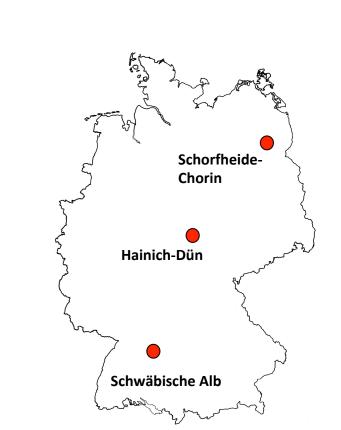


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Landscape management for grassland multifunctionality



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Context: Strategies for landscape multifunctionality

Trade-offs between conservation and production lead to **increasing land-use conflicts** at the local scale.

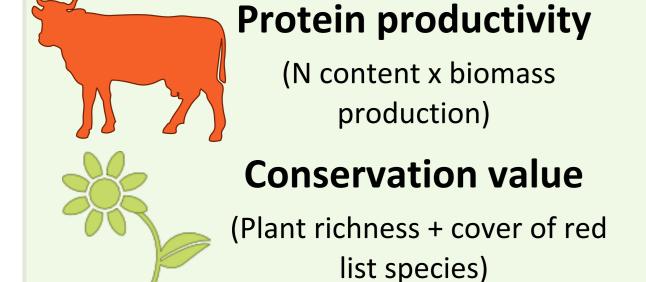
Multifunctionality assessments at the landscape scale have mostly centred on the land sharing v. land-sparing debate, which focuses only on two services: conservation and production.

What is the optimal landscape composition (i.e., minimizing trade-offs among services) in terms of low-medium and high land use intensity (LUI) plots when additional services are considered?

Methods

Biodiversity Exploratories: 150 grassland plots in three regions of Germany, monitored since 2007.

Focus on four ecosystem services identified as the most valued by multiple stakeholders:





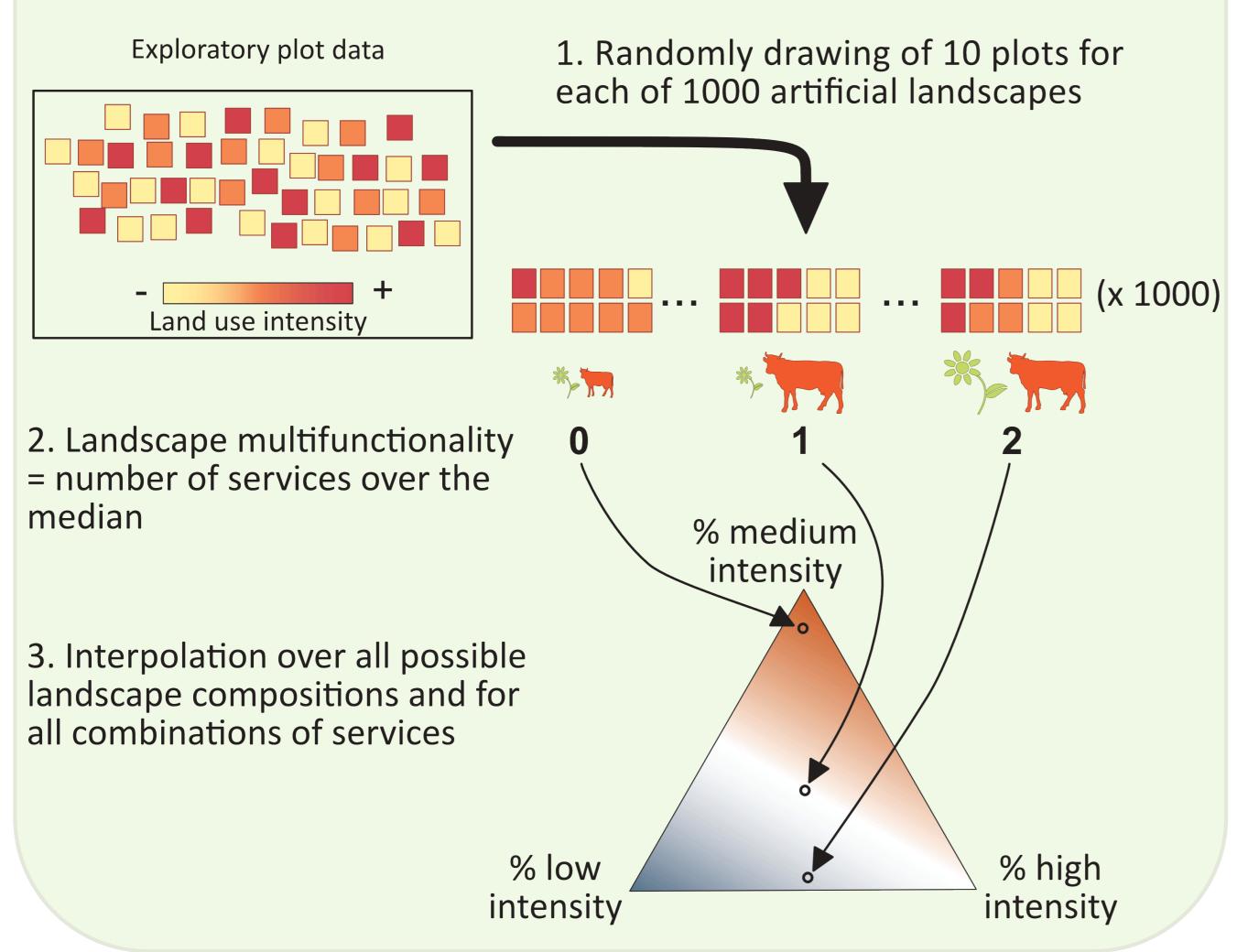
Carbon storage

(Organic carbon stock in 0-10cm soil depth)

Ae (Bird richt

Aesthetic value
(Bird richness + cover of flowering plants + butterfly abundance)

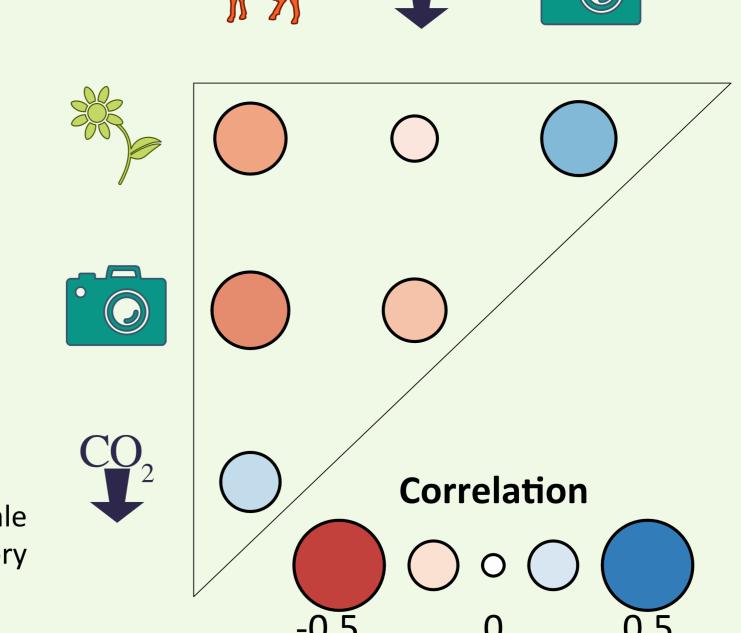
Simulations:



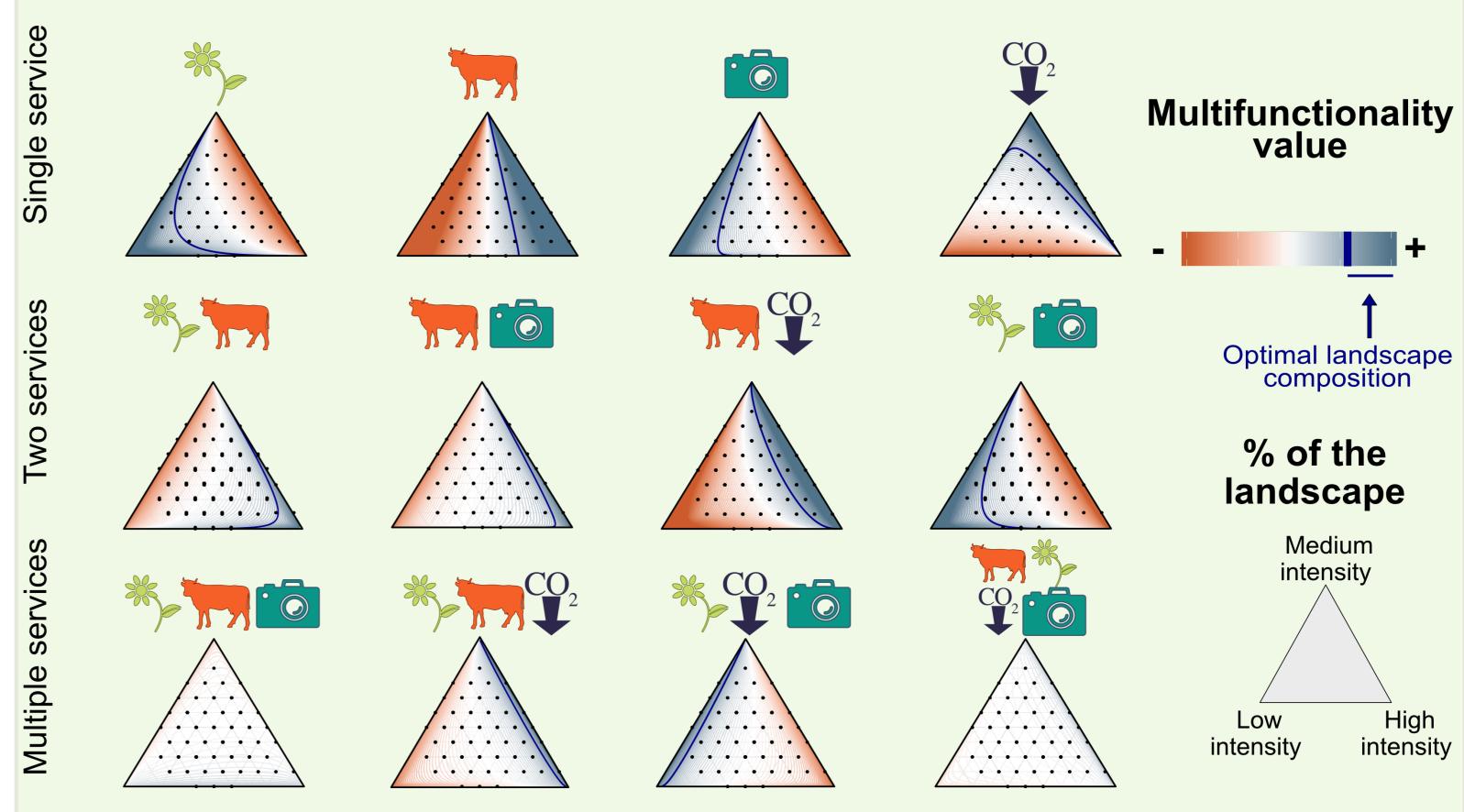
Results

1. Conservation displays a **strong trade-off** with production and a **synergy** with aesthetic value. This is consistent across regions and with what is observed at plot scale.

Correlation coefficients among landscape-scale services in Hainich Exploratory

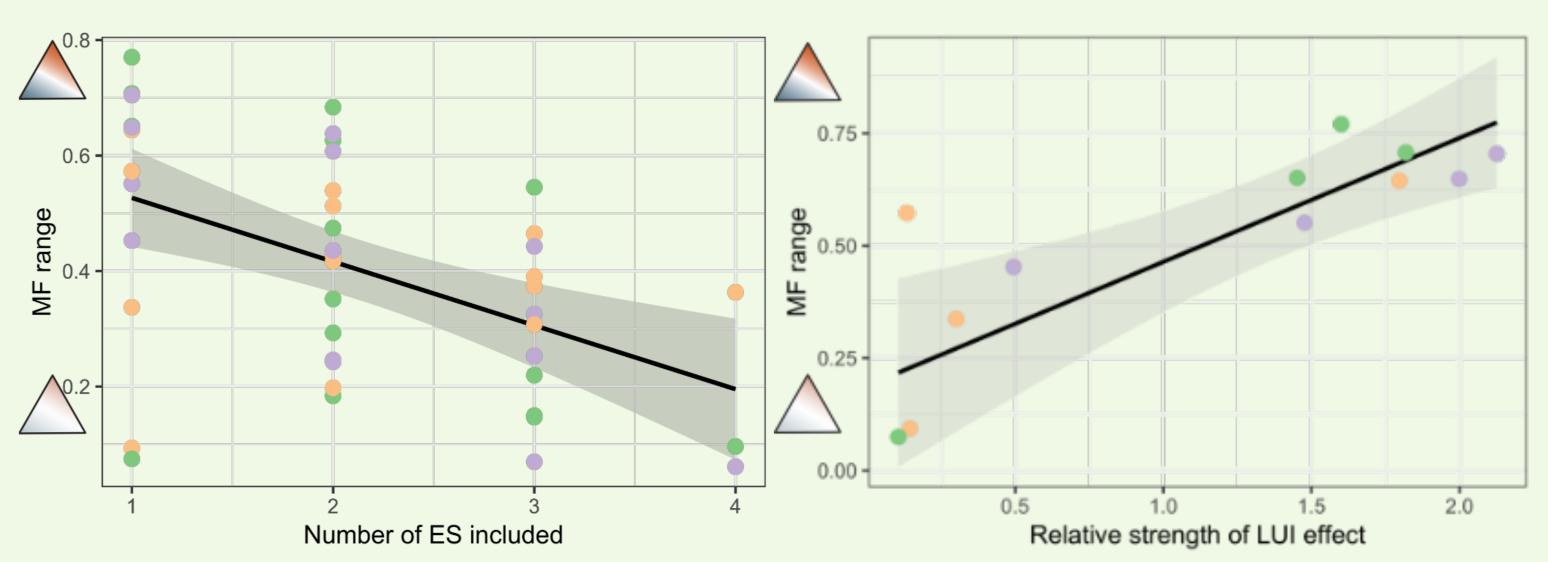


2. Optimal landscape composition can be found for **one or two services**, but optimisation is increasingly complex as more services are considered.



Variation of landscape multifunctionality with landscape composition for different service combinations in Hainich Exploratory

3. The possibility to define optimal landscape compositions depends on how the different services respond to LUI relative to other **environmental drivers**, and decreases with the **number of services** considered



Variation in the responsiveness of multifunctionality to landscape composition with the number of services included (left) and the relative effect of LUI compared to other environmental drivers (right). Different colours represent the different regions.

Conclusion

- Simple land sharing-sparing strategies might fail to identify optimal landscape strategies for multiple services.
- Further research should consider how multiple drivers determine optimal land-use strategies.



