



Digging deeper: soil health and livestock systems

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@Dirt_Science

Up to 40% of the planet's land is degraded

Impacting on the soil functions of:

- Food production
- Habitat provision
- Water quality and regulation
- Nutrient cycling
- Carbon storage
- Cultural heritage



United Nations
Convention to Combat
Desertification

GLOBAL LAND OUTLOOK

Second Edition

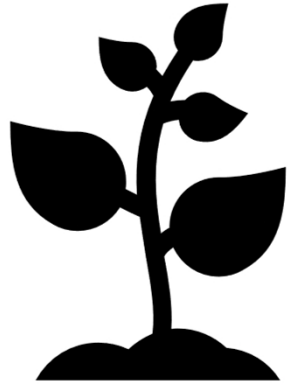
Land Restoration for
Recovery and Resilience

What is soil health?

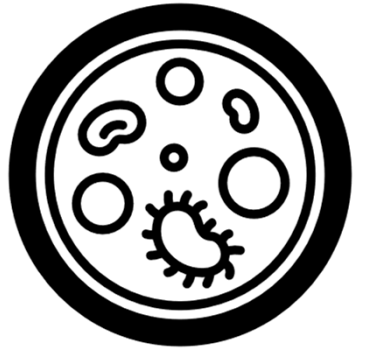
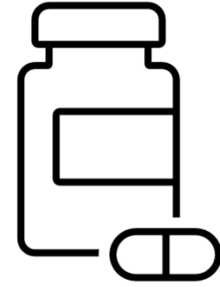
Livestock systems have positive and negative impacts on soil health

“Capacity of soil to function as a vital living system within ecosystem and land use boundaries”





PHYSICAL



CHEMICAL



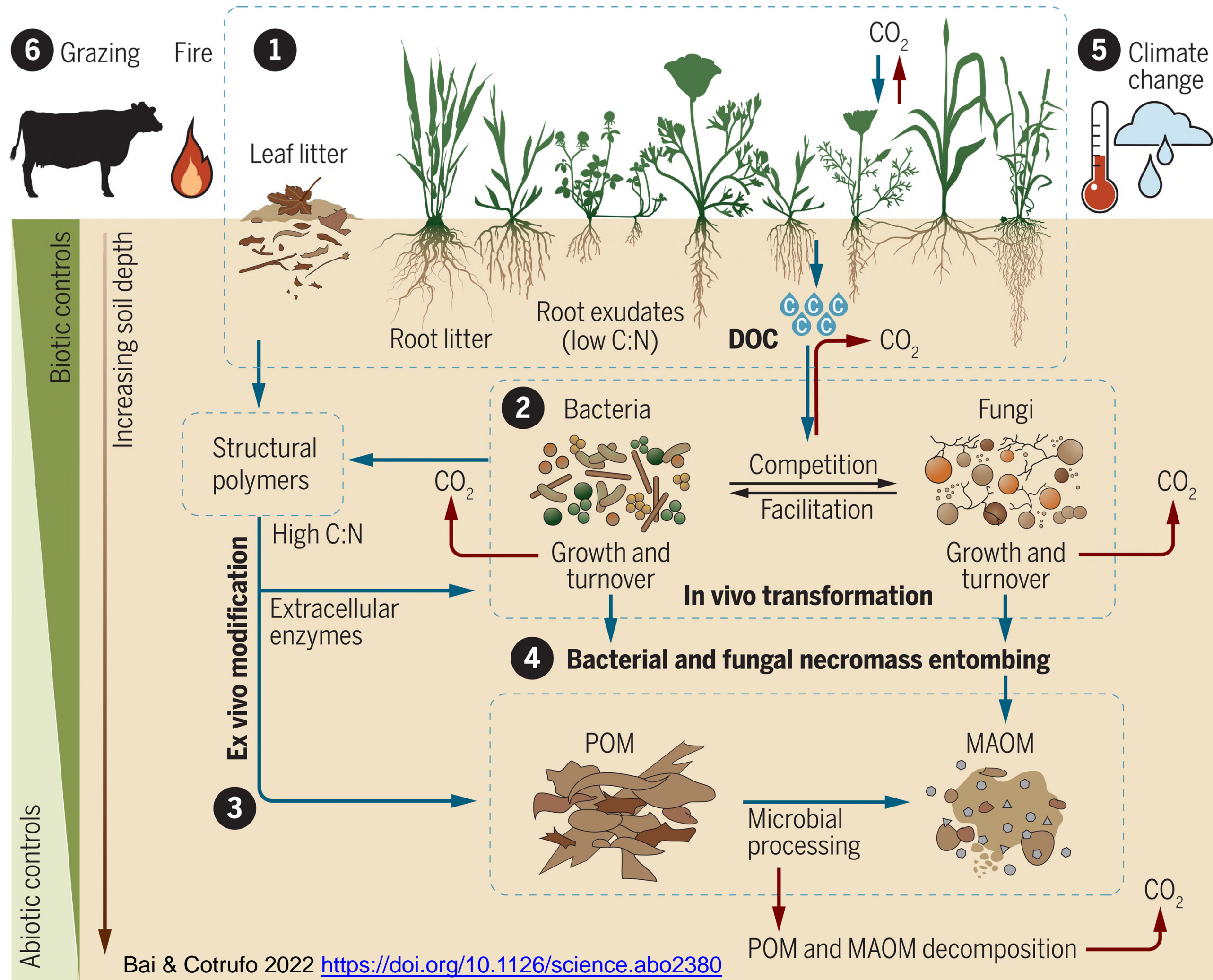
BIOLOGICAL



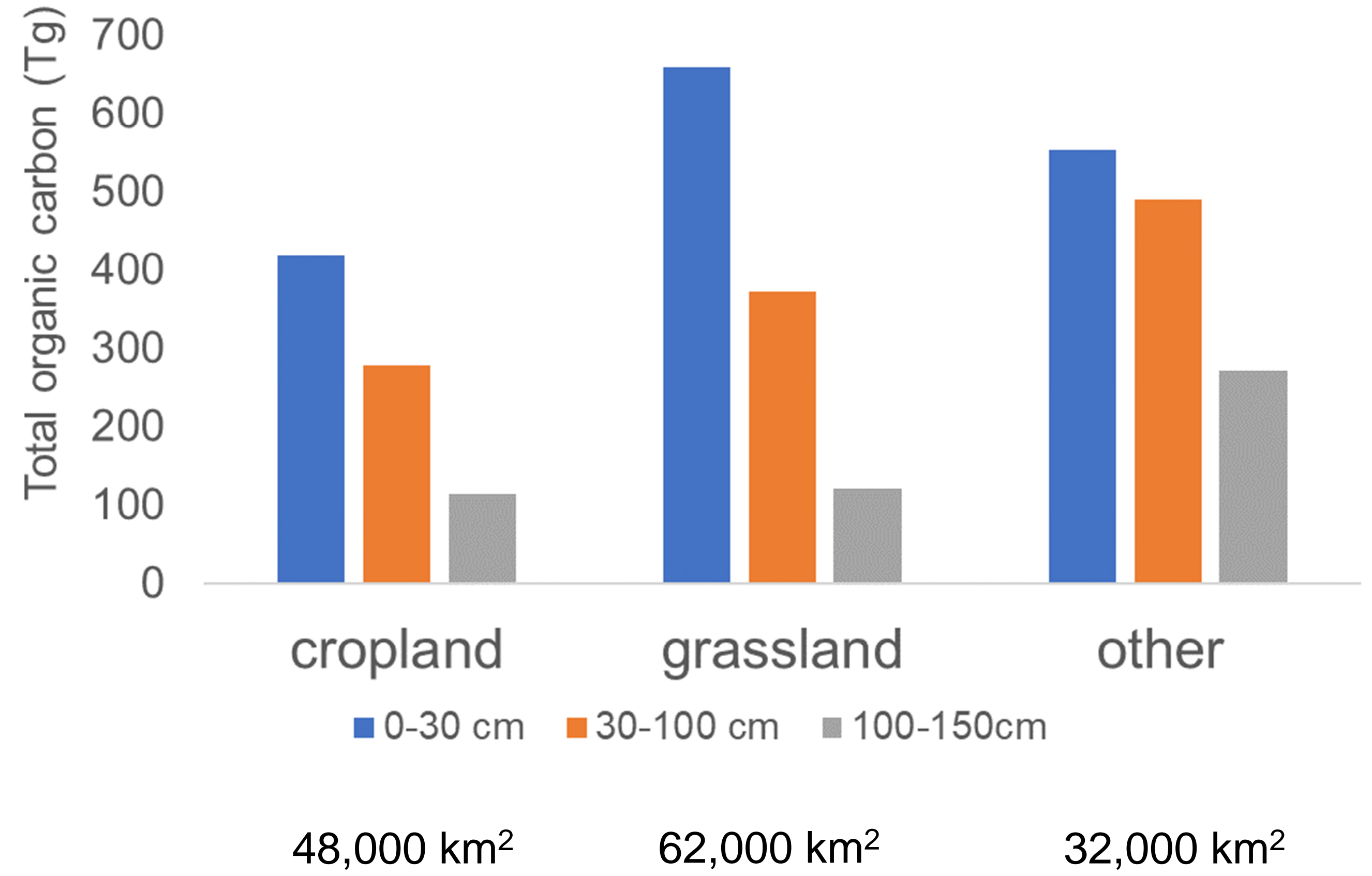
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Soil carbon sequestration in grassland

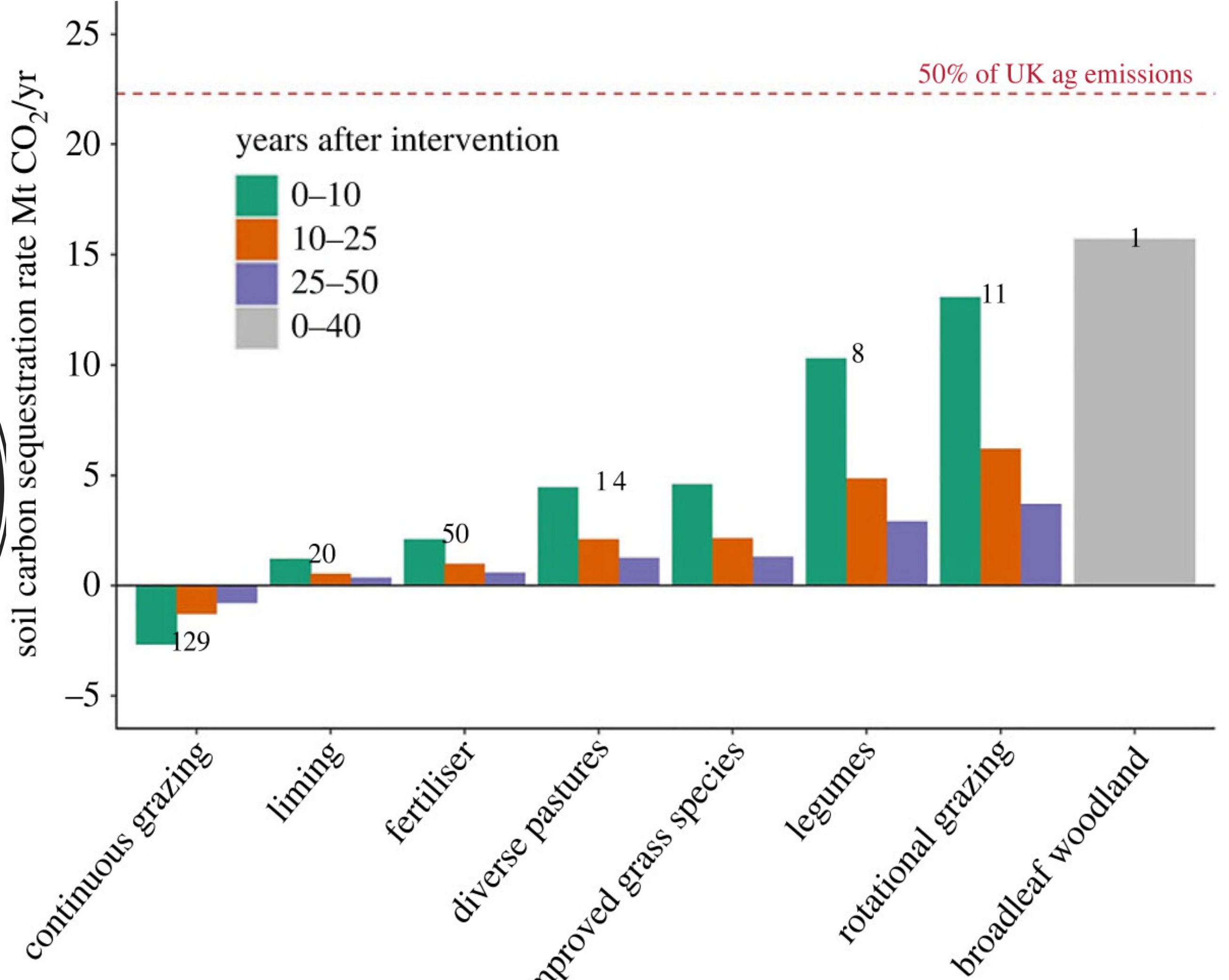
60% NPP allocated below ground in grasslands



Organic carbon in UK soils



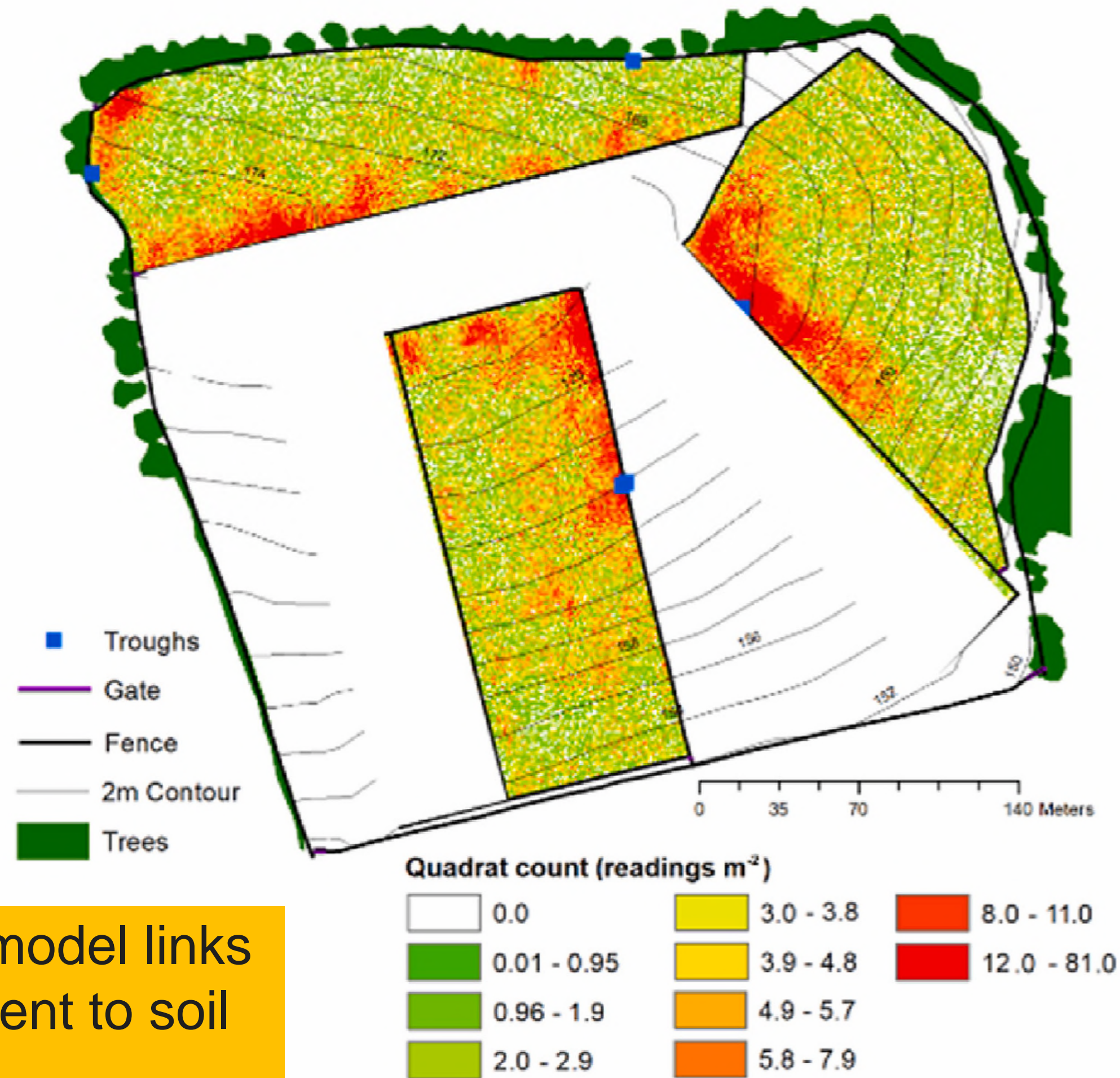
Overgrazing decreases soil carbon



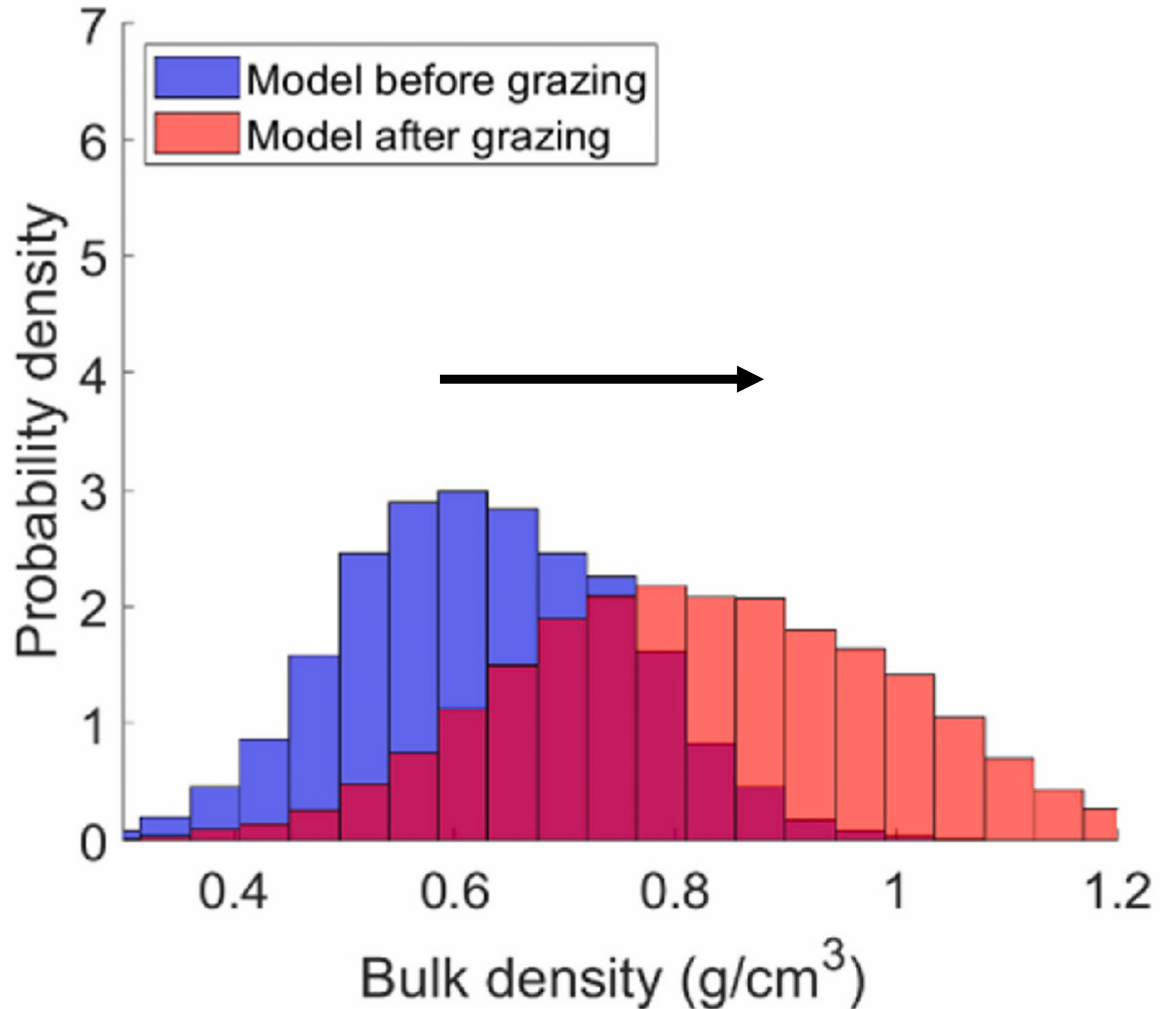
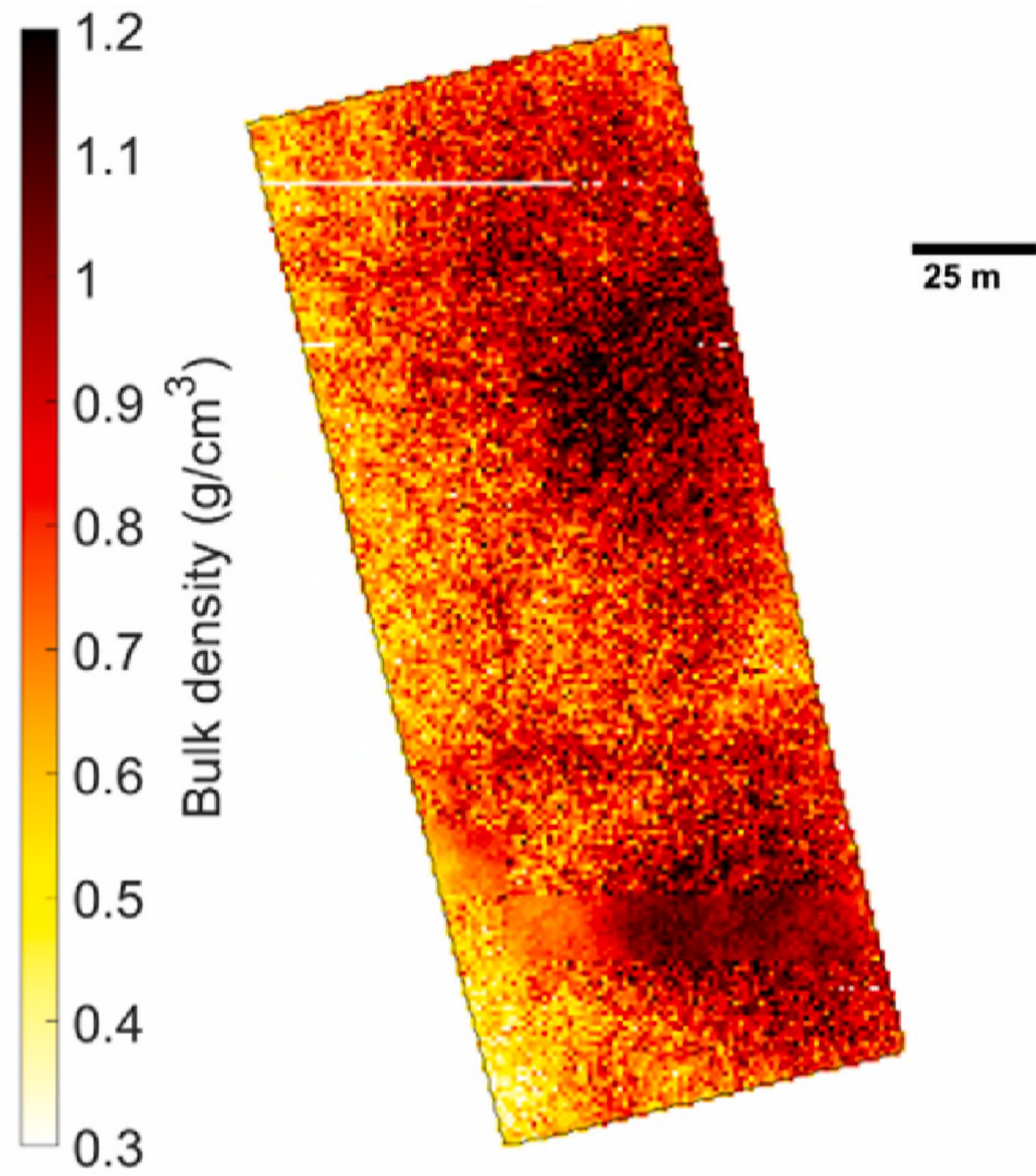
Soil compaction via poaching



"Moovement" model links animal movement to soil compaction



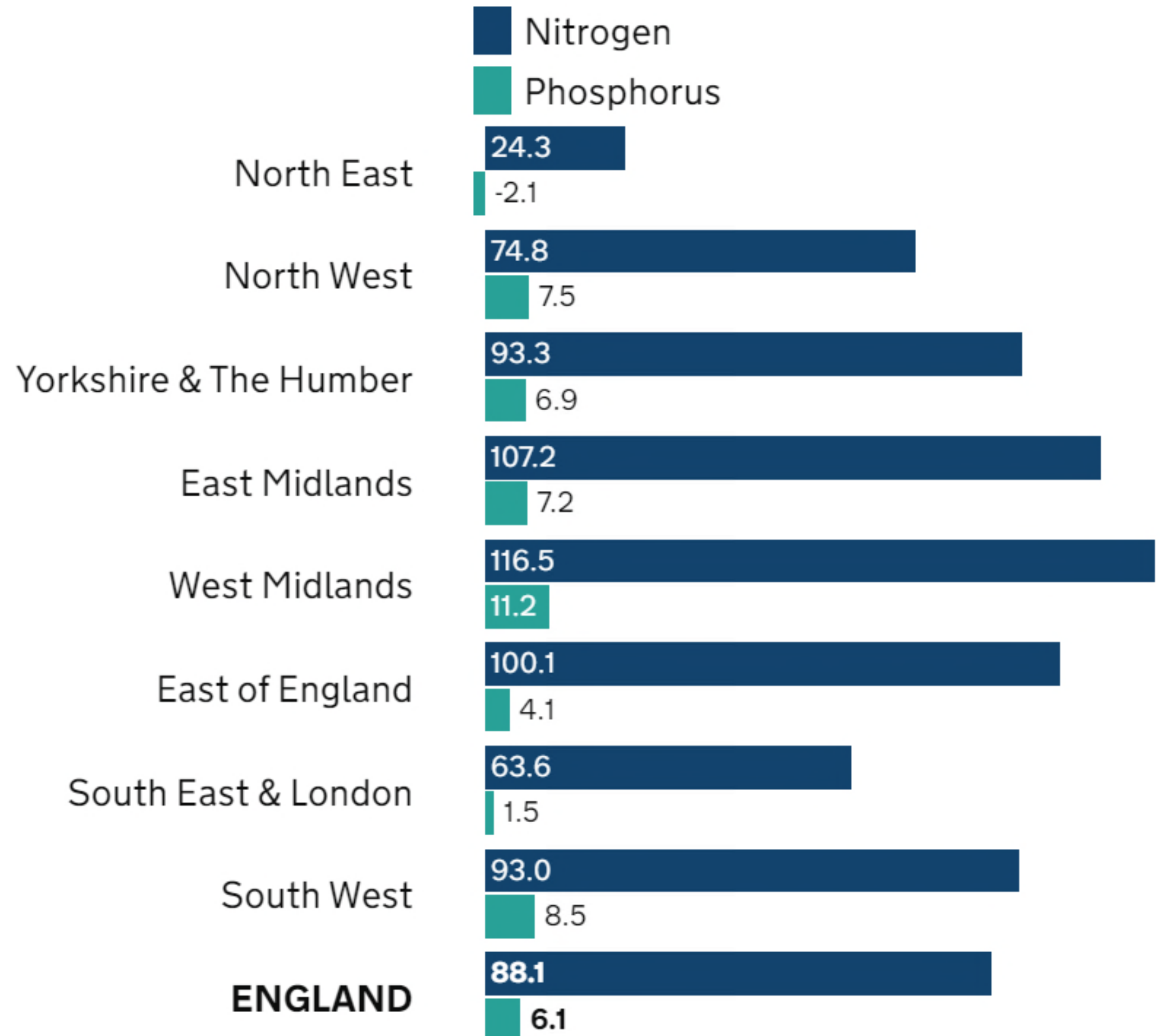
Simulated soil bulk density soil after grazing



Nutrient balances

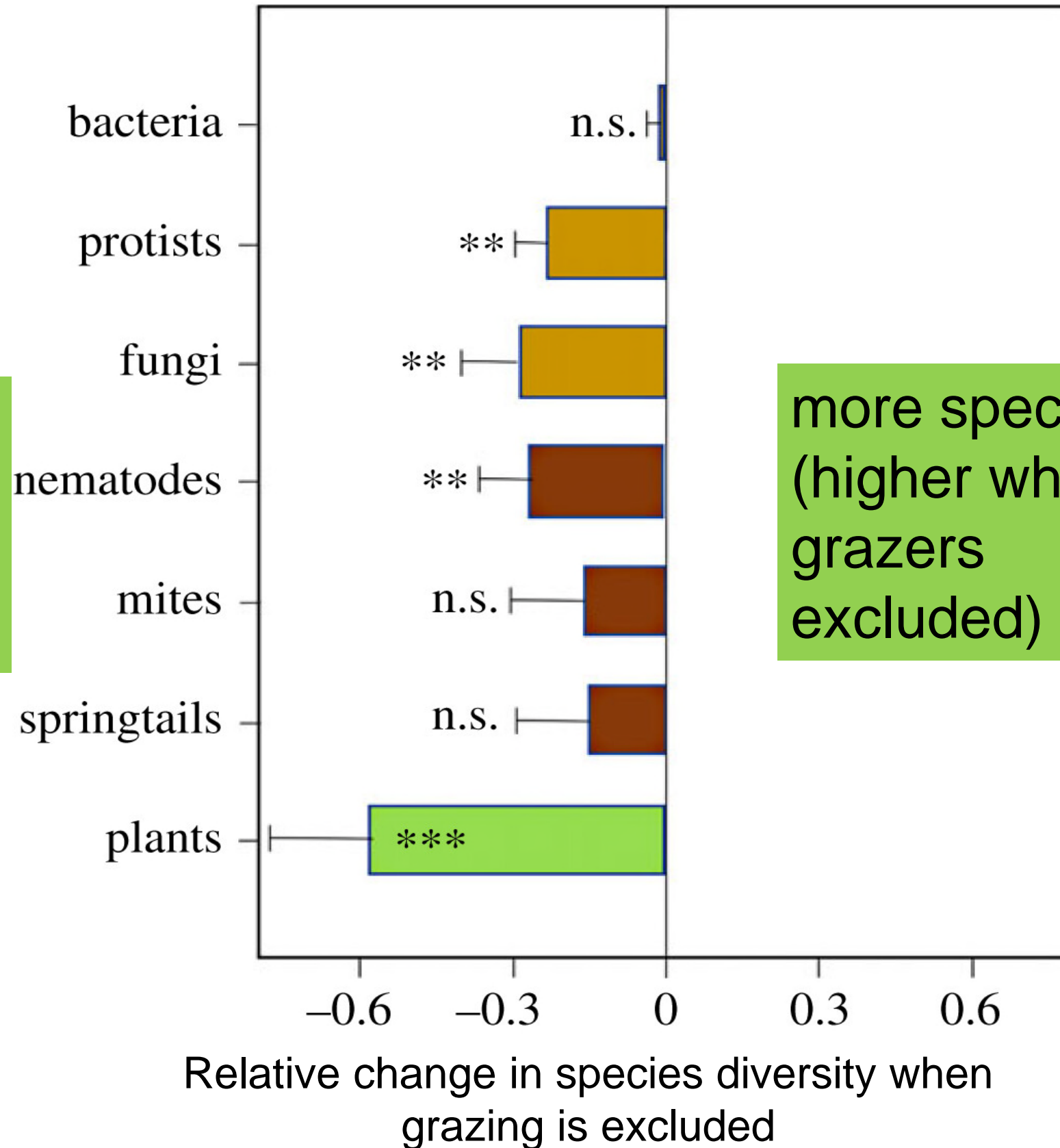
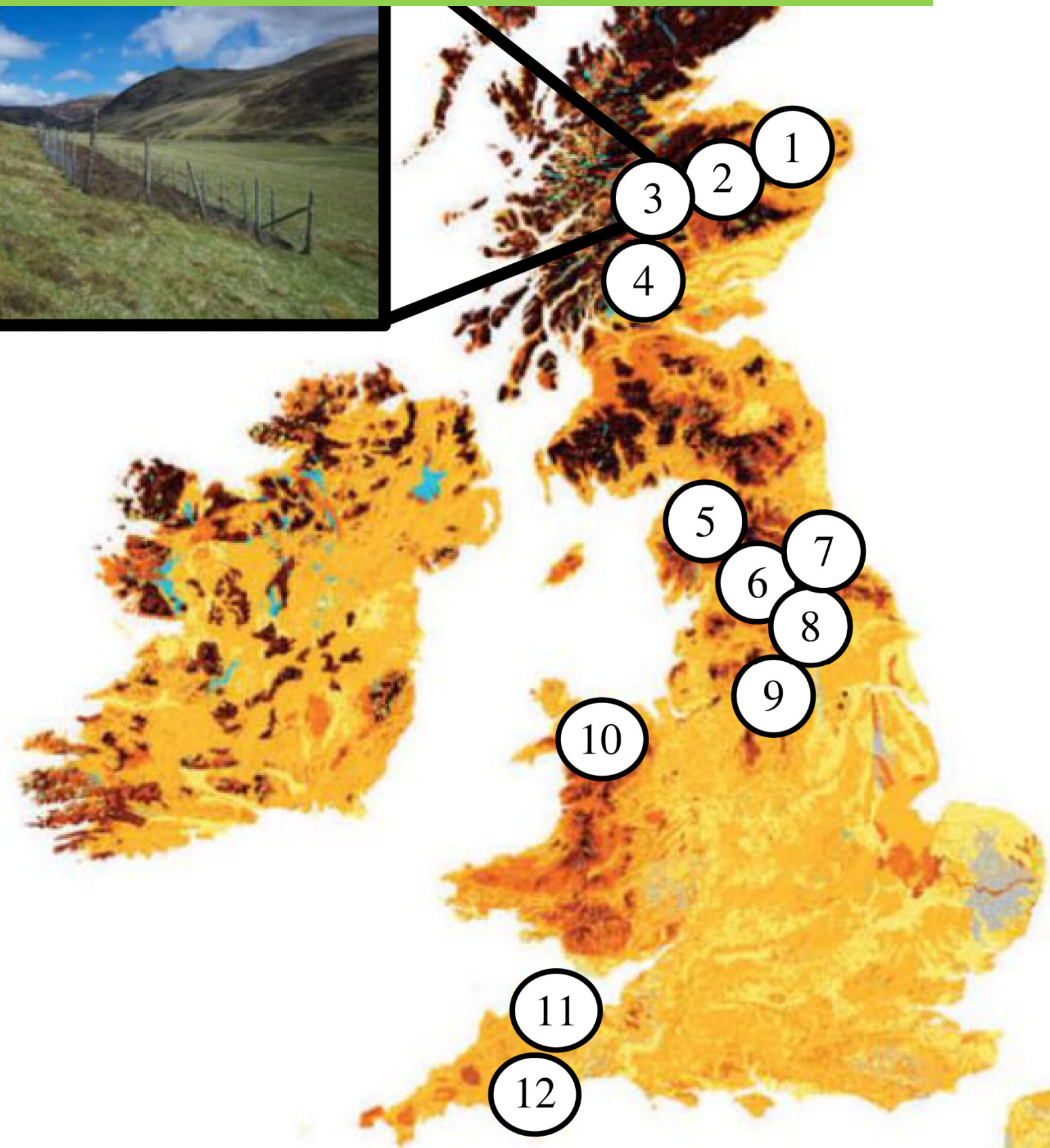
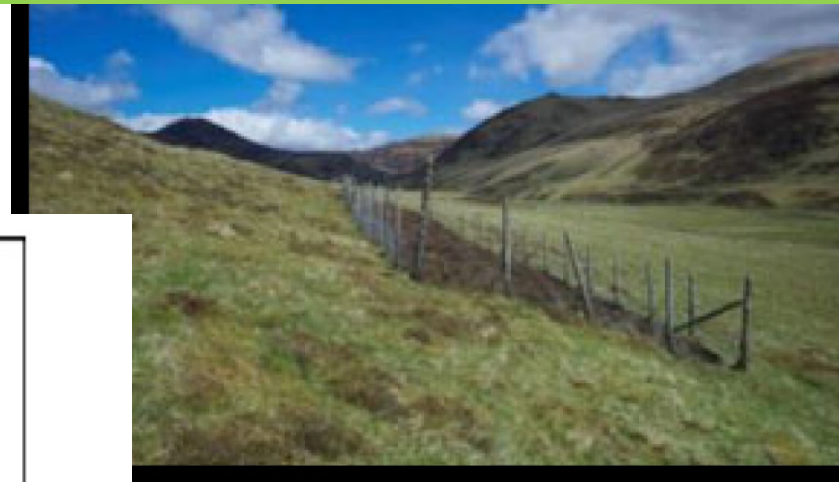
Soil Nutrient balances on managed agricultural land (2021)

- Nitrogen: surplus 95 kg/ha
- Phosphorus: surplus 5.7 kg/ha



Low intensity grazing benefits soil biology

What happens when you exclude grazing?



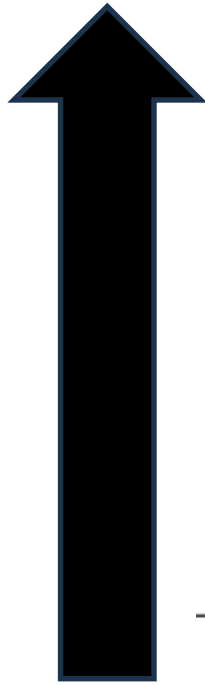
more species (higher when grazers excluded)

Fewer species (higher in grazed)

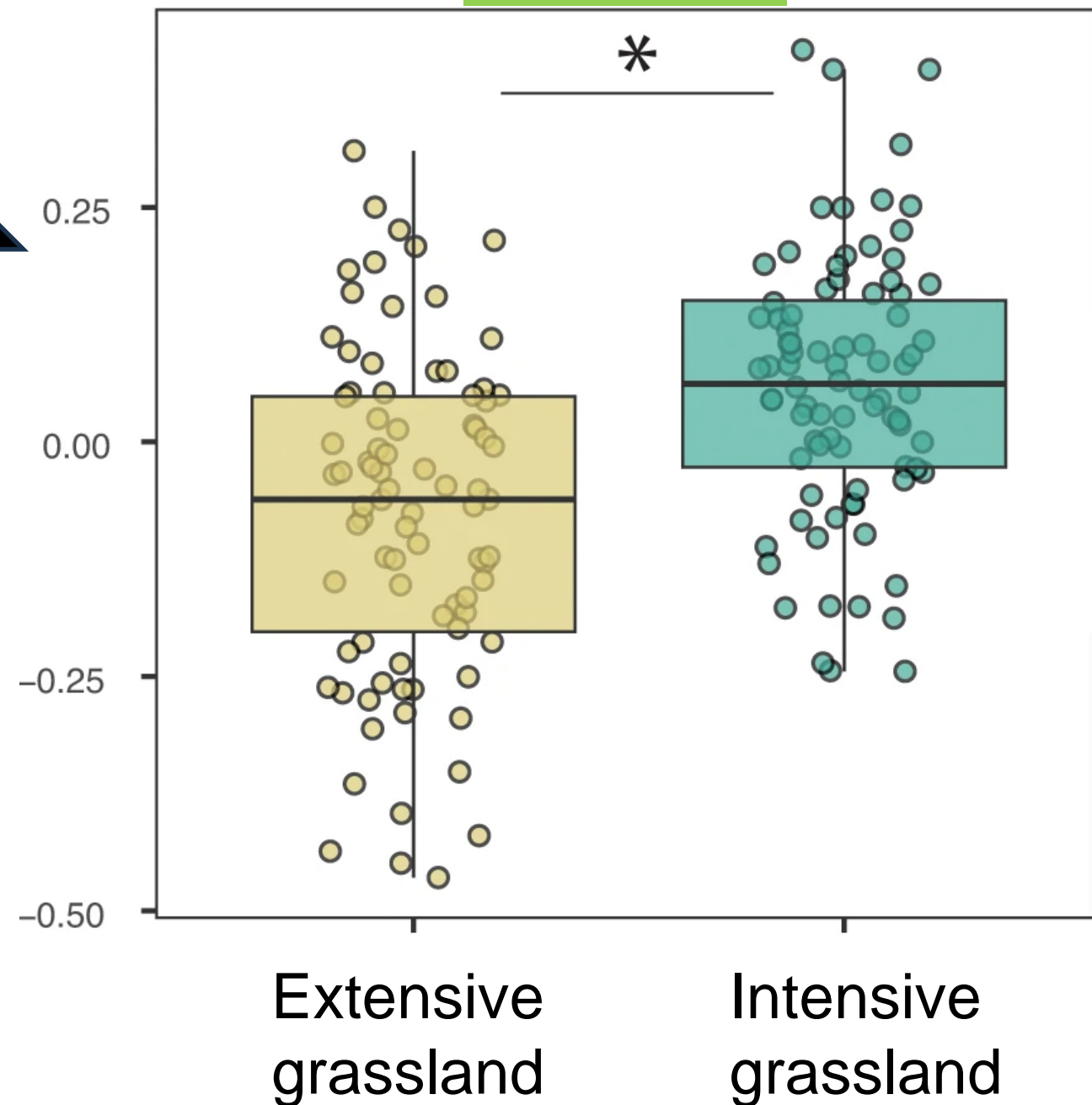
Grassland management affects soil microbial resilience to drought



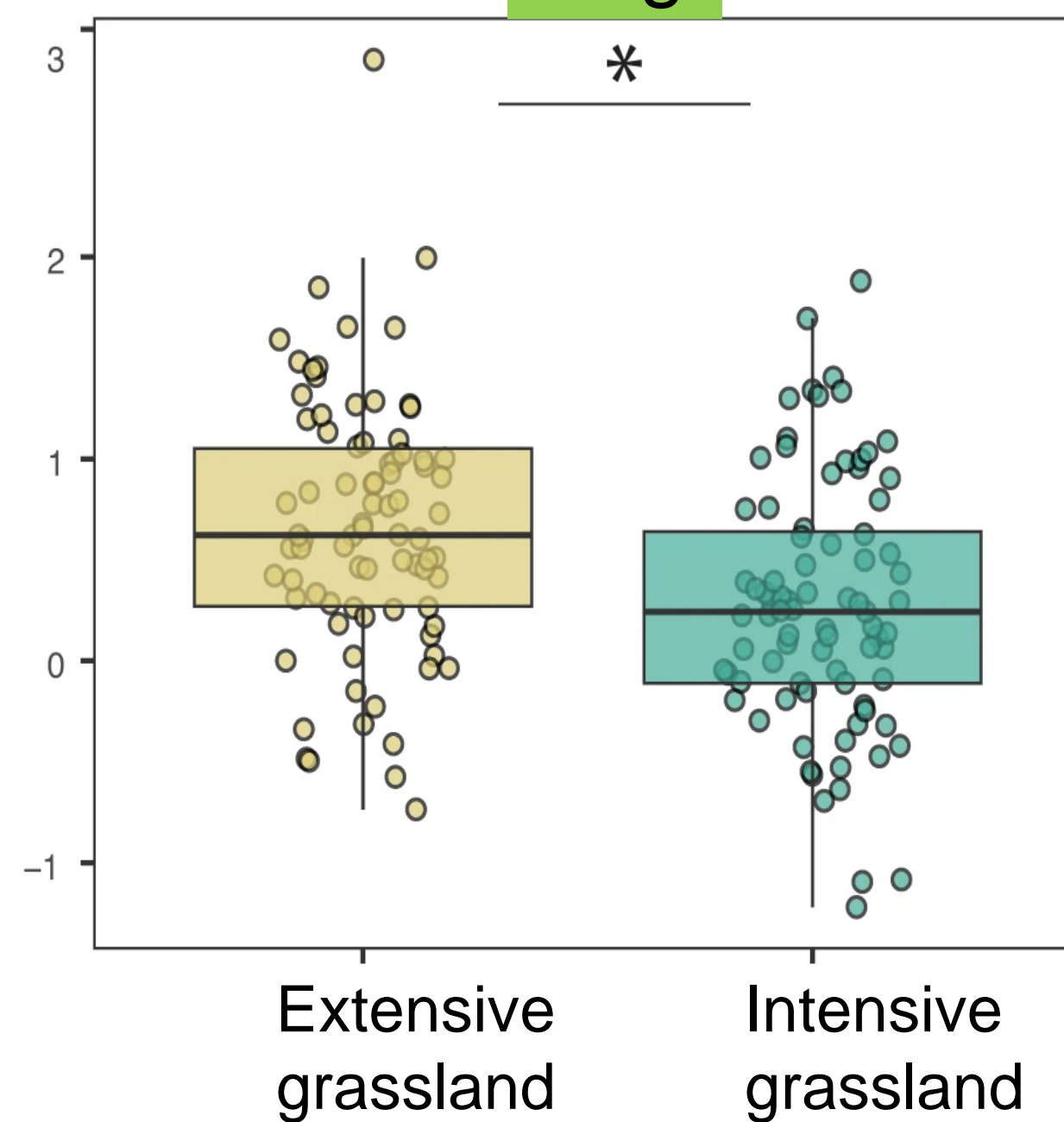
Dominant species more resilient to drought



bacteria



fungi



Intensive grassland = bacteria dominated impacting C and N cycling

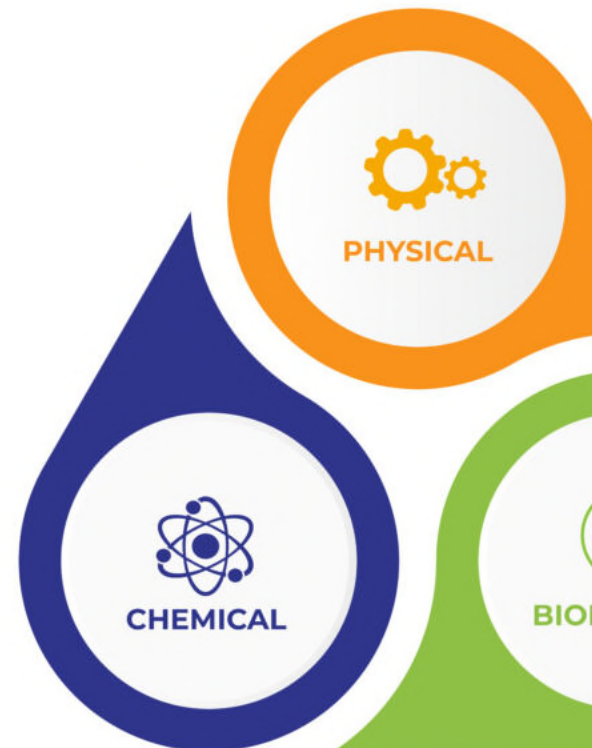
Things we can do....

Soil sampling & analysis programme

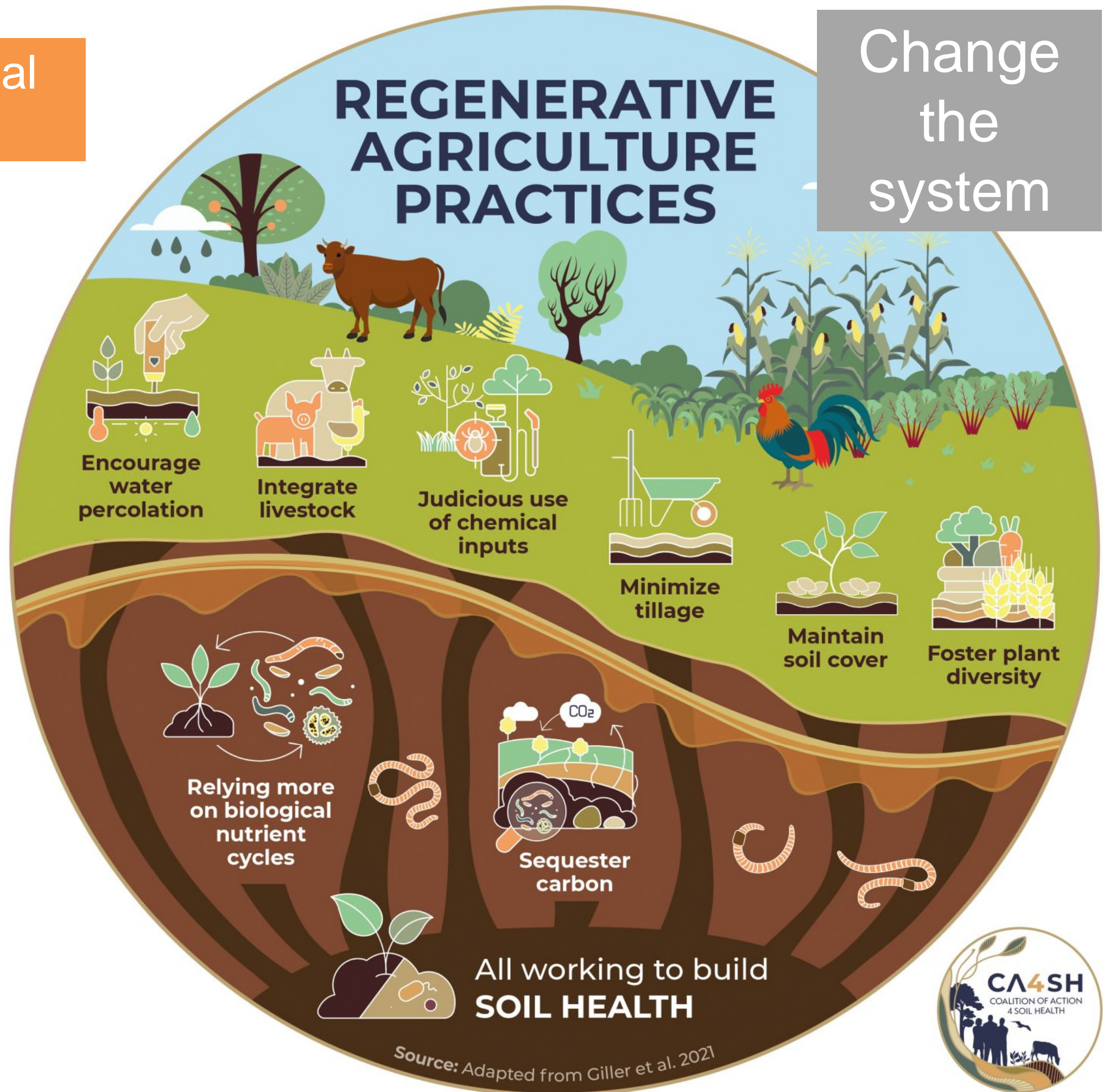


**SOIL NUTRIENT
HEALTH SCHEME**

Rotational grazing



Change the system



Takeaways

Livestock farming significantly impacts soil health and function:

- Good for soil carbon sequestration
- Changes in soil porosity & knock-on effects on water infiltration, plant health
- Imbalanced nutrients and nutrient cycling & knock on effects on water quality
- Grazing and management alters soil microbiology

Soil is an integral part of the livestock system



**BRITISH SOCIETY
OF SOIL SCIENCE**

Our vision is to ensure sustainable soils for people and planet

