EAAP 2019

Assessing and comparing social and biophysical trade-offs in an extensive beef cattle system region

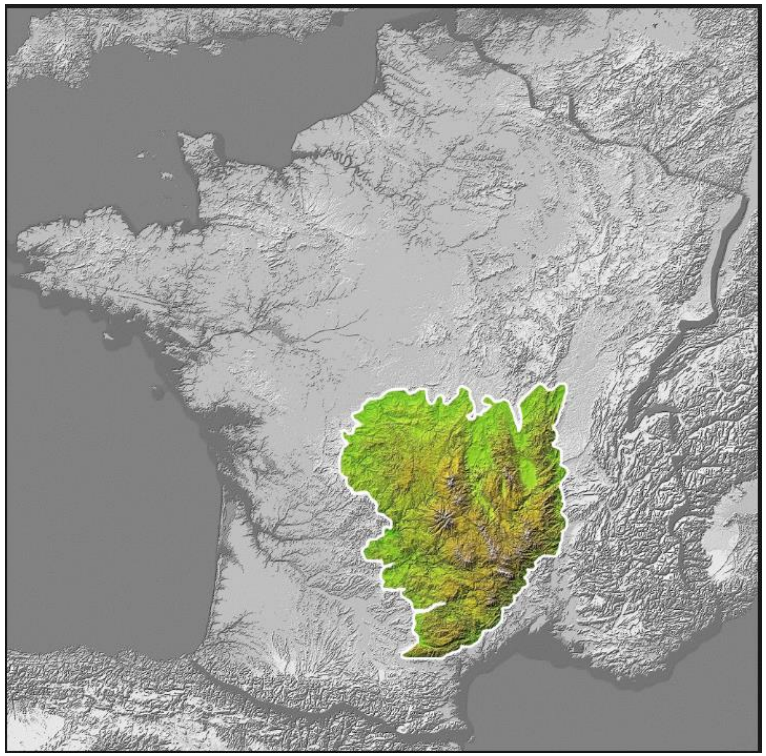
F. Accatino, D. Neumeister, M.Tichit

francesco.accatino@inra.fr

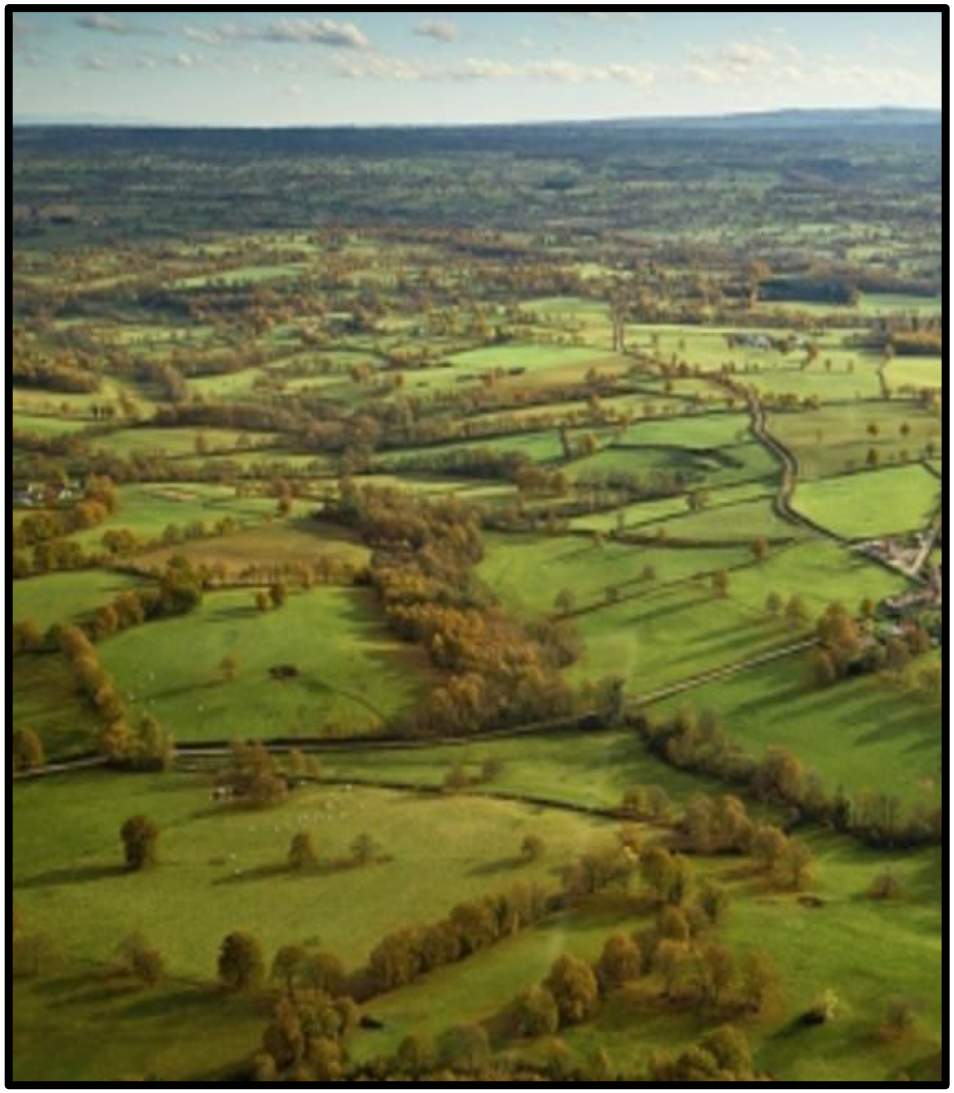
INRA
SCIENCE & IMPACT

An overview

Massif central



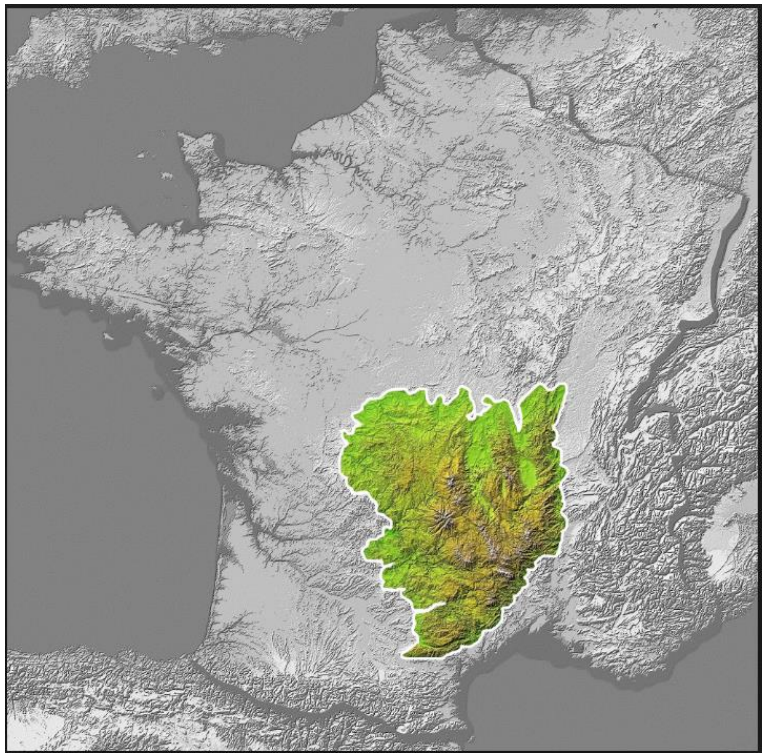
Grassland-dominated landscape



Bocage Bourbonnais

An overview

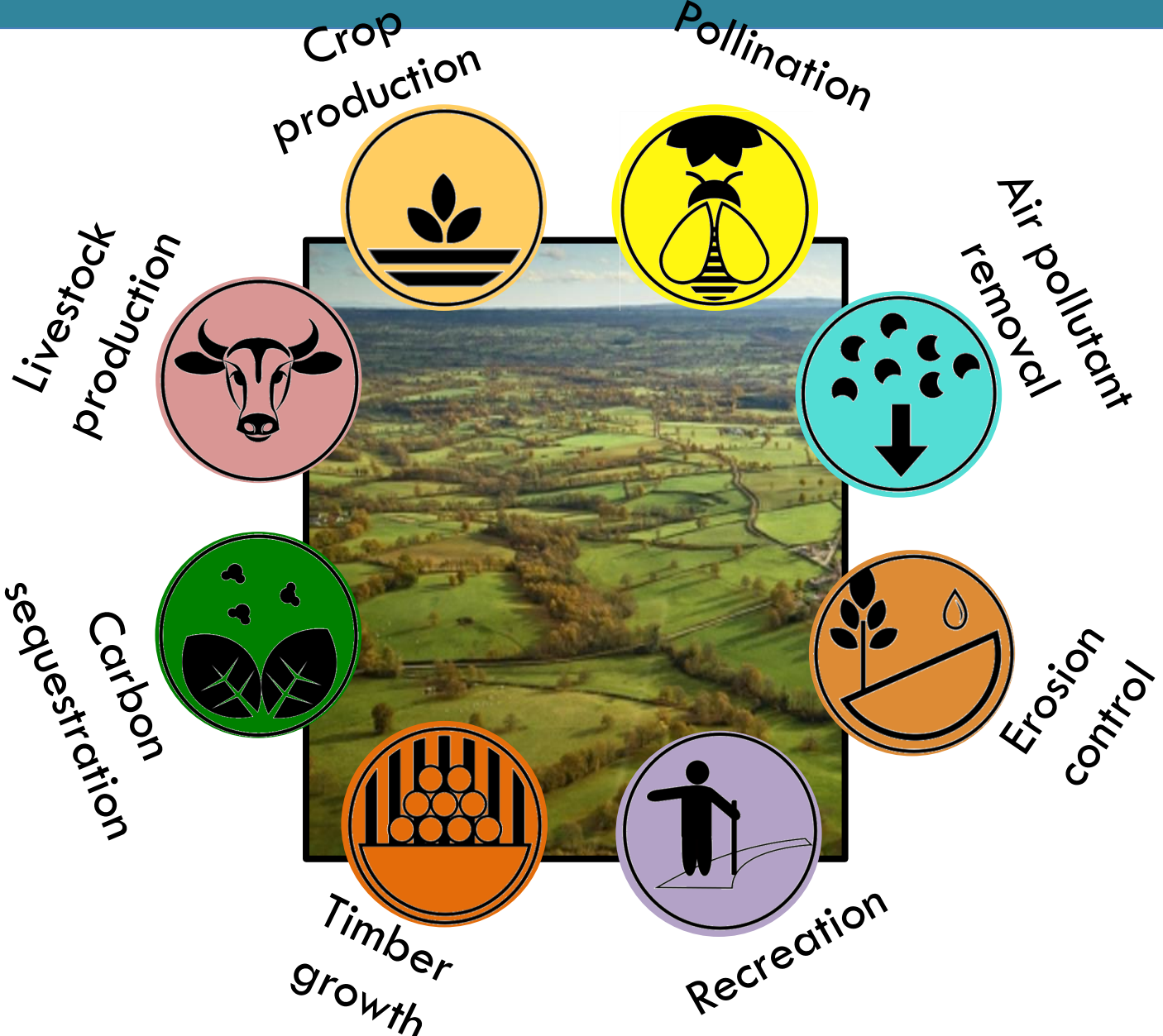
Massif central



Extensive cattle rearing (transported to Italy)

Vache Charolais

Ecosystem services



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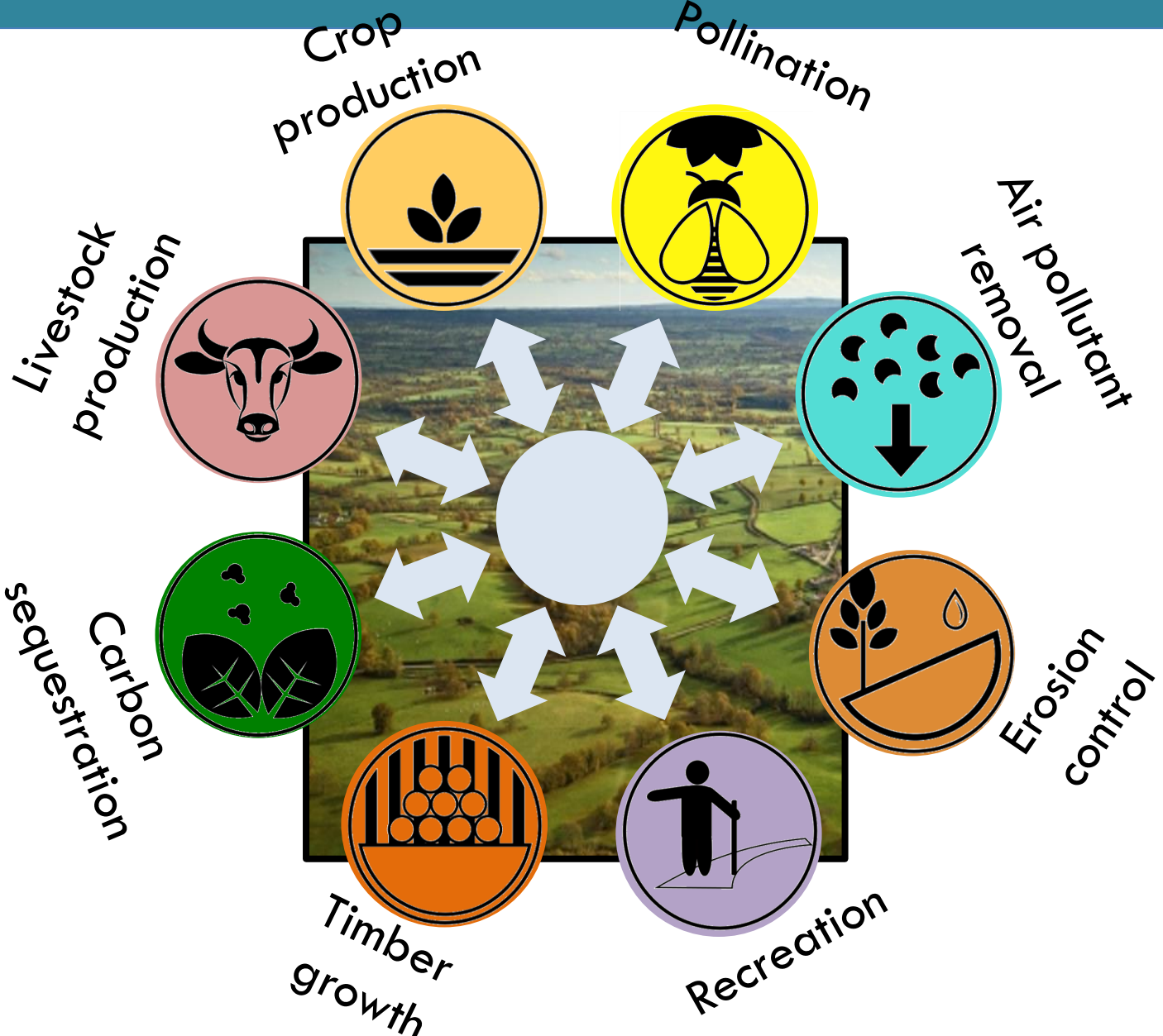

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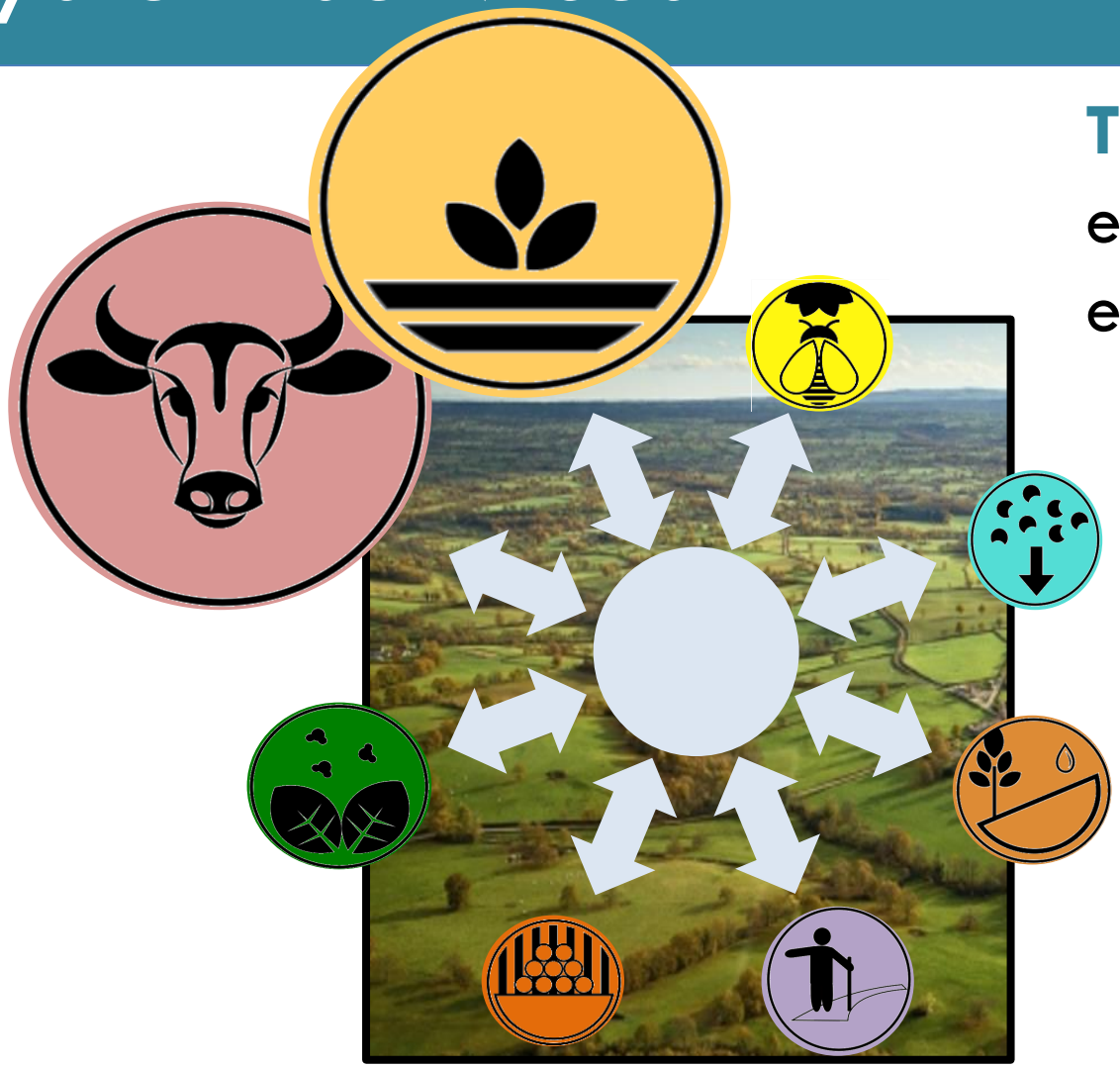
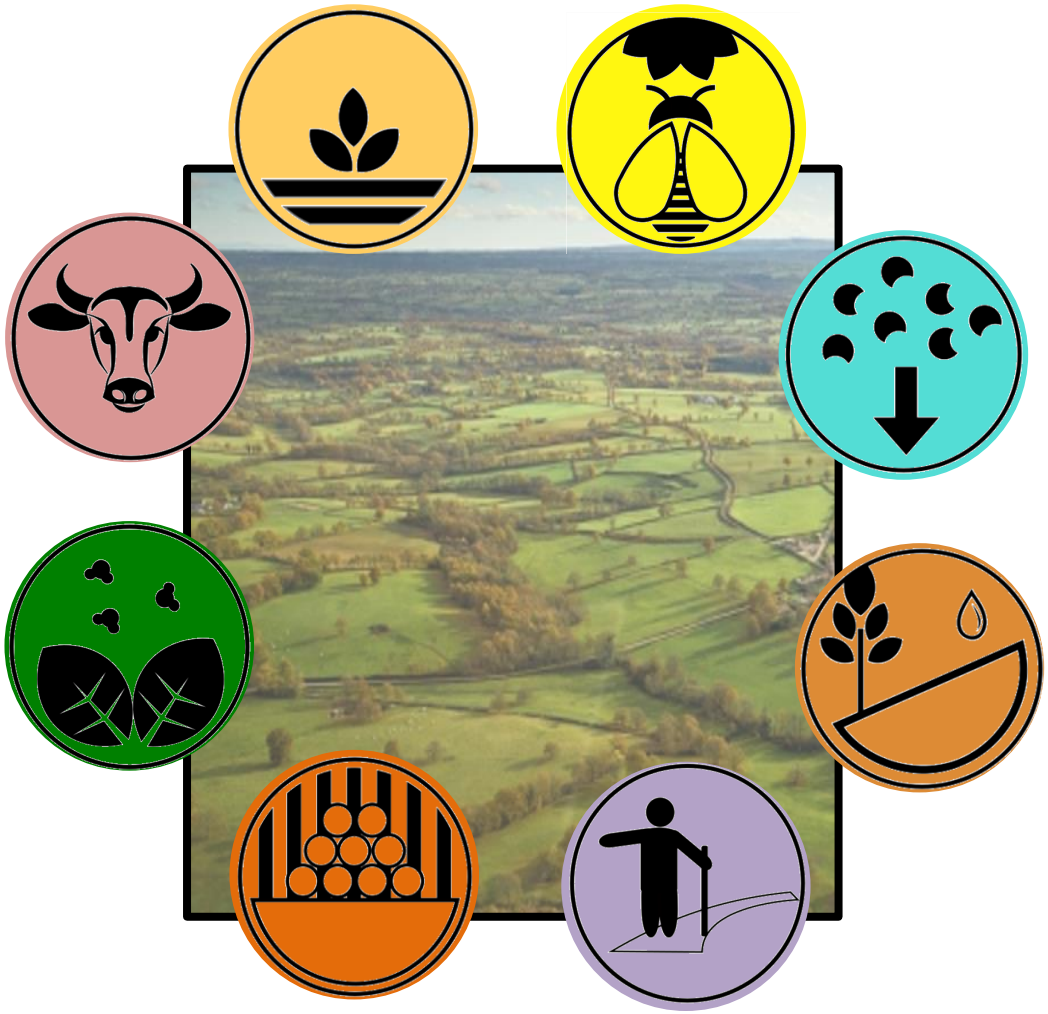


Tradeoffs might exist between ecosystem services

Ecosystem services



Ecosystem services

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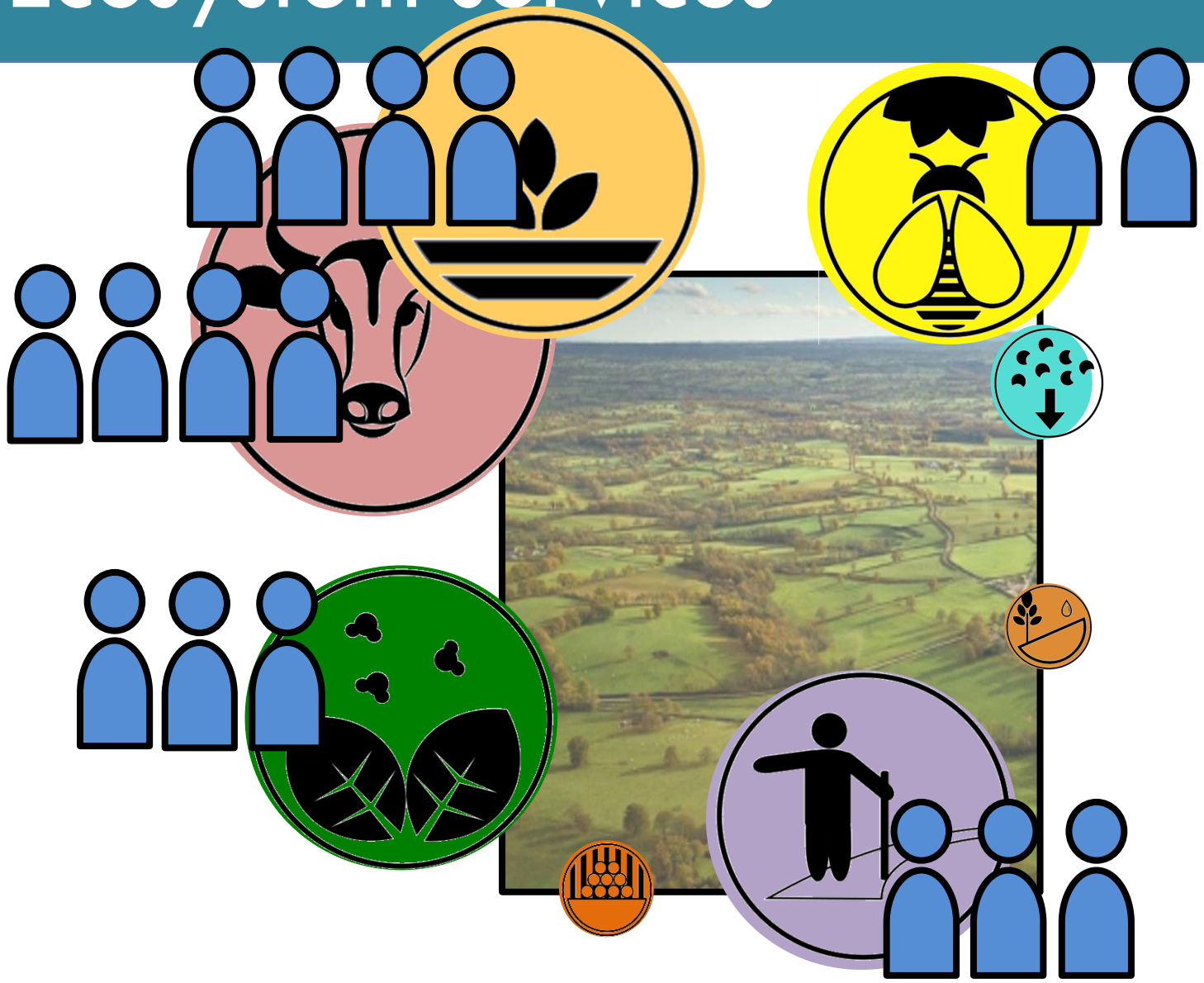
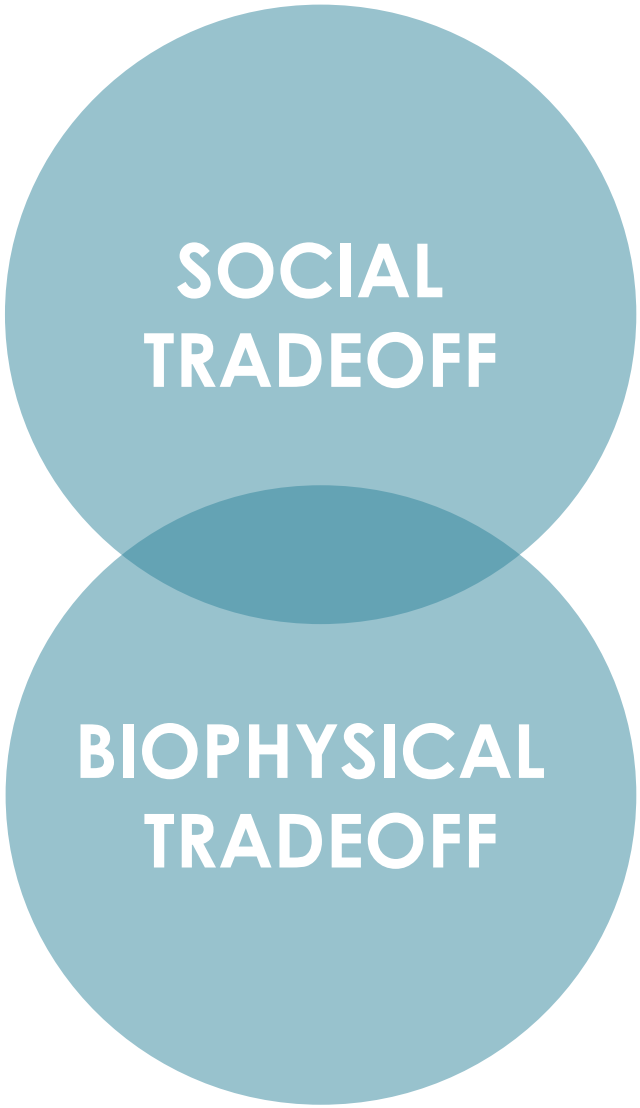
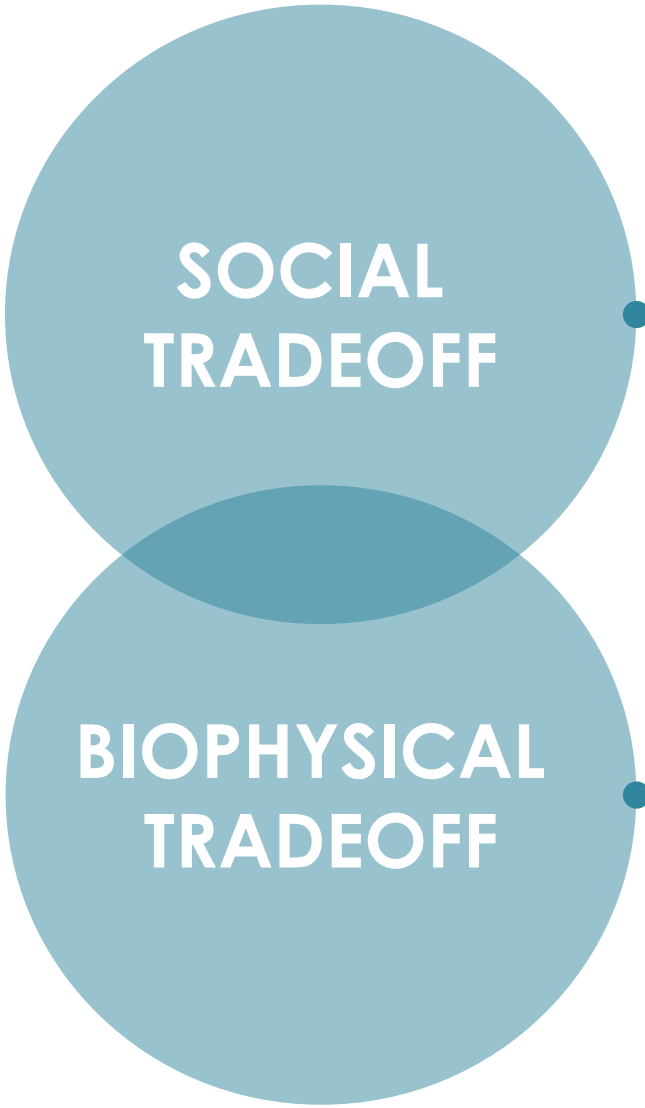


Ecosystem services tradeoffs



Ecosystem services tradeoffs

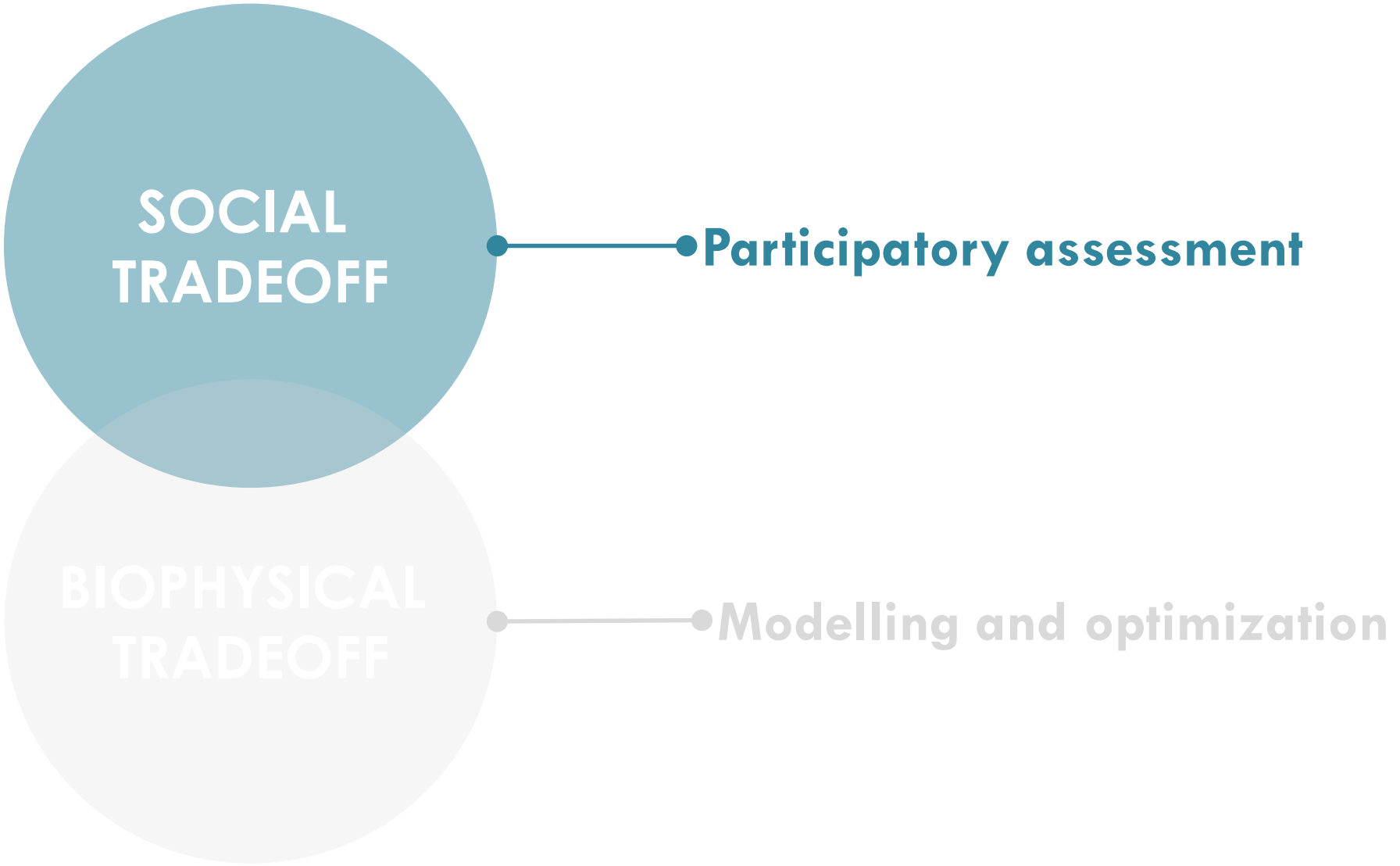
How to assess?



Participatory assessment

Modelling and optimization

Ecosystem services tradeoffs



Participatory assessment

Workshop **FOPIA-SUREfarm**

Functions provided by the study region and **importance assigned** by the stakeholders

26 participants to the workshop

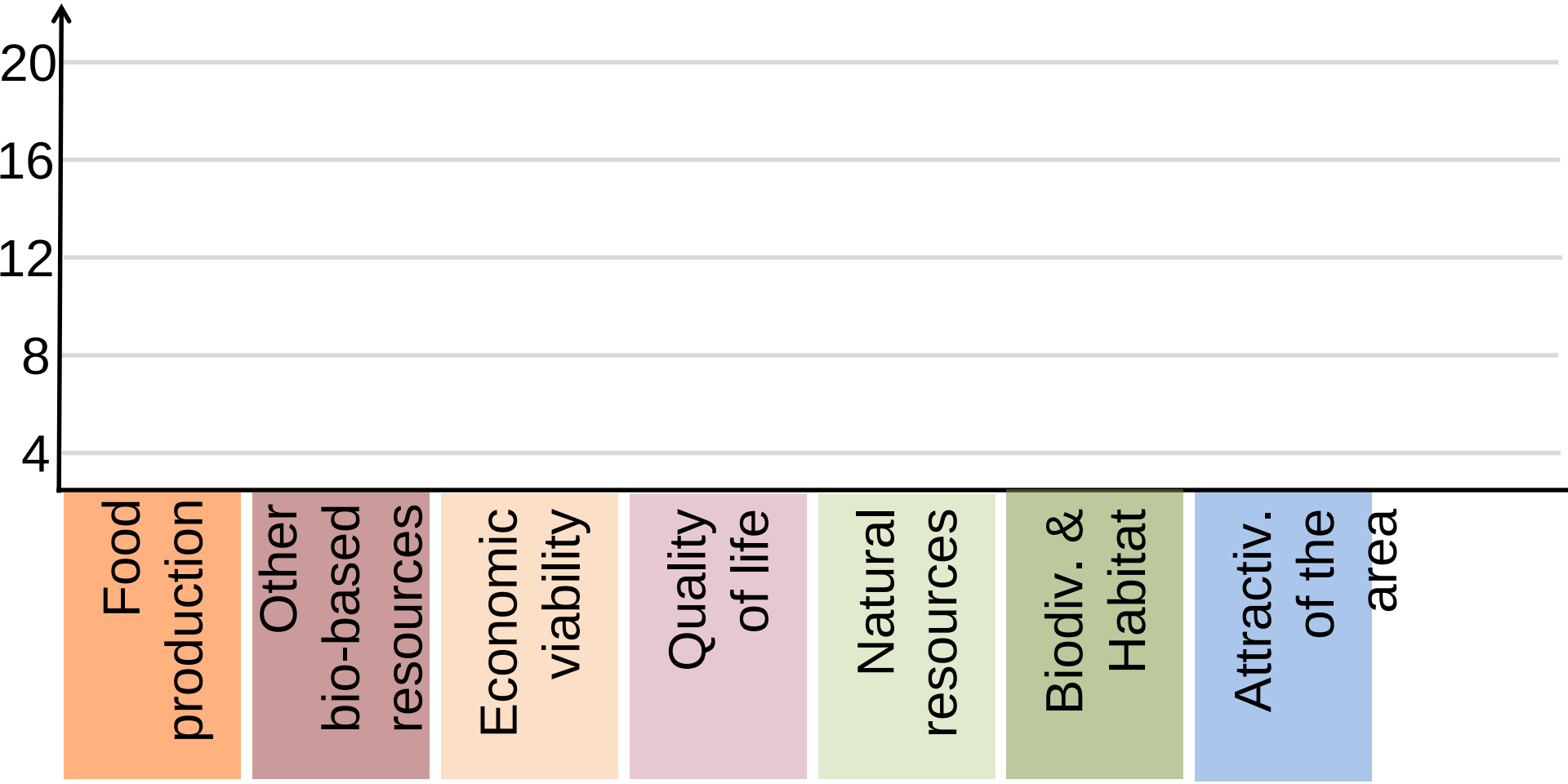
- Breeders
- Agricultural chamber
- NGOs
- Cooperatives
- Research institutes

100 points to distribute among functions

This project has received funds from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 727520

Importance of functions

Participatory assessment: participants were asked to **assign importance to landscape functions**



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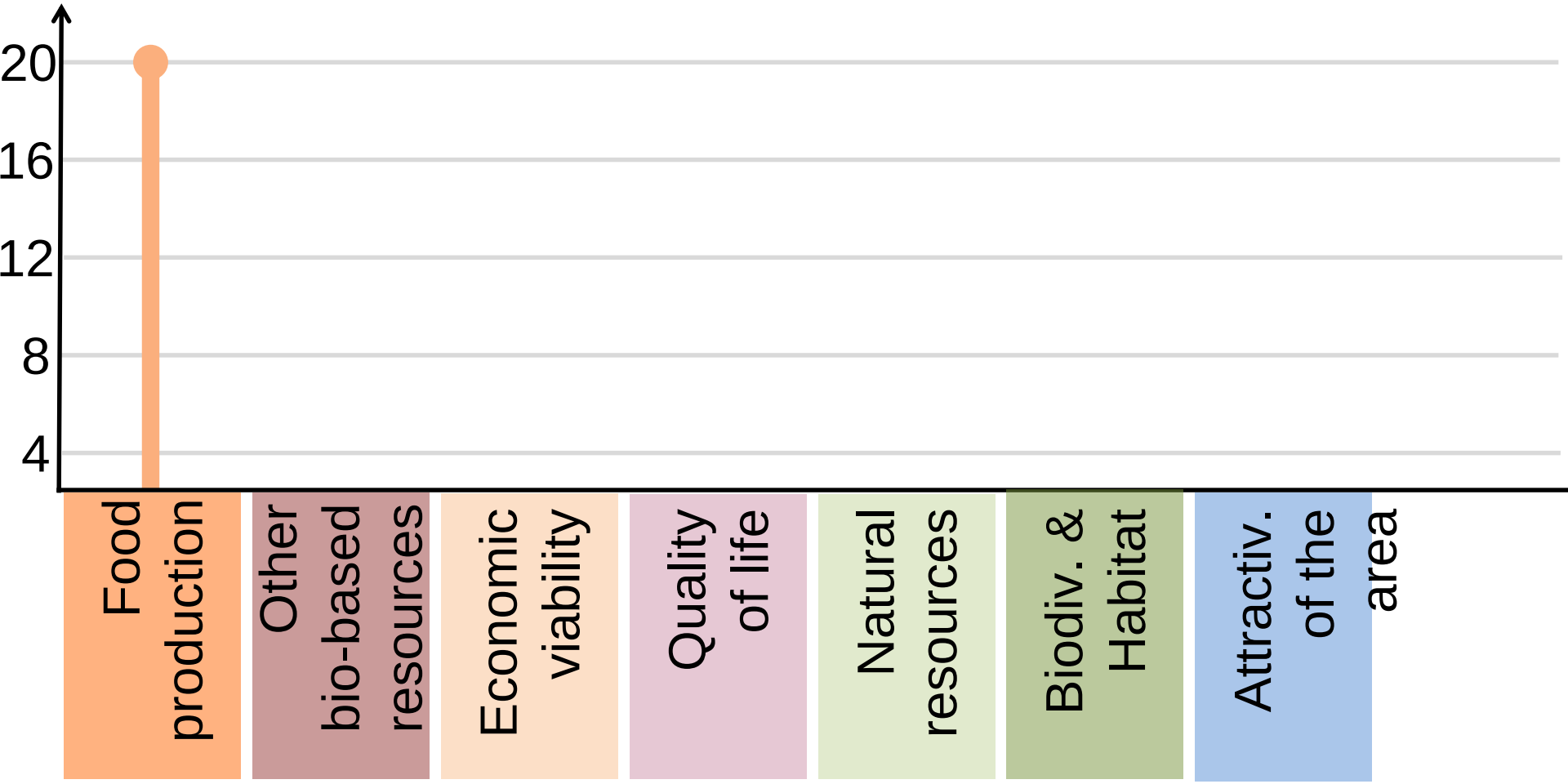

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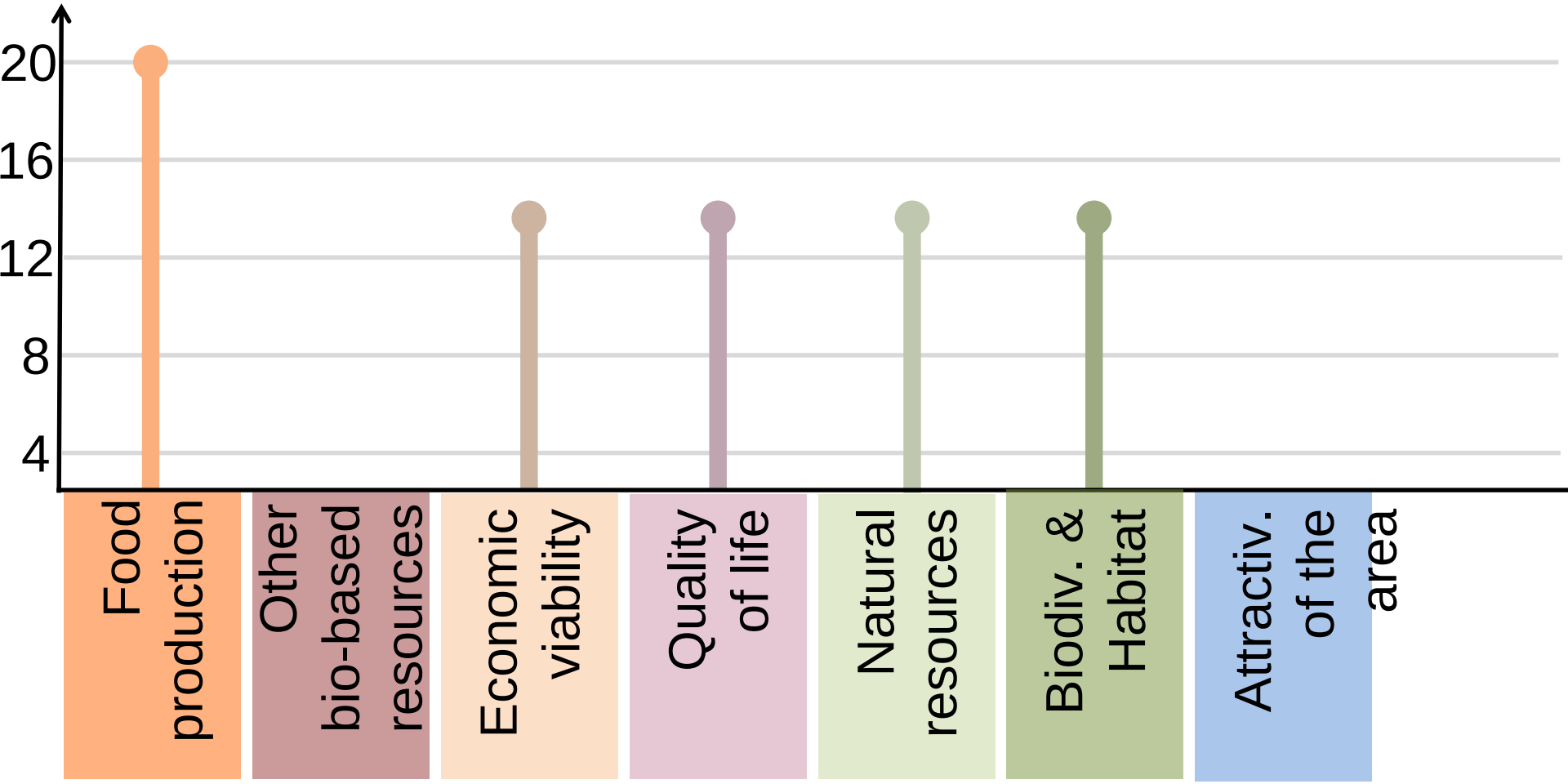

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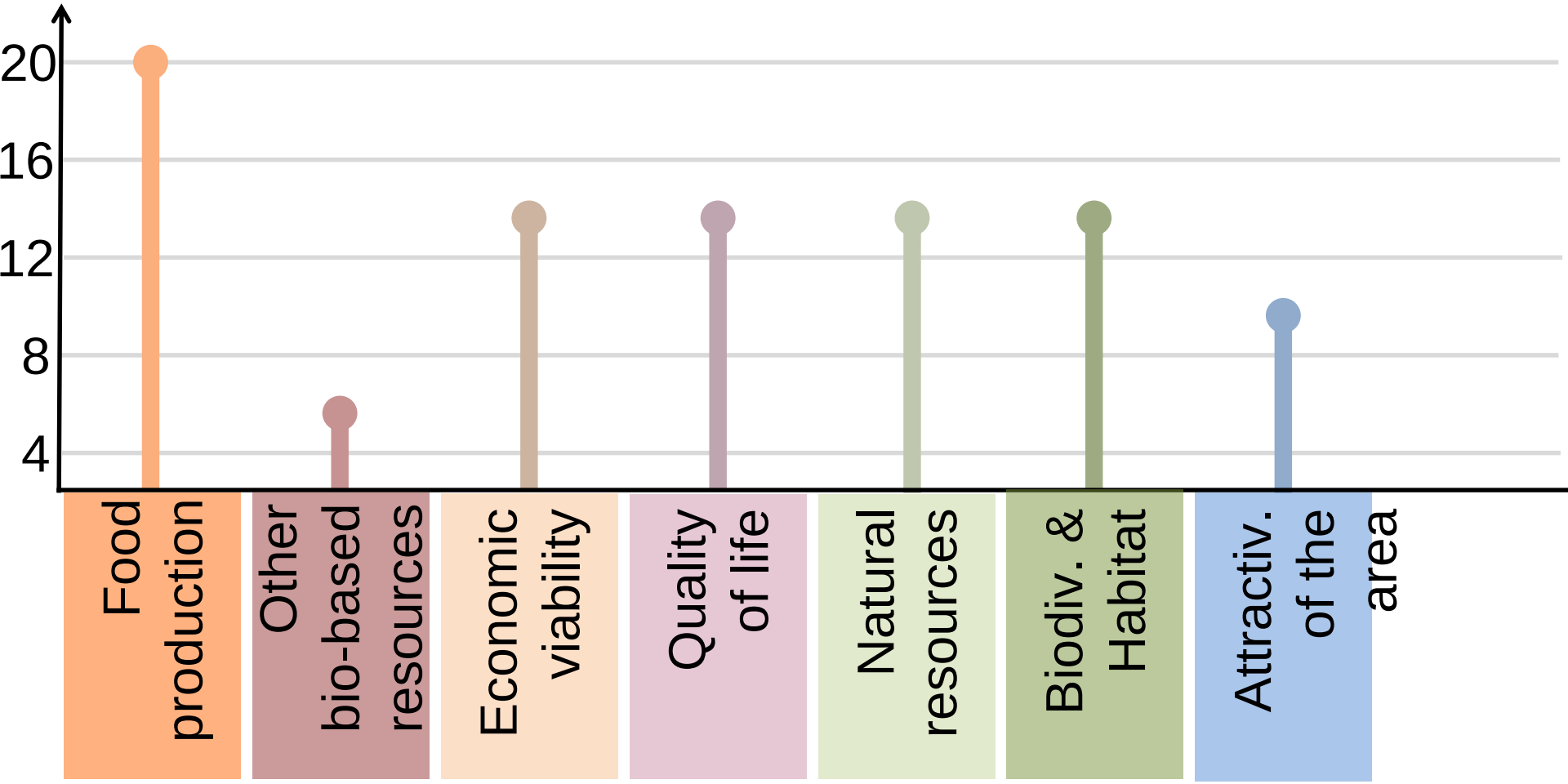

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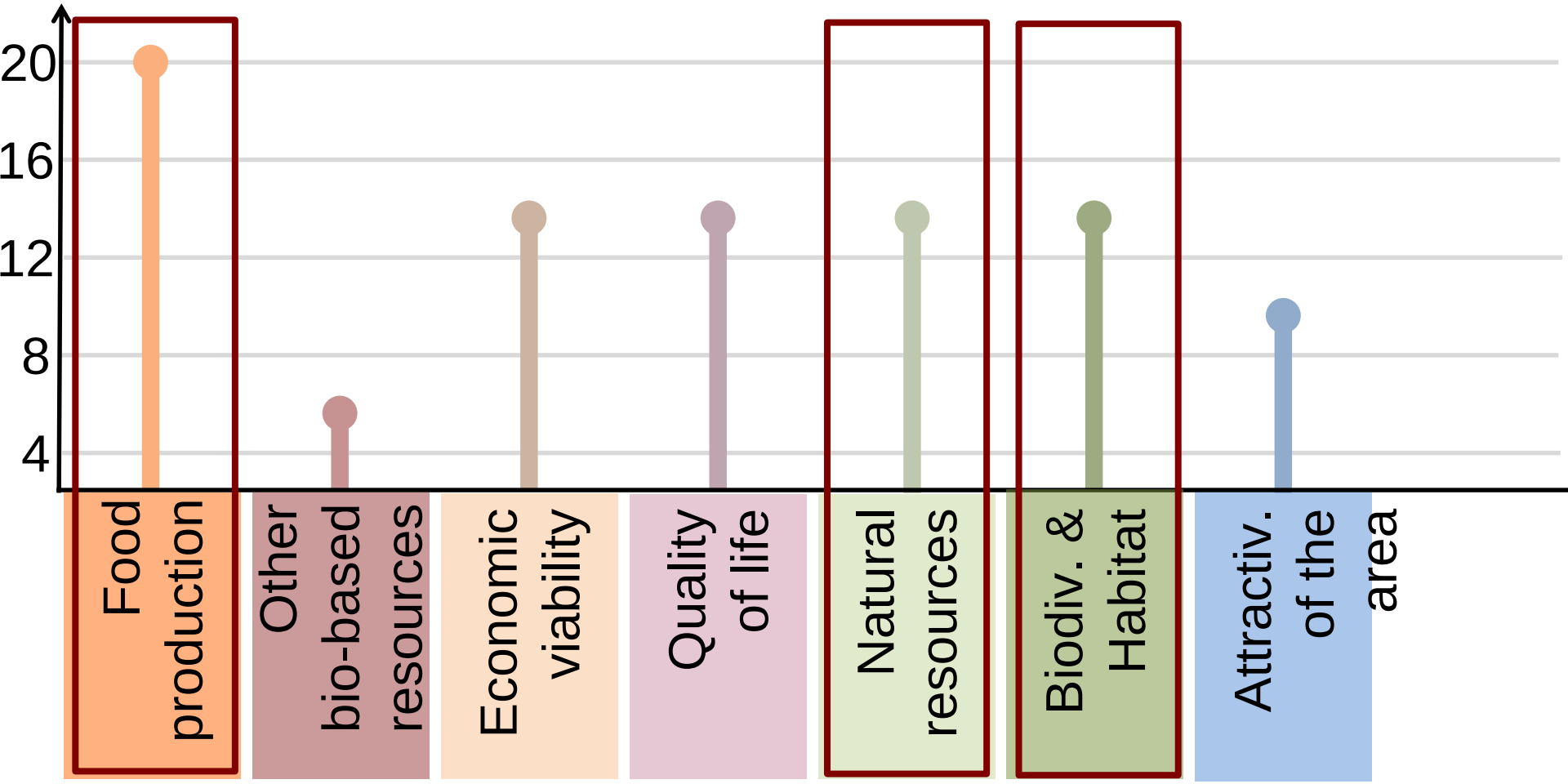
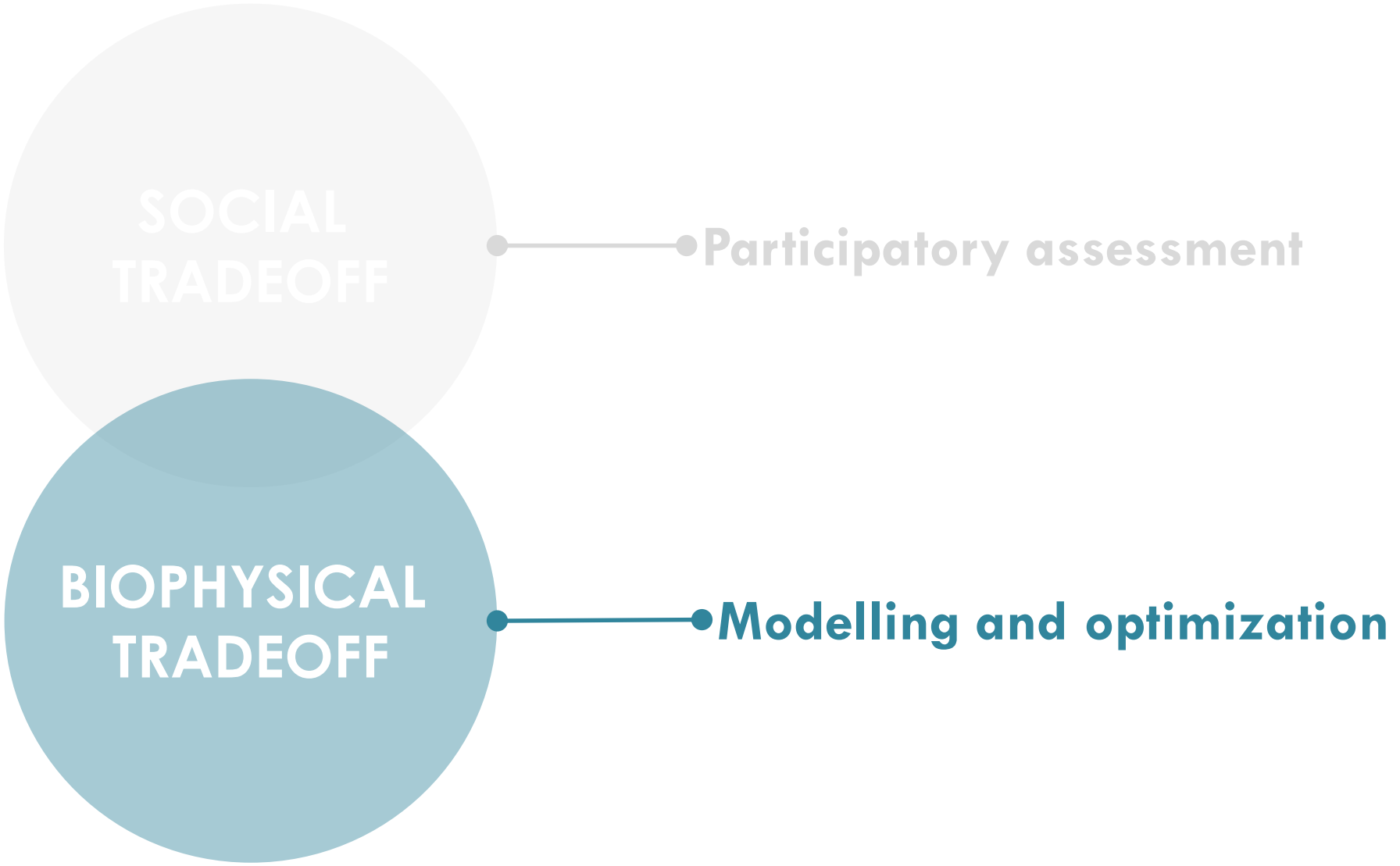


Ecosystem services tradeoffs



Assessing biophysical tradeoff

Build a **model** of food and ecosystem services provision

Apply **multi-criteria analysis** for exploring tradeoffs and synergies

Assessing biophysical tradeoff

Build a **model** of food and ecosystem services provision

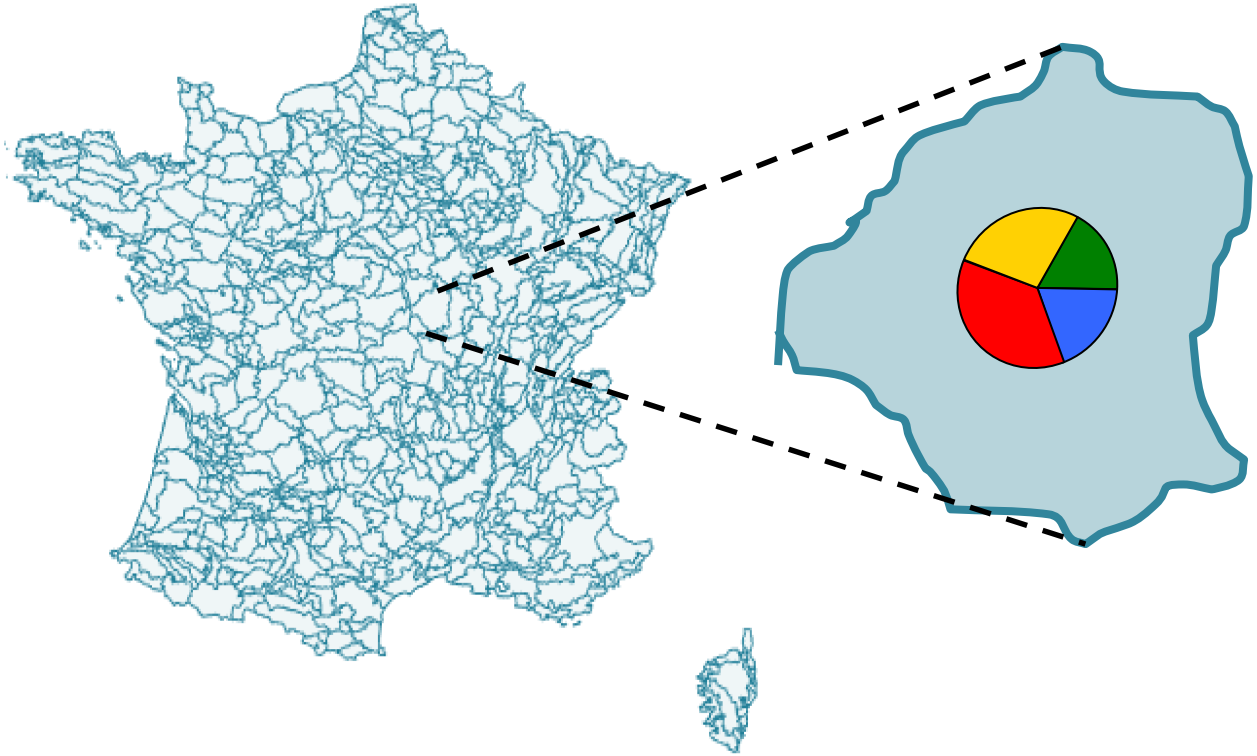
Apply **multi-criteria analysis** for exploring tradeoffs and synergies

A model for food production and ecosystem services provision

Model resolution: Small Agricultural Region (**SAR**)

Average area: 669.6 km^2

Land covers represented as **fractions**



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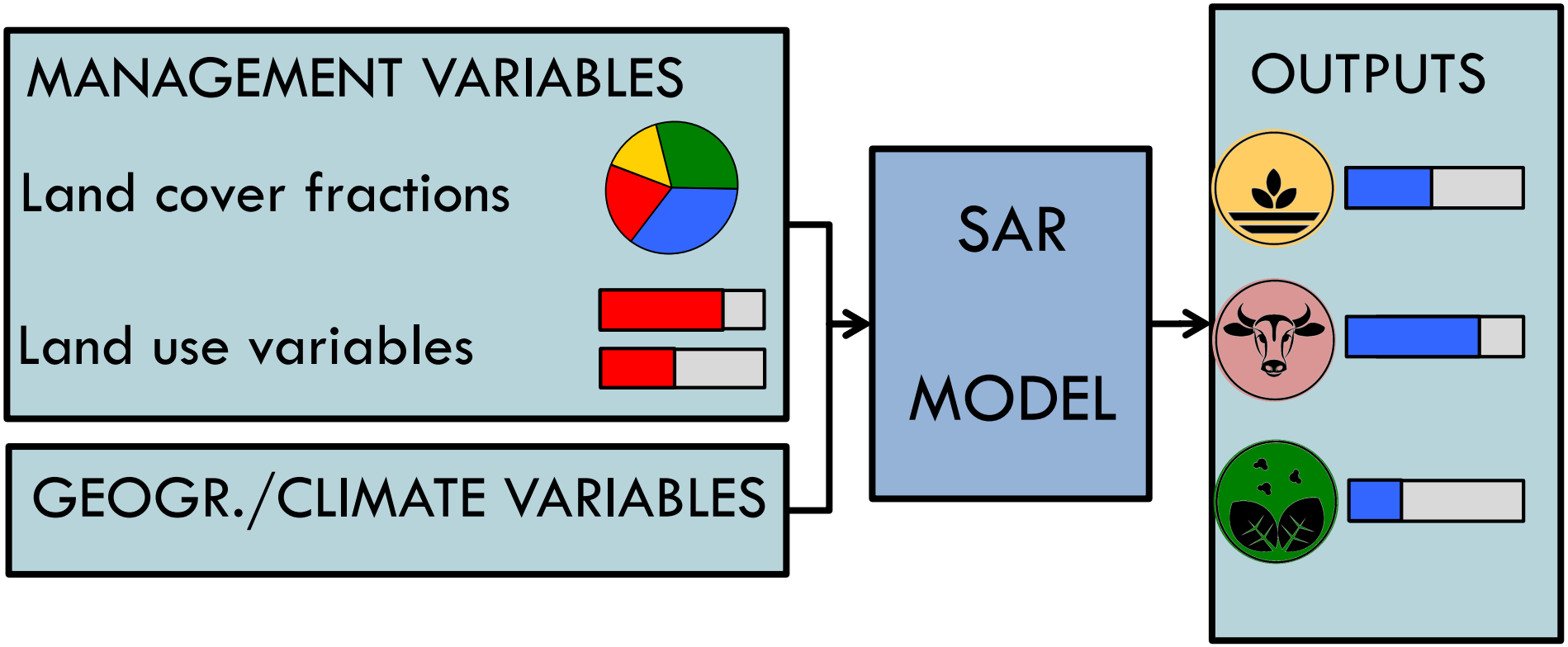
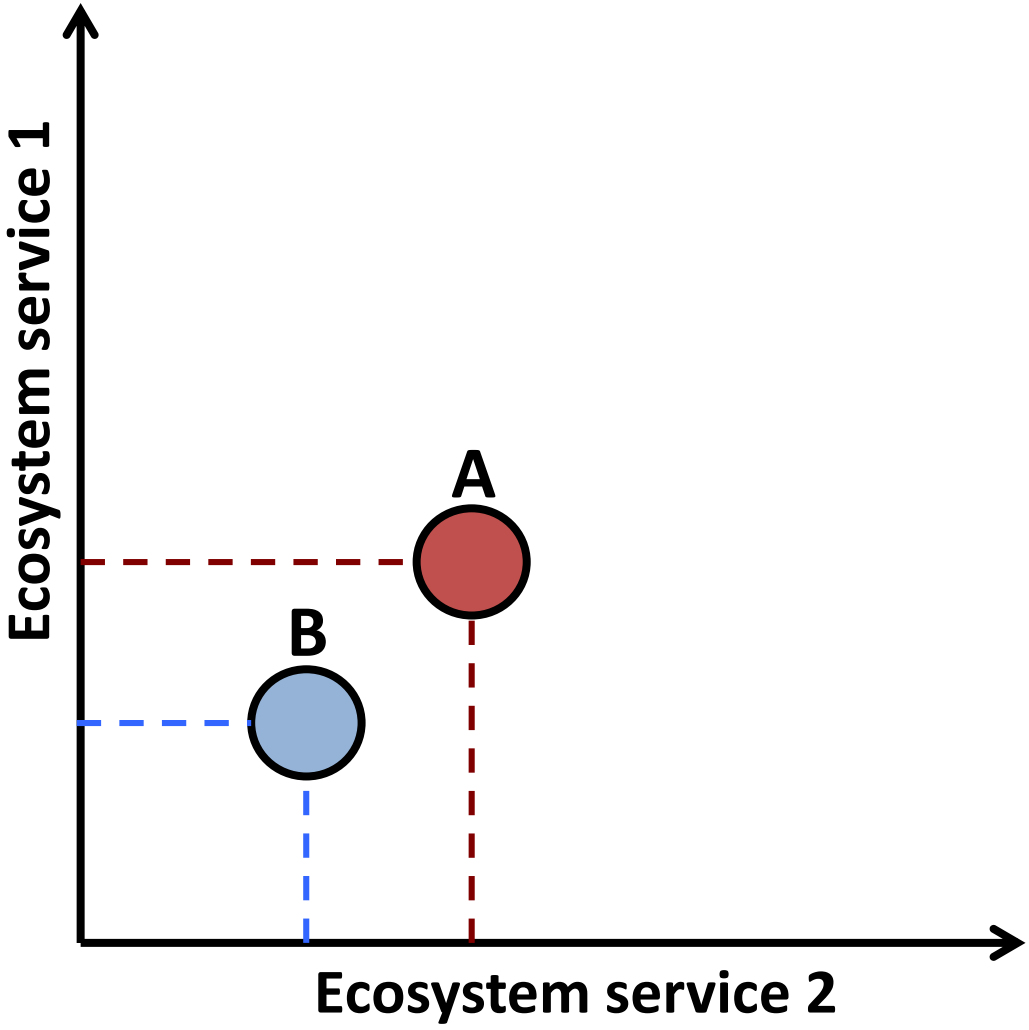


Assessing biophysical tradeoff

Build a model of food and ecosystem services provision

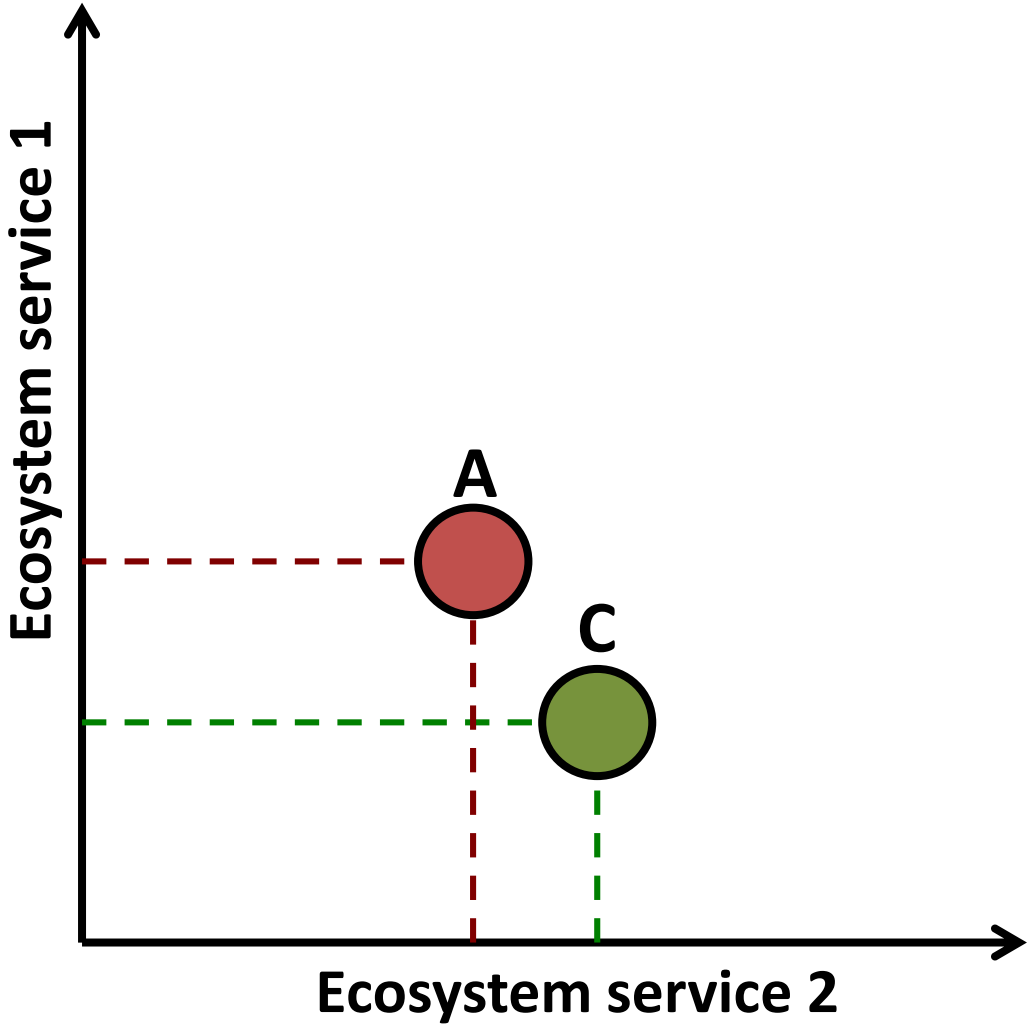
Apply **multi-criteria analysis** for exploring tradeoffs and synergies

Multi-criteria analysis for exploring tradeoffs and synergies



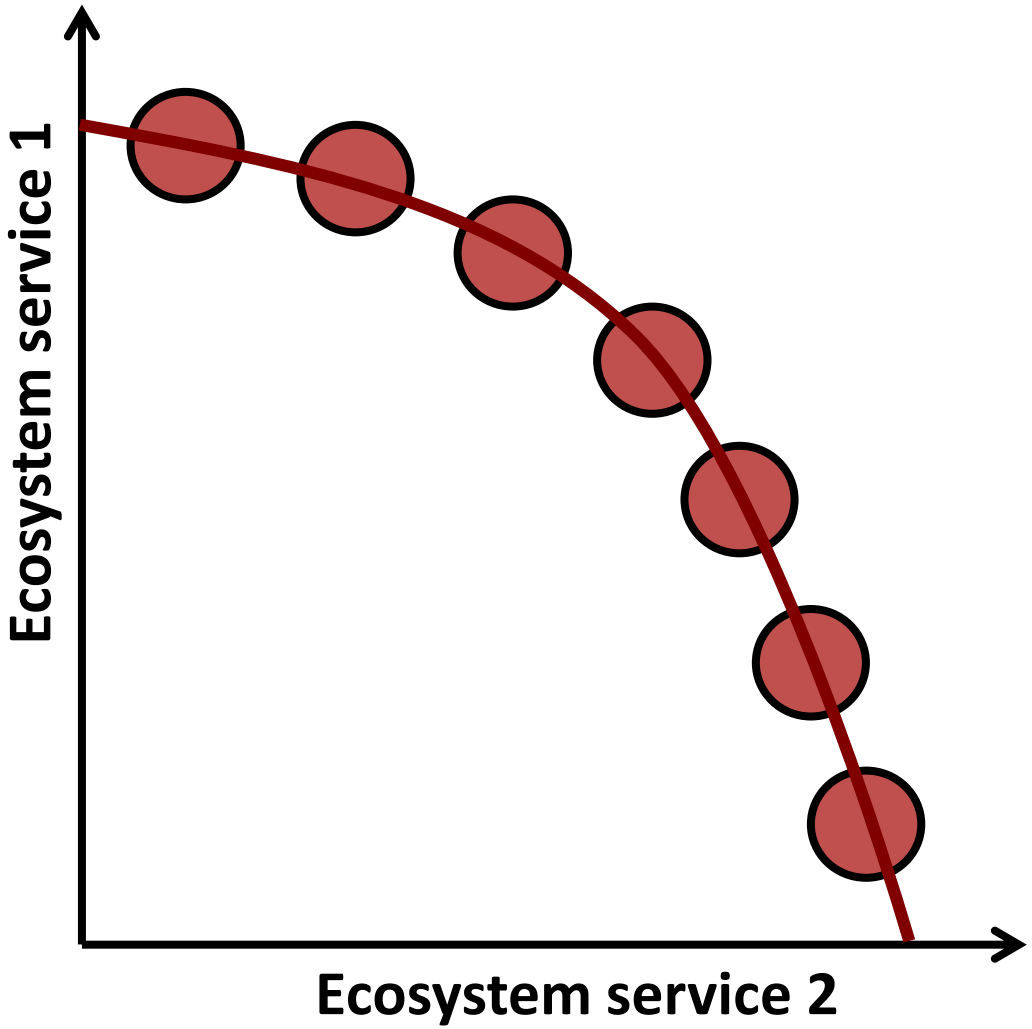
A is better than **B** because it **performs better in both criteria**

Multi-criteria analysis for exploring tradeoffs and synergies



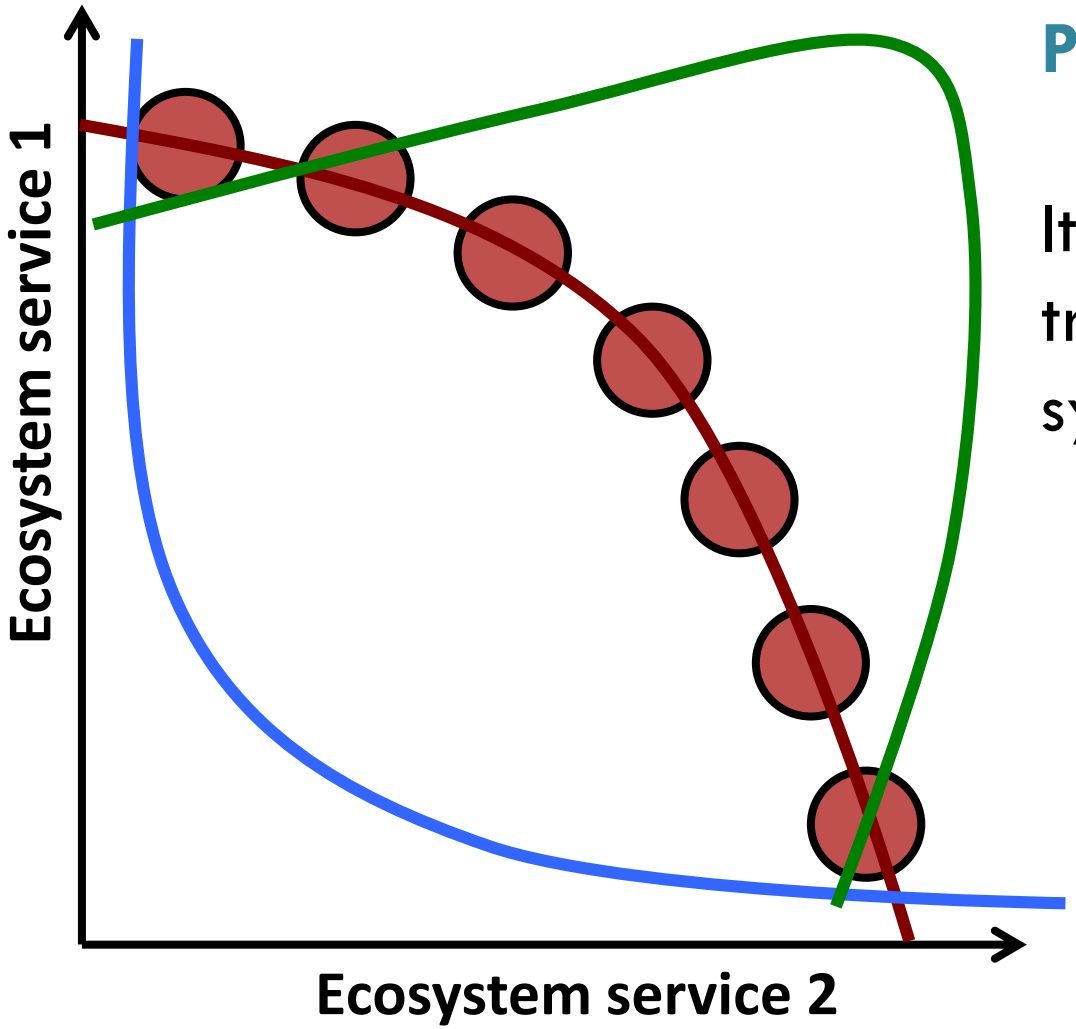
A and **C** perform better in different criteria: none of the two is better

Multi-criteria analysis for exploring tradeoffs and synergies



Pareto frontier

Multi-criteria analysis for exploring tradeoffs and synergies



Pareto frontier

Its **shape** reveals tradeoffs and synergies

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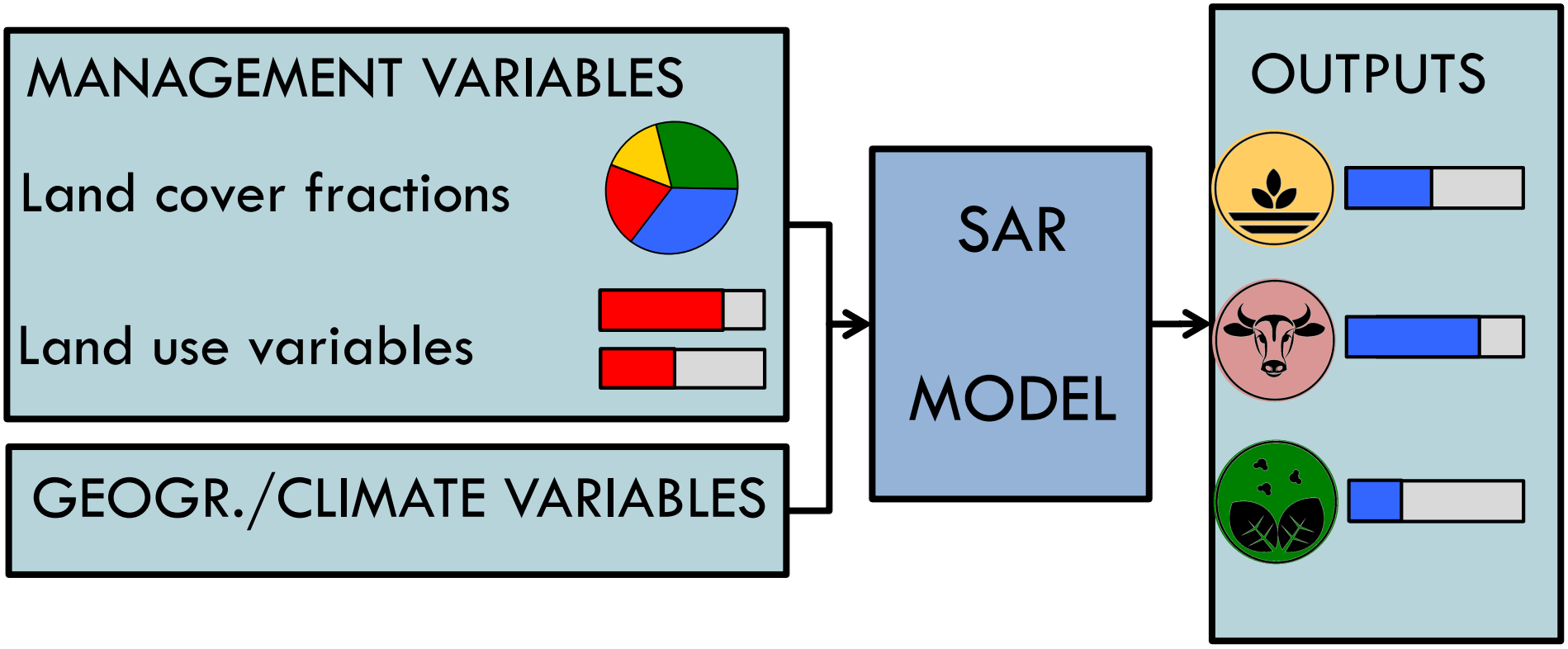
Systematically change the combinations of management variables to compute the Pareto frontier with evolutionary algorithms



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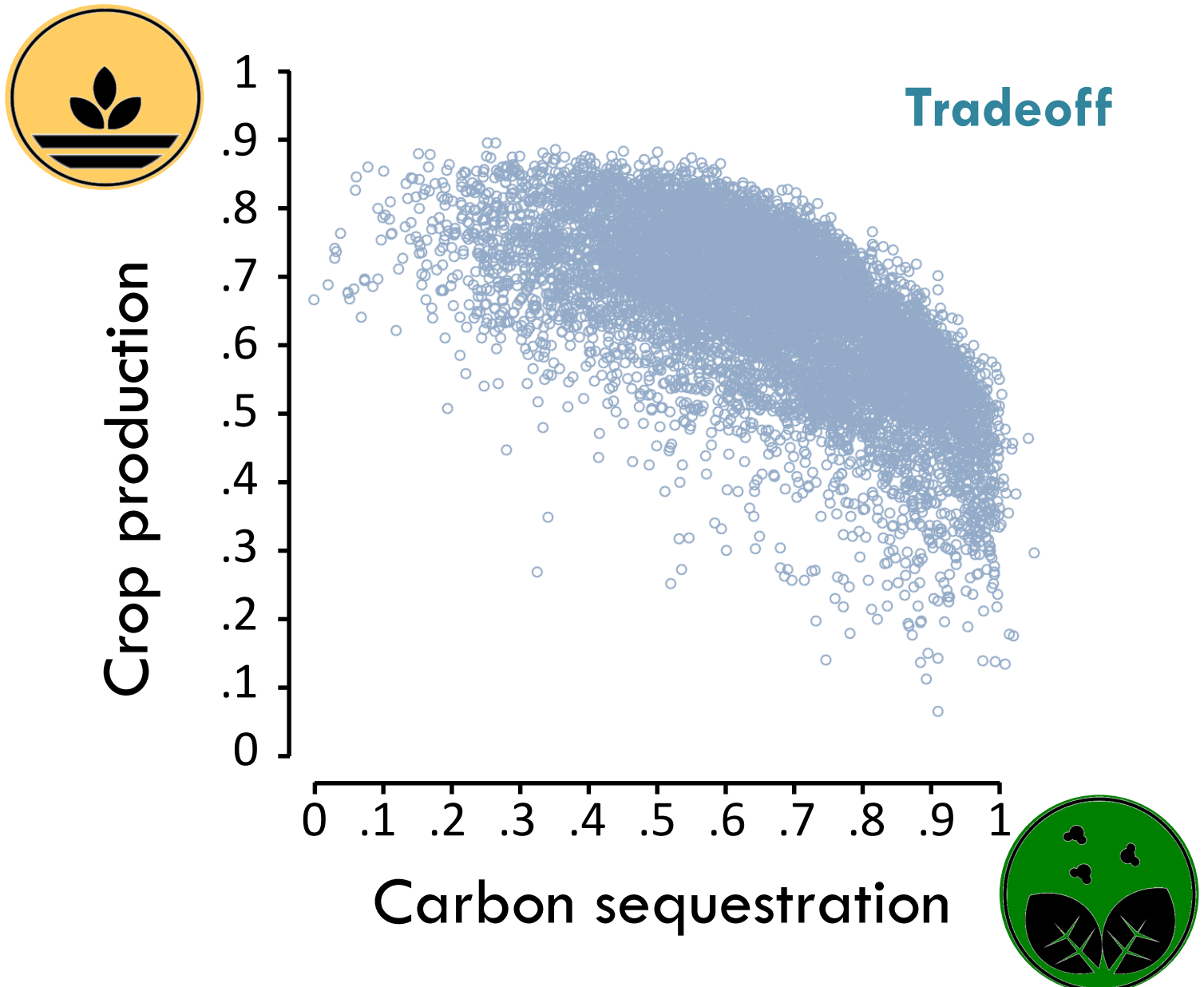

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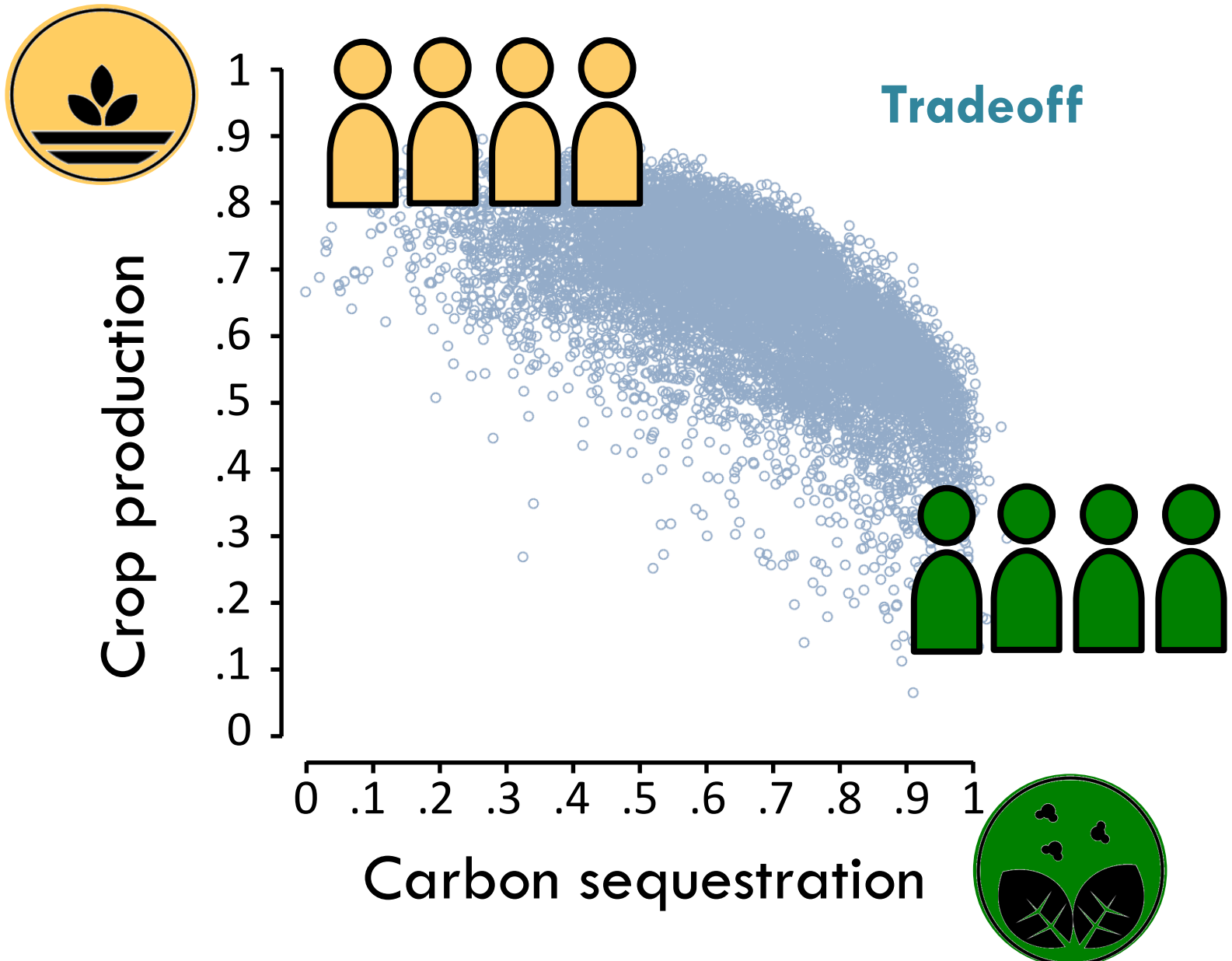

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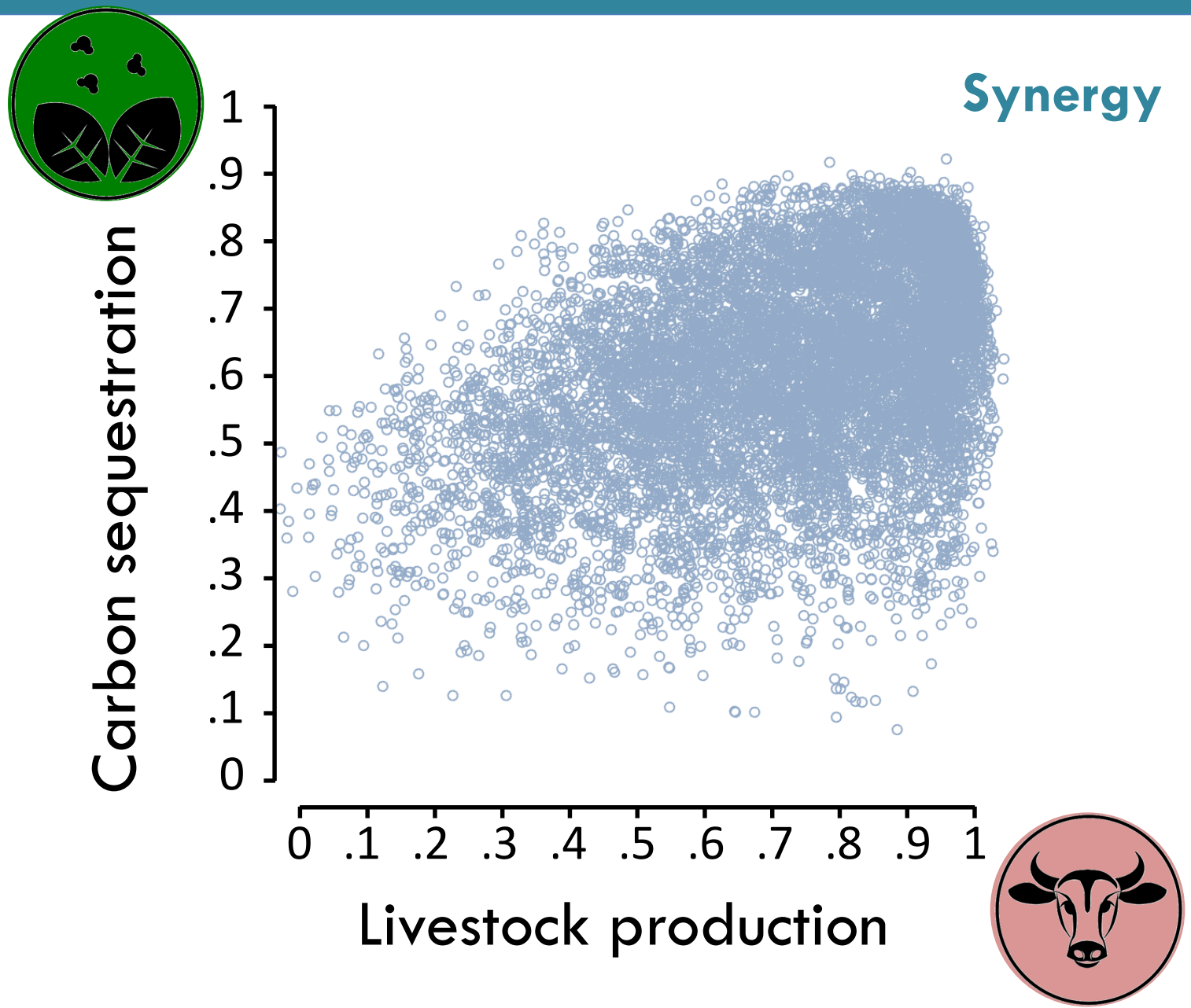

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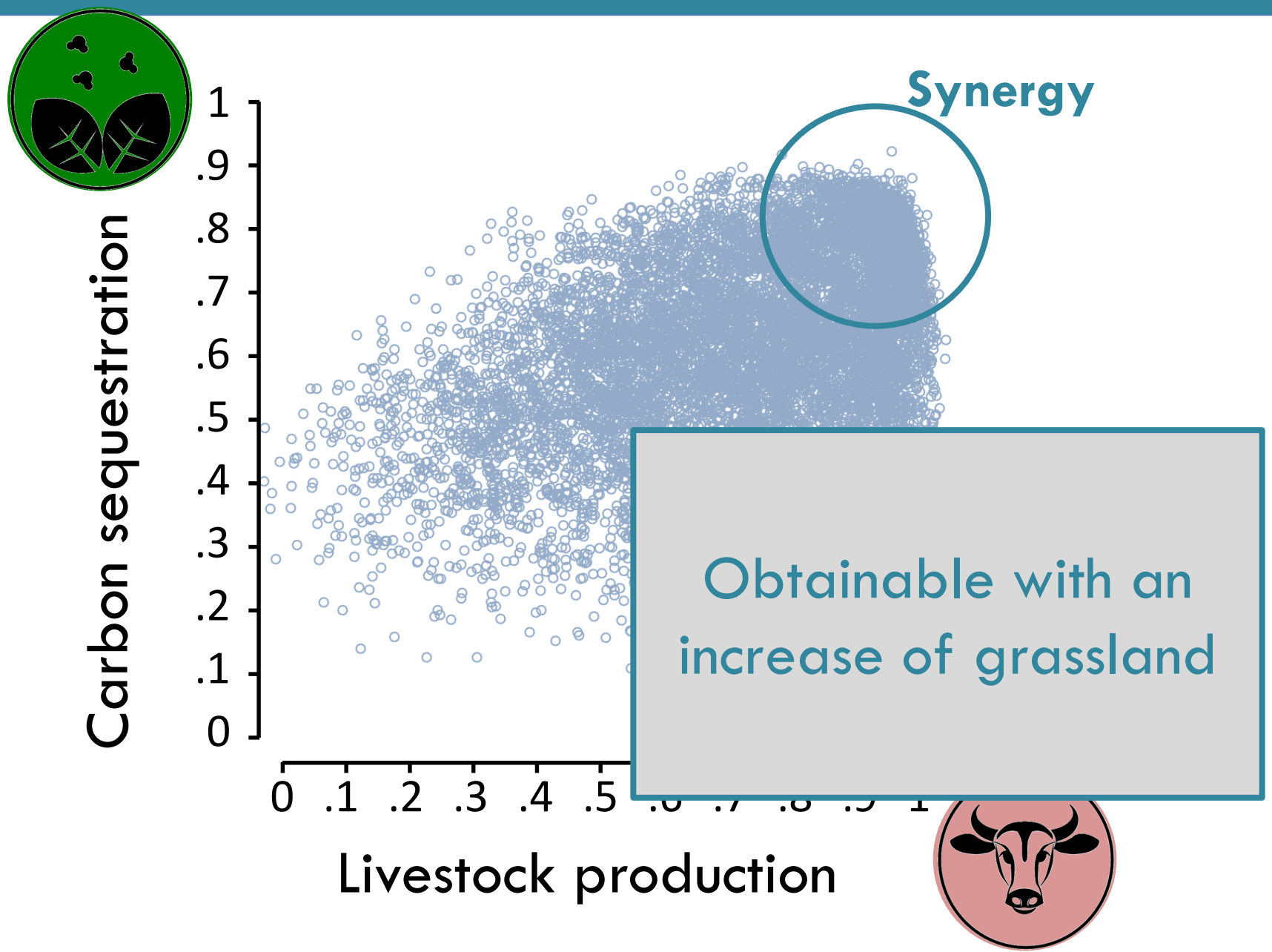
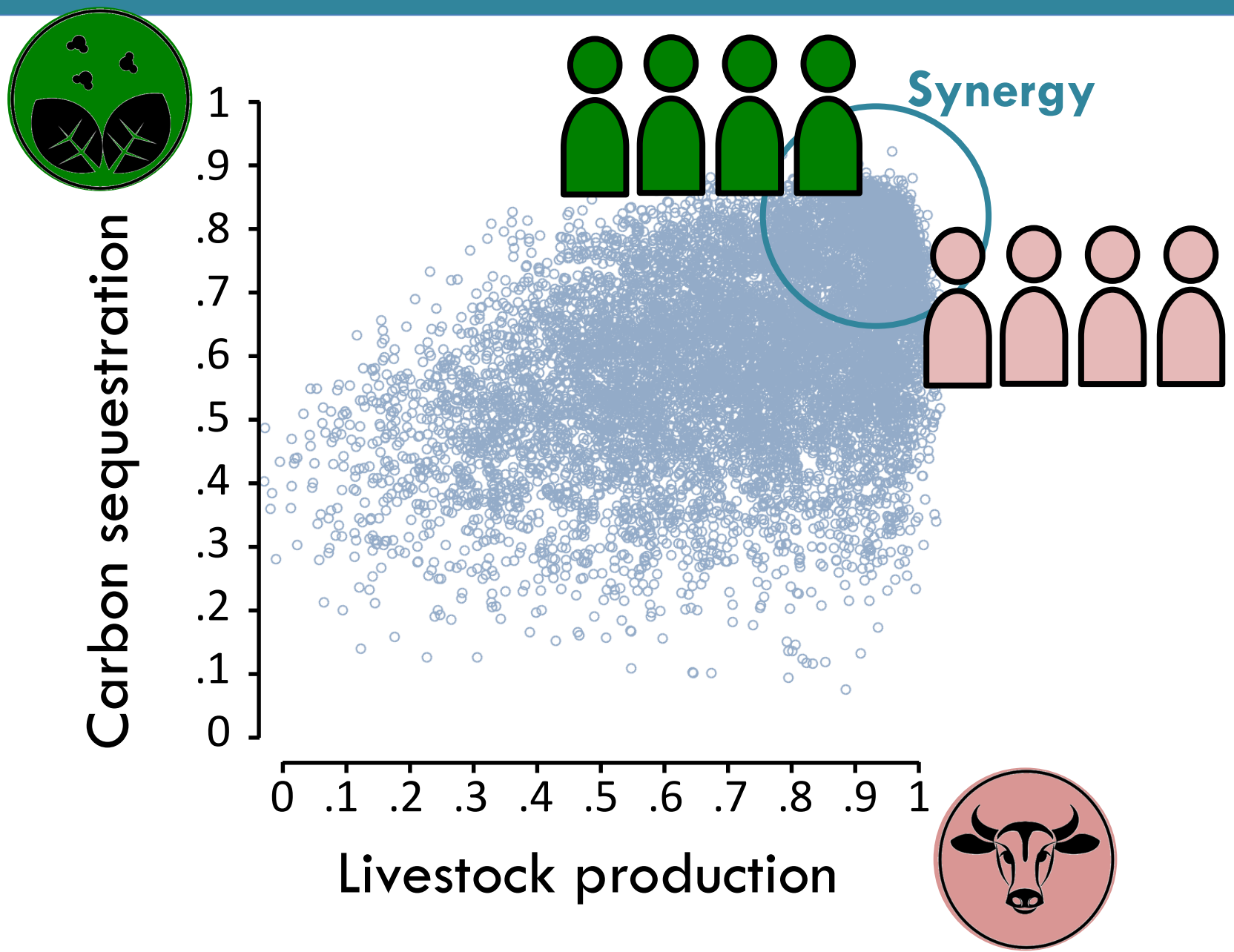


Pareto frontier

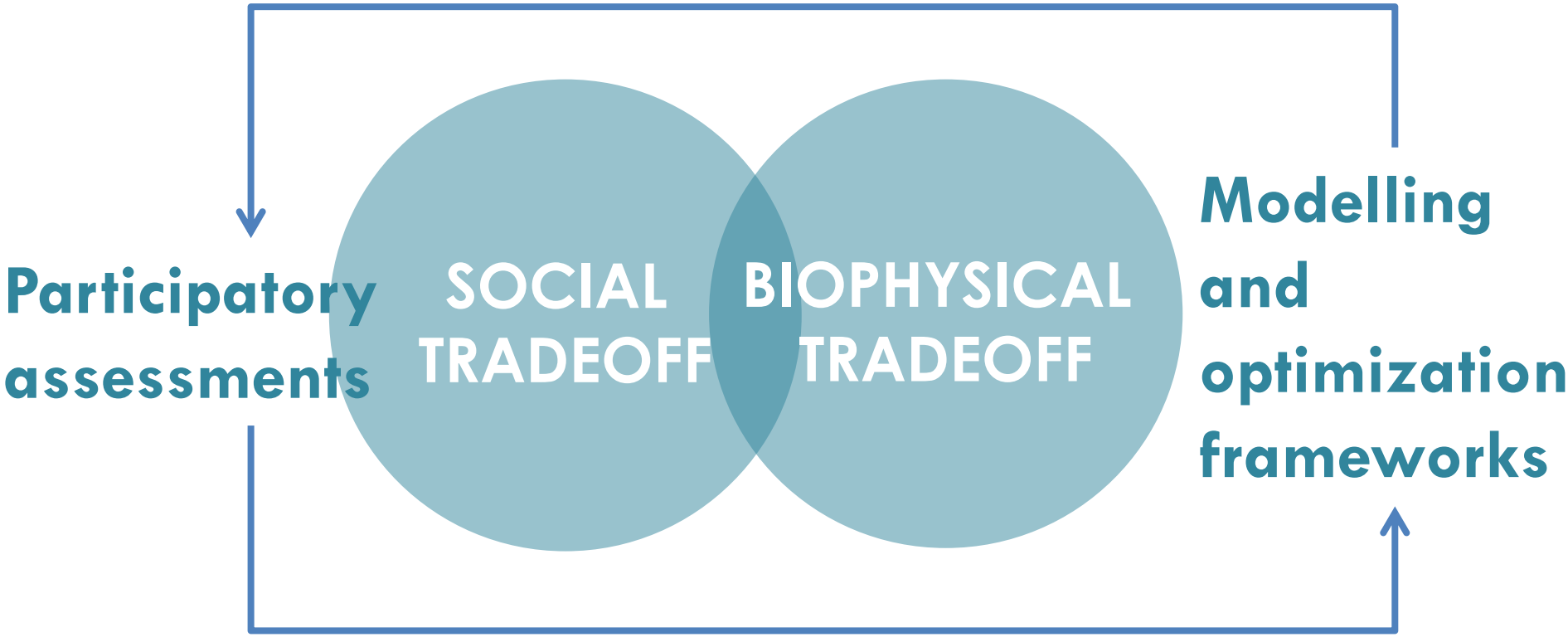


Perspectives

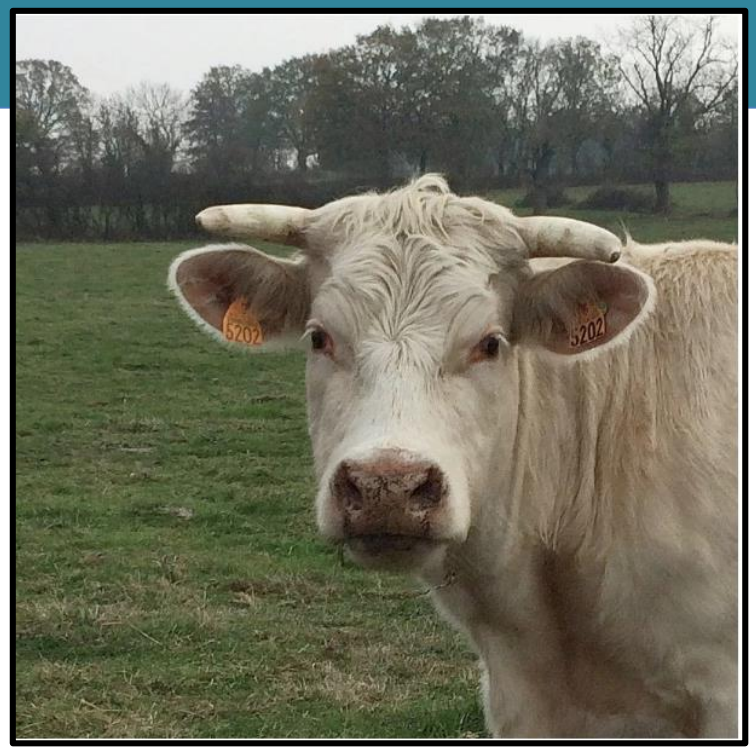
- For the moment the quantitative approach is limited to the **biophysical system** (e.g., no economic viability is included)

- We are working on **improving some production functions** and include **environmental impacts**

Take-home message



THANK YOU



francesco.accatino@inra.fr

Twitter: @FraAccatino

Pareto frontier