

# Food production and food security in a changing climate

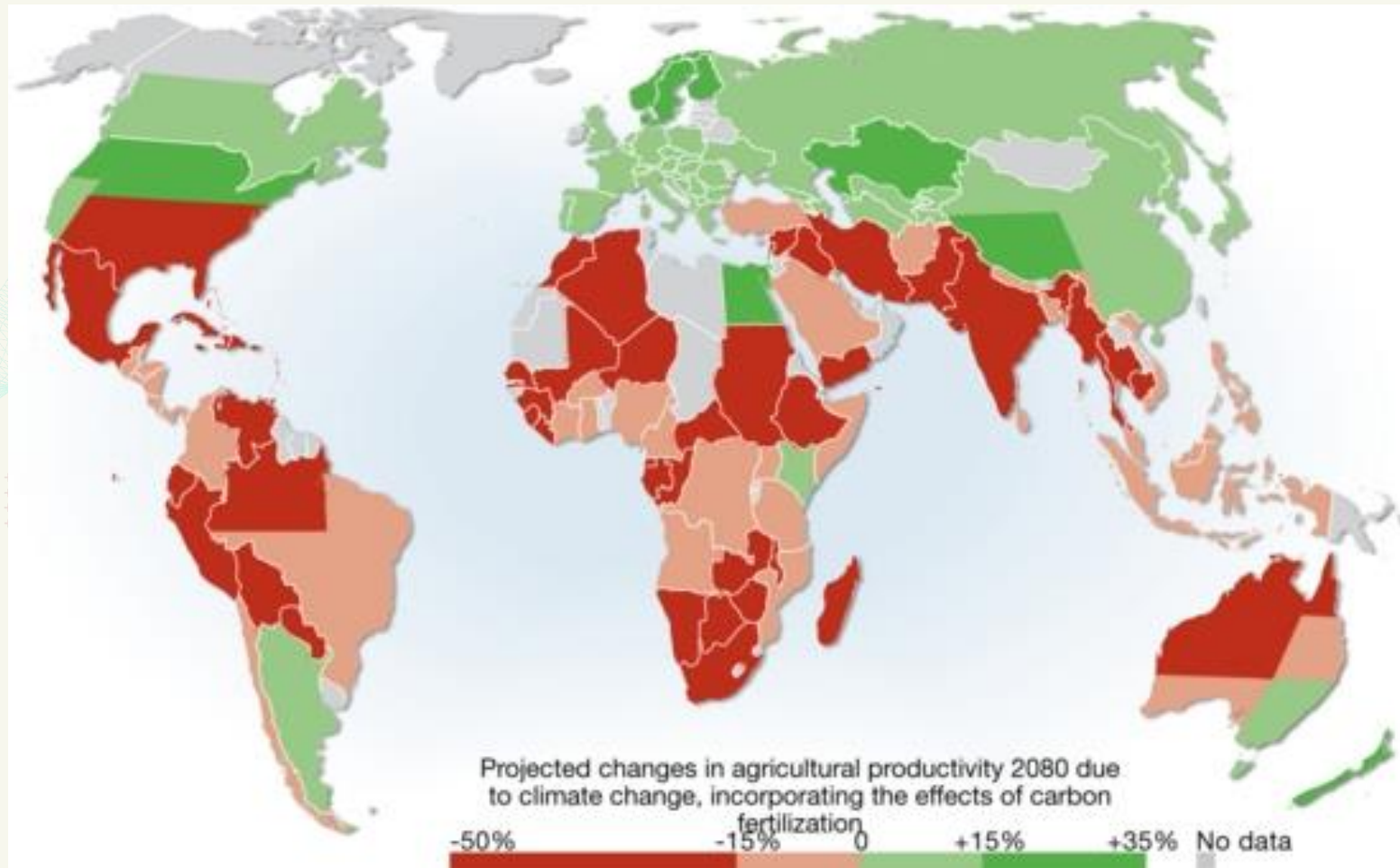
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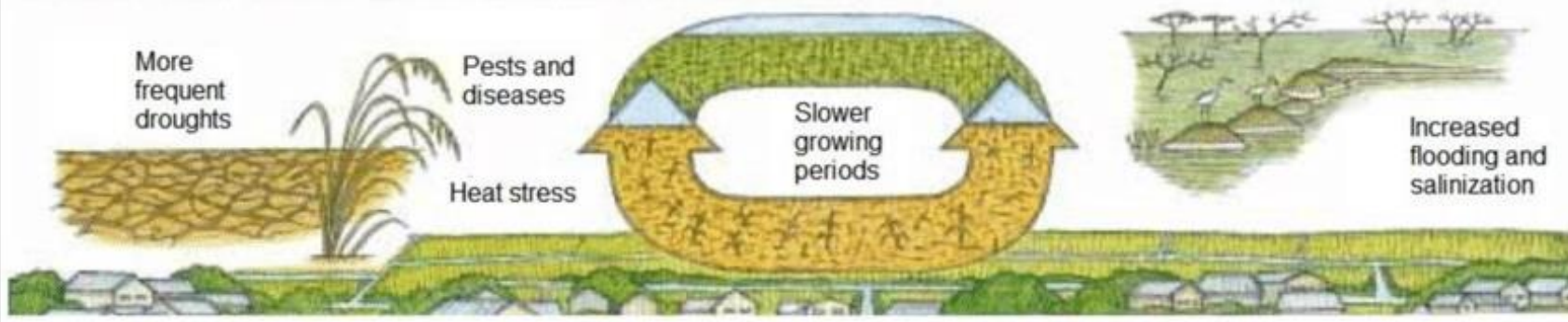
# Impact of climate change on food production

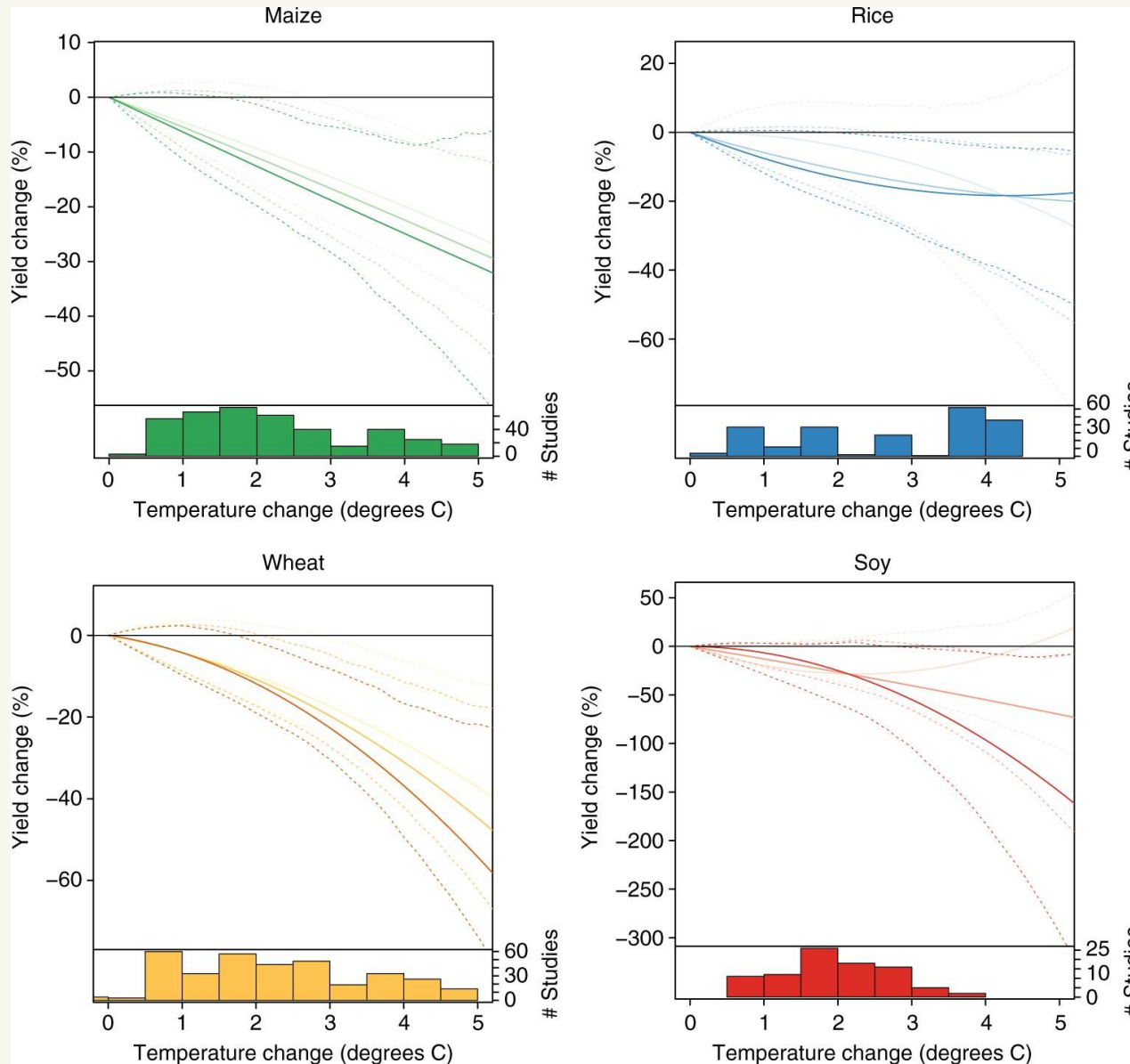


### POSSIBLE BENEFITS OF CLIMATE CHANGE ON AGRICULTURE



### POSSIBLE DRAWBACKS OF CLIMATE CHANGE ON AGRICULTURE





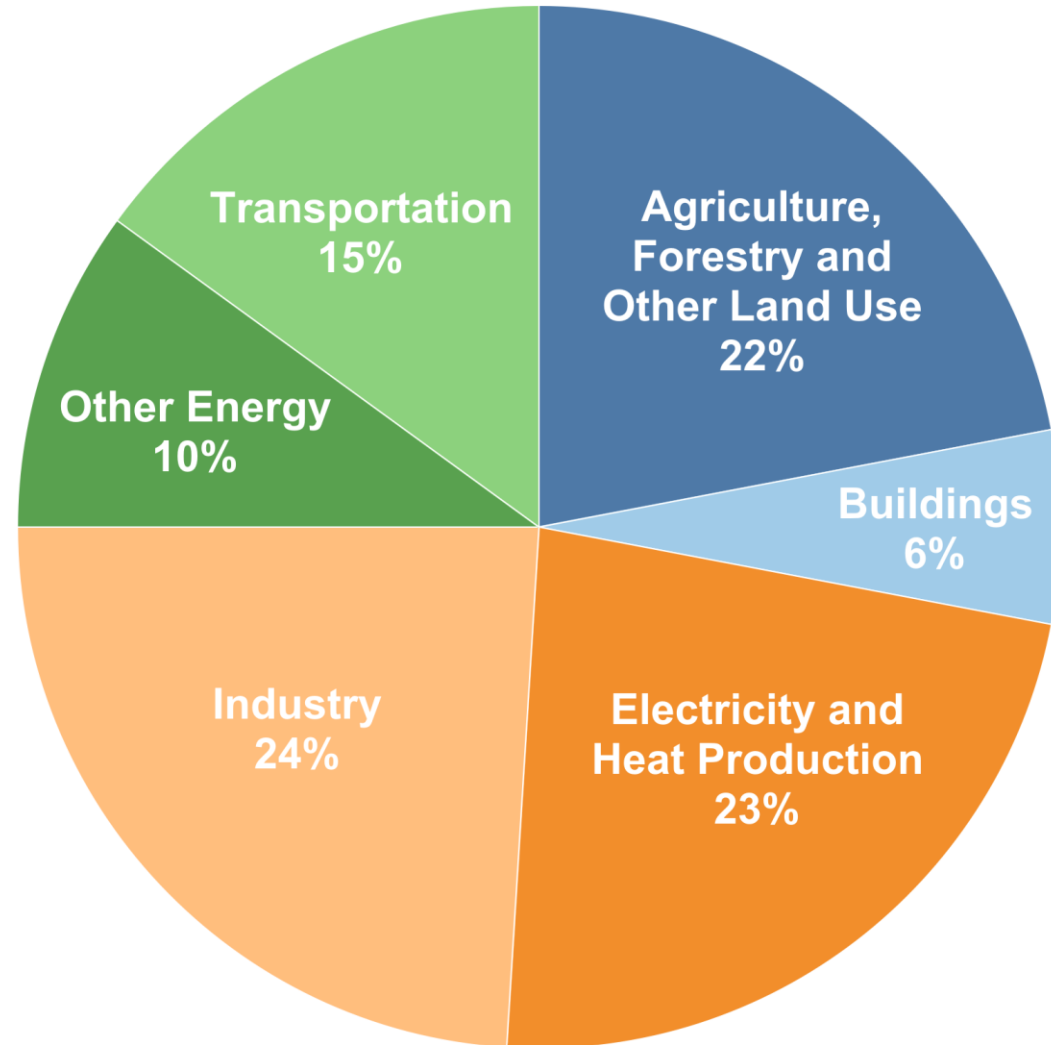
## Effects of climate change on yield of specific crops



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

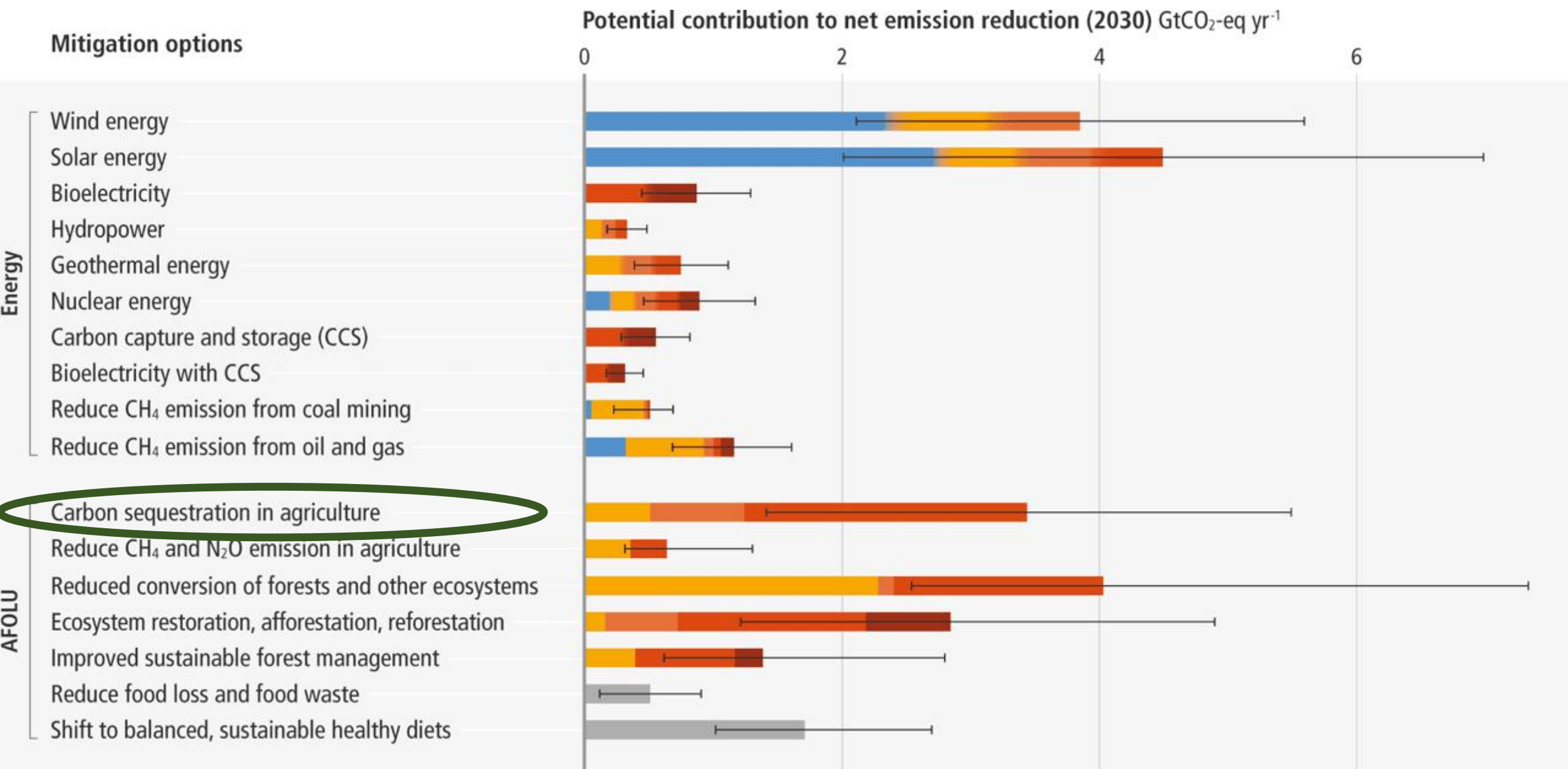
EMISSIONS DATA FROM 2019



Source: IPCC, 2022: Summary for Policymakers.

EconoFact: [econofact.org](http://econofact.org)





# Carbon dynamics in the agricultural landscape

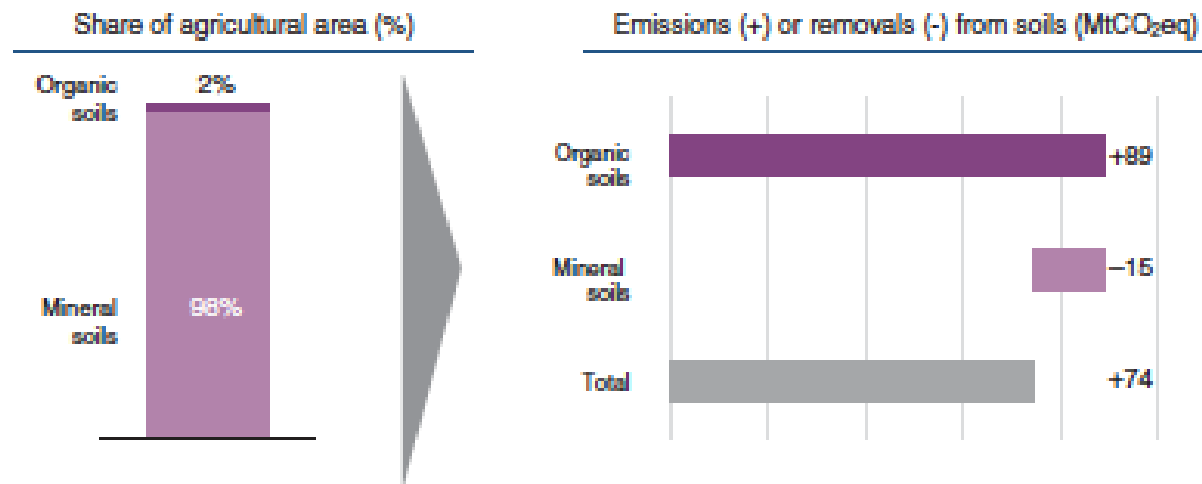


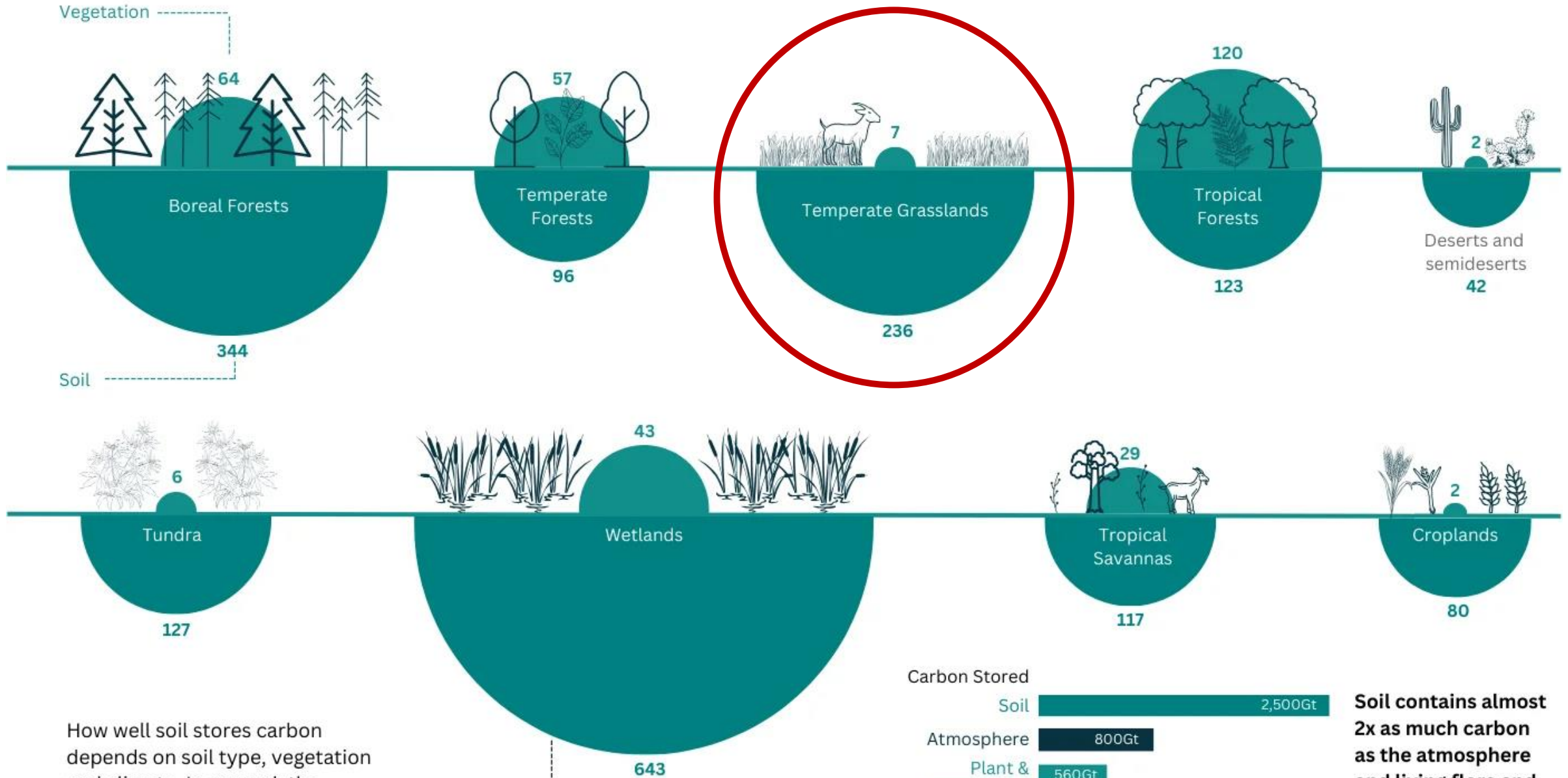
Figure 8 Mineral and organic soils in Europe and their contribution to carbon dynamics. Source: European Court of Auditors (2021).

# Carbon Storage

## Tonnes of Carbon

The world's forests absorb around **15.6 gigatonnes** of CO<sub>2</sub> each year. That's around 3x the annual CO<sub>2</sub> emissions of the United States.

However, around **8.1 gigatonnes of CO<sub>2</sub>** 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](http://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

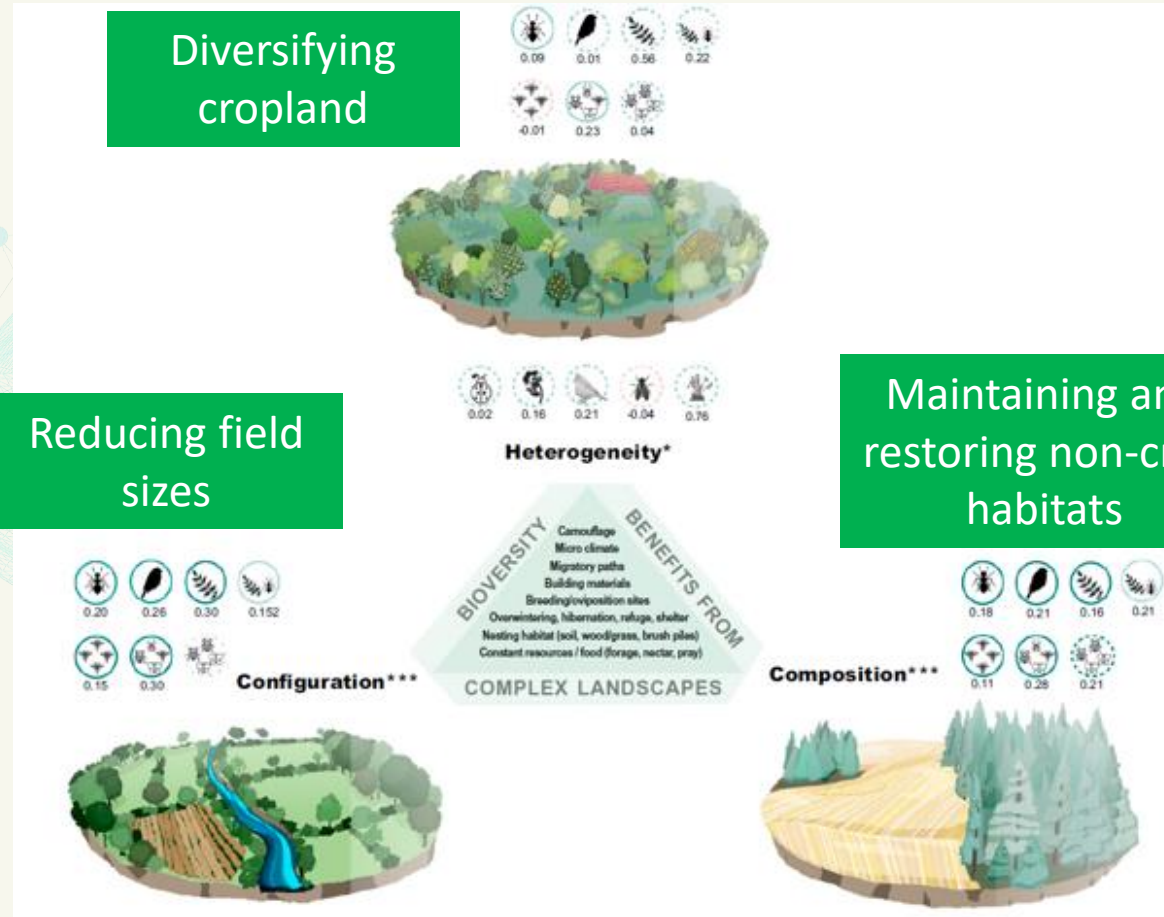


- > Restoration in the agricultural landscape
- > Maintenance of existing semi-natural habitats
- > Connecting high-diversity landscape features
- > Development of green infrastructure
- > Increasing landscape and management heterogeneity





# The Importance of the Landscape Scale



Source: Estrada-Carmona et al. 2023 PNAS

# Food system





# Thank You!



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