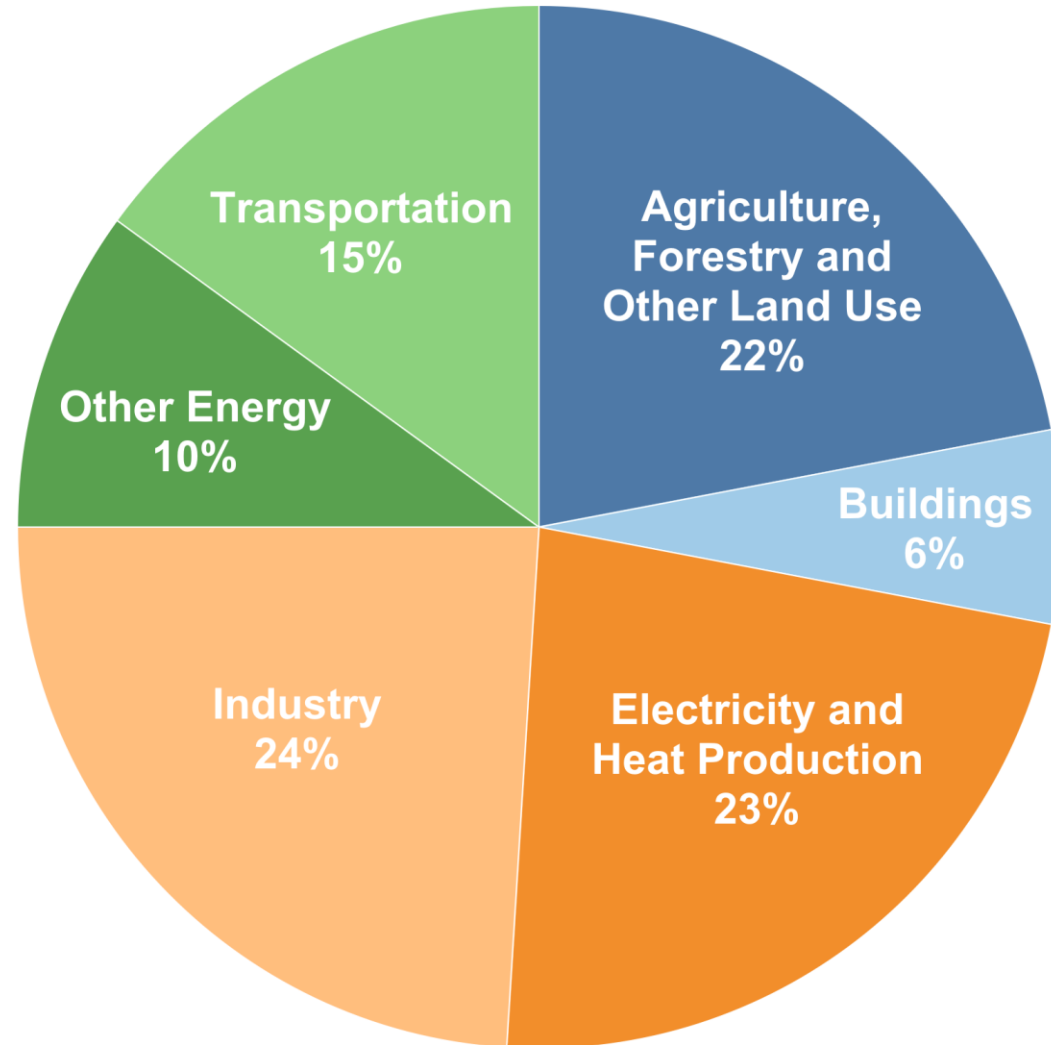
Effects of climate change on yield of specific crops



Moore, F.C., Baldos, U., Hertel, T. *et al.* New science of climate change impacts on agriculture implies higher social cost of carbon. *Nat Commun* **8**, 1607 (2017).
<https://doi.org/10.1038/s41467-017-01792-x>

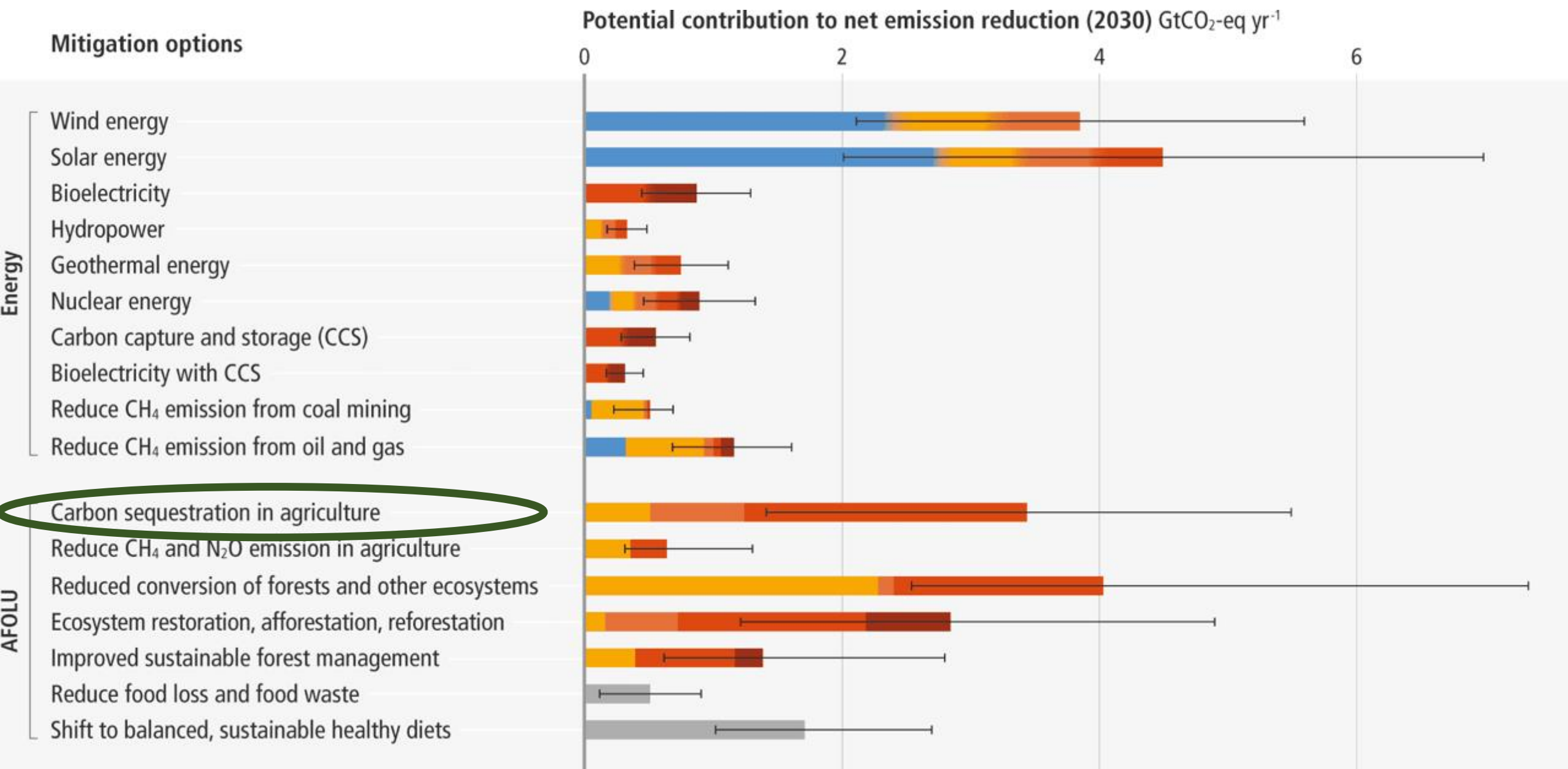
GLOBAL GREENHOUSE GAS EMISSIONS BY ECONOMIC SECTOR

EMISSIONS DATA FROM 2019



Source: IPCC, 2022: Summary for Policymakers.

EconoFact: econofact.org



Carbon dynamics in the agricultural landscape

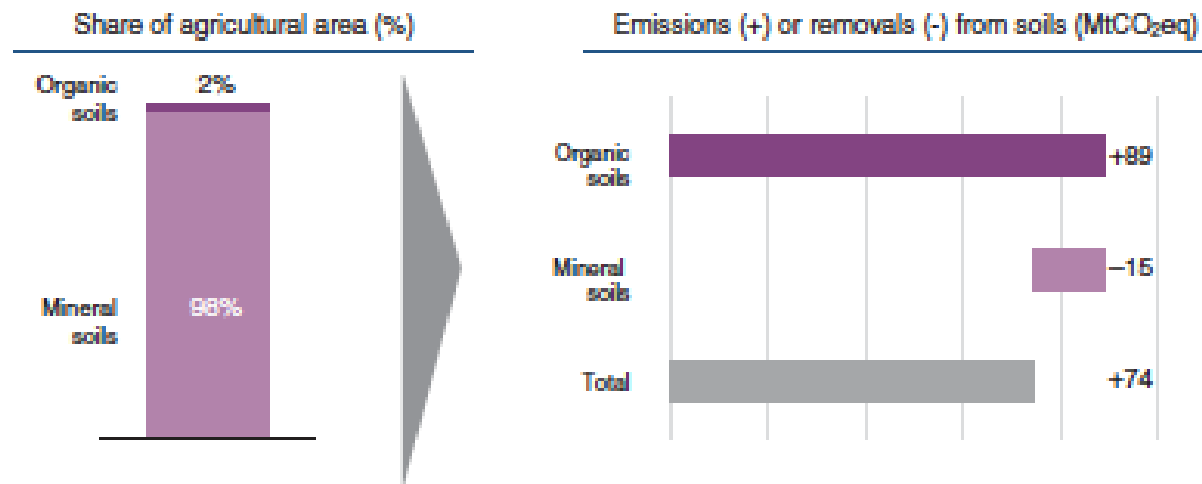


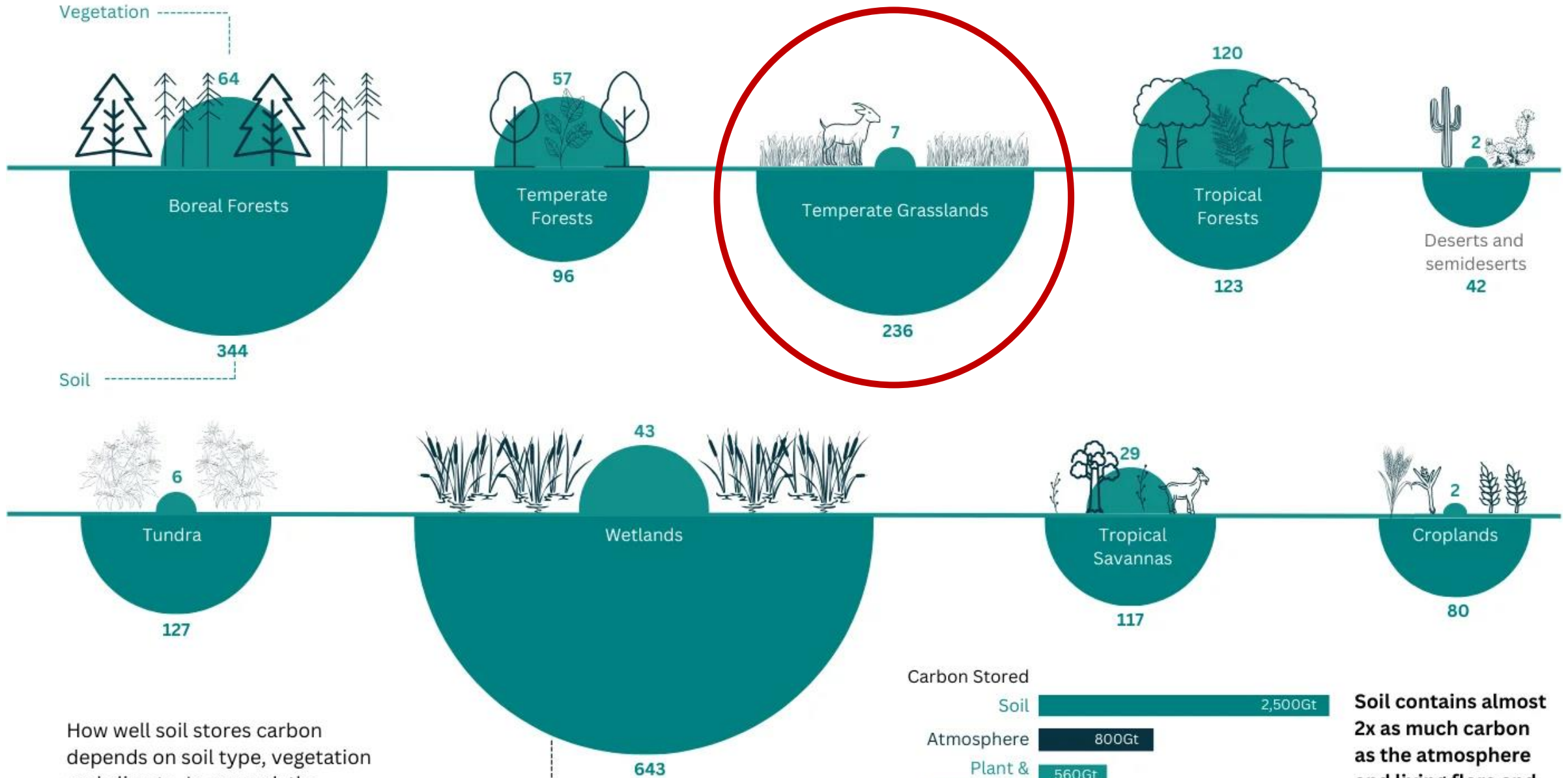
Figure 8 Mineral and organic soils in Europe and their contribution to carbon dynamics. Source: European Court of Auditors (2021).

Carbon Storage

Tonnes of Carbon

The world's forests absorb around **15.6 gigatonnes** of CO₂ each year. That's around 3x the annual CO₂ emissions of the United States.

However, around **8.1 gigatonnes of CO₂** leaks back into the atmosphere due to deforestation, fires and other disturbances.



How well soil stores carbon depends on soil type, vegetation and climate. In general, the **wetter and colder**, the better

Carbon Stored



Soil contains almost 2x as much carbon as the atmosphere and living flora and animals combined.

European Academies

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Science Advisory Council

Regenerative agriculture in Europe

A critical analysis of contributions to European Union
Farm to Fork and Biodiversity Strategies



EASAC policy report 44

April 2022

ISBN: 978-3-8047-4372-4

This report can be found at
www.easac.eu

Science Advice for the Benefit of Europe

Policy environment

- Biodiversity Strategy
- Farm to Fork Strategy
- Common Agricultural Policy



Maintain agricultural productivity

Evolving toolbox

- Sustainable innovations e.g. nutrient cycling, pest control
- Diversification of agricultural practices in space and time



Restore biodiversity and soil health

Enhance carbon capture and storage



Farm scale

- < Diversification within and among crops
- < Introduction of permanent and perennial crops
- < Expanded agroforestry and intercropping
- < Keeping green plant cover on farm fields during all seasons
- < Reduced tillage

Synergies

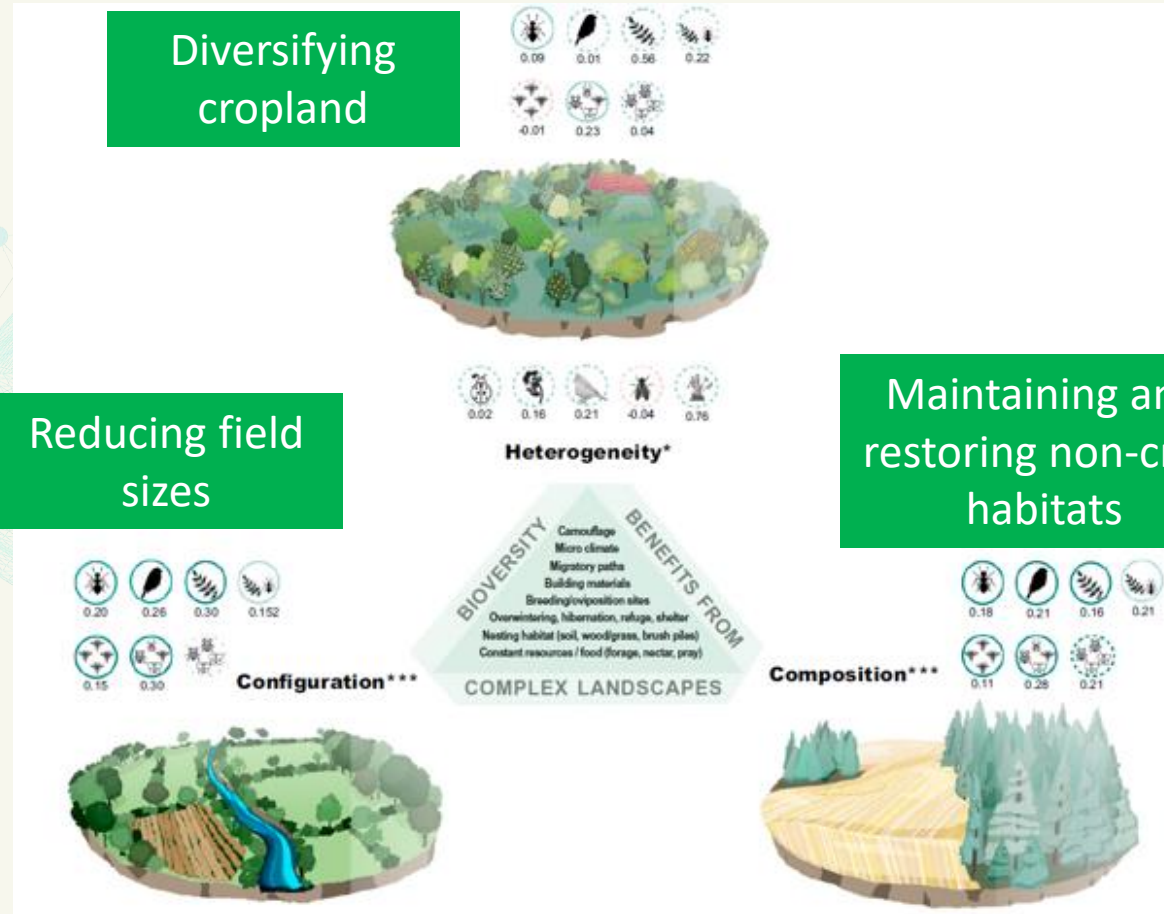
Landscape scale



- > Restoration in the agricultural landscape
- > Maintenance of existing semi-natural habitats
- > Connecting high-diversity landscape features
- > Development of green infrastructure
- > Increasing landscape and management heterogeneity



The Importance of the Landscape Scale



Source: Estrada-Carmona et al. 2023 PNAS

Food system



Thank You!



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