



Scale, Scope, Functions, Performance Measures and Circular Food Systems

Adrian Muller

Circular@WUR – Webinar on Theme I: Biosphere

Online, 3.2.2021

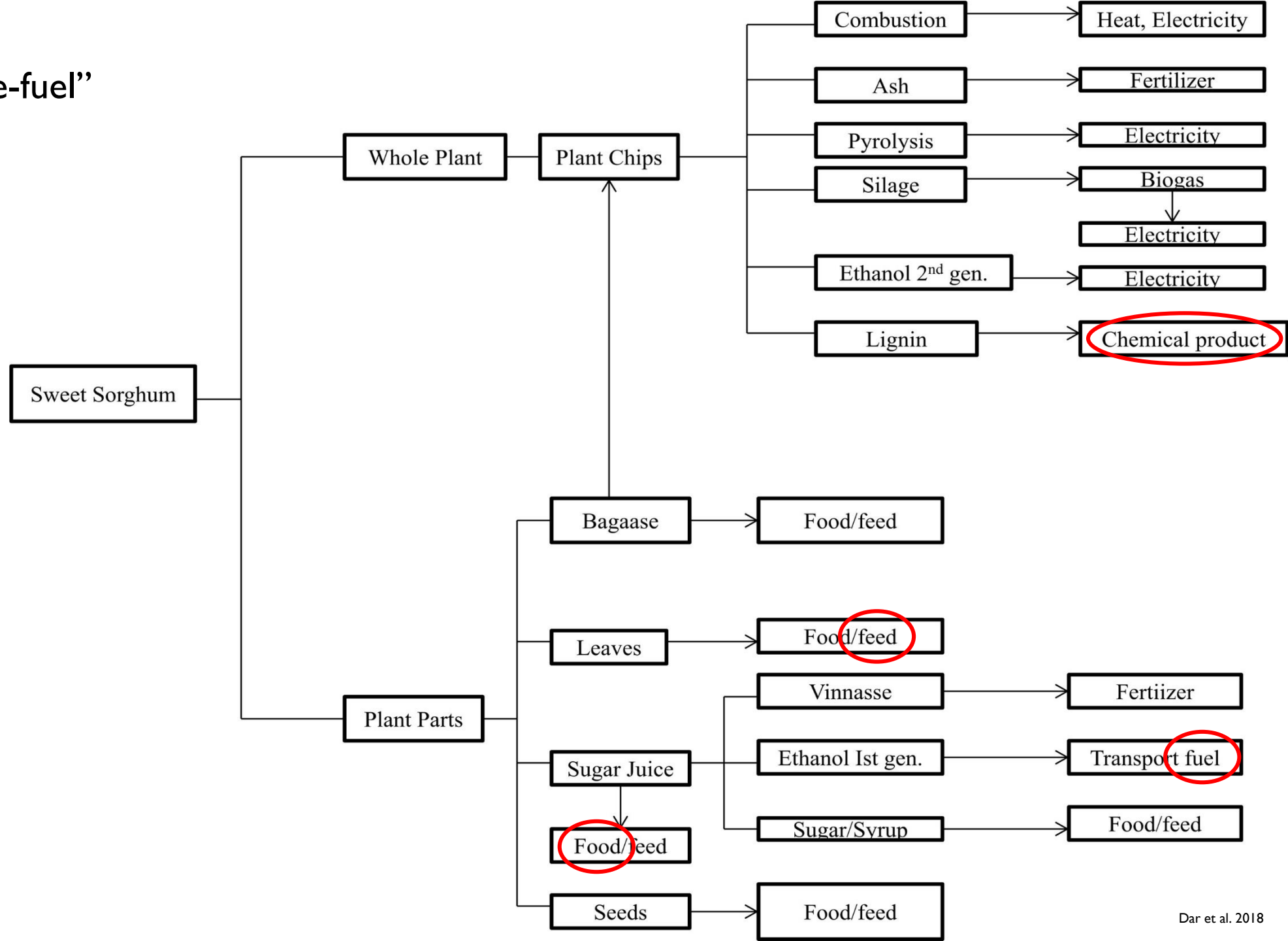
Scale

plot-farm-landscape-nation-global



Scope

“food-feed-fibre-fuel”



Scope

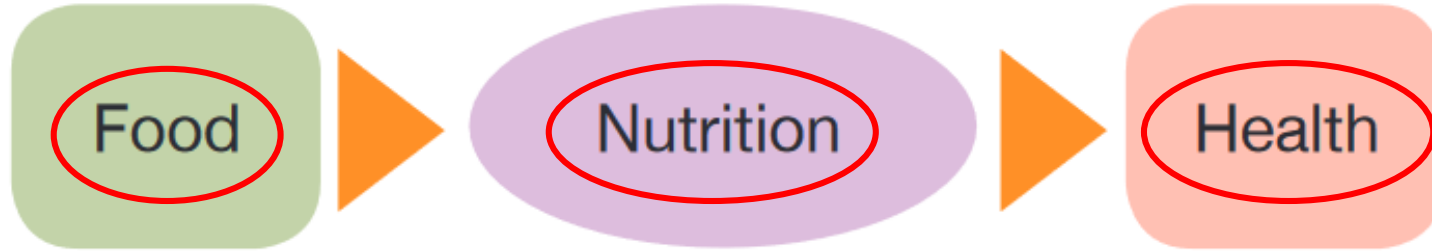
- annual crops
- perennial crops
- grasslands
- livestock
- fish
- insects
- artificial meat,
- vertical farming
- ...



Scope

Continuum from Agriculture to Health

- Agriculture
- Food supply
- Food Service



- Promotion
- Protection
- Treatment
- Restore

- Food production
- Nutrition orientation for healthy diet
- Food, feed and fuel and bio-products
- Climate changes

- Food quality
- Food safety (Consumer and Trade)

- Nutrient needs
- Dietary intakes
- Nutritional wellbeing
- Nutrition literacy

- Safe from Hazards
- Good health
- Restore

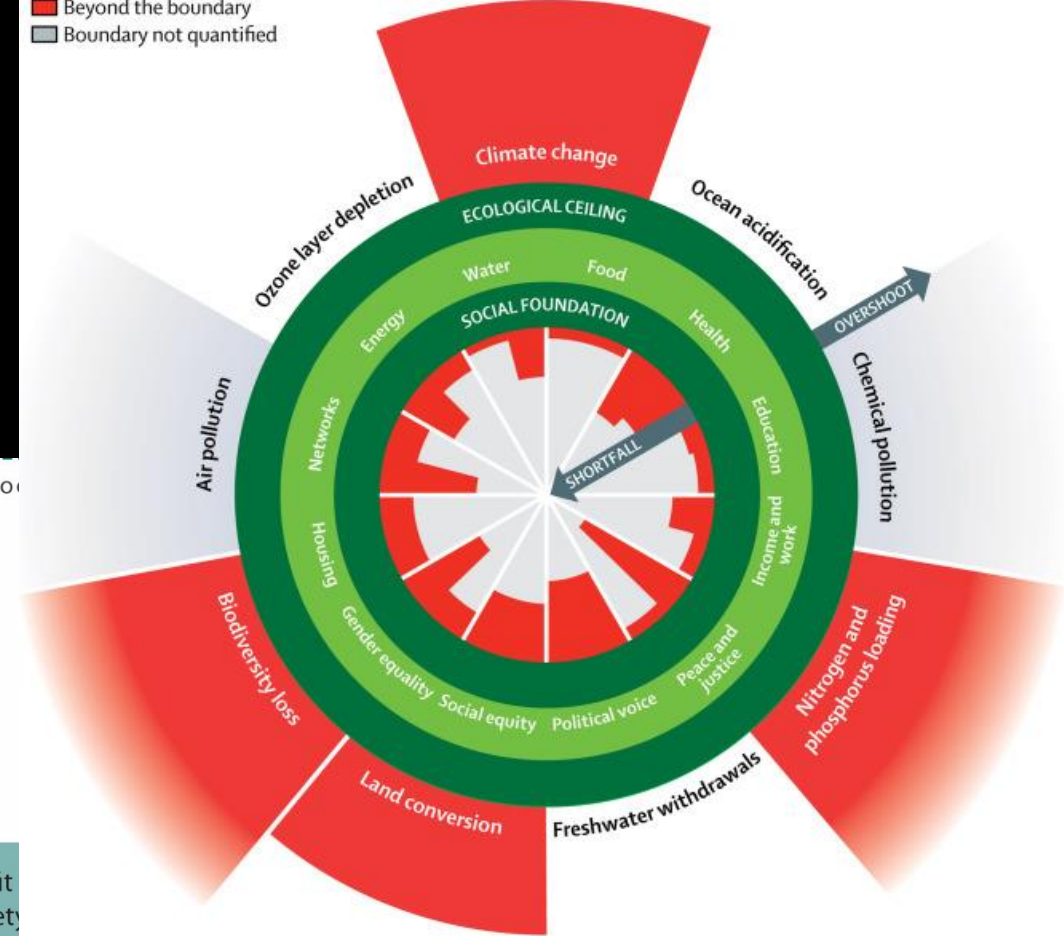
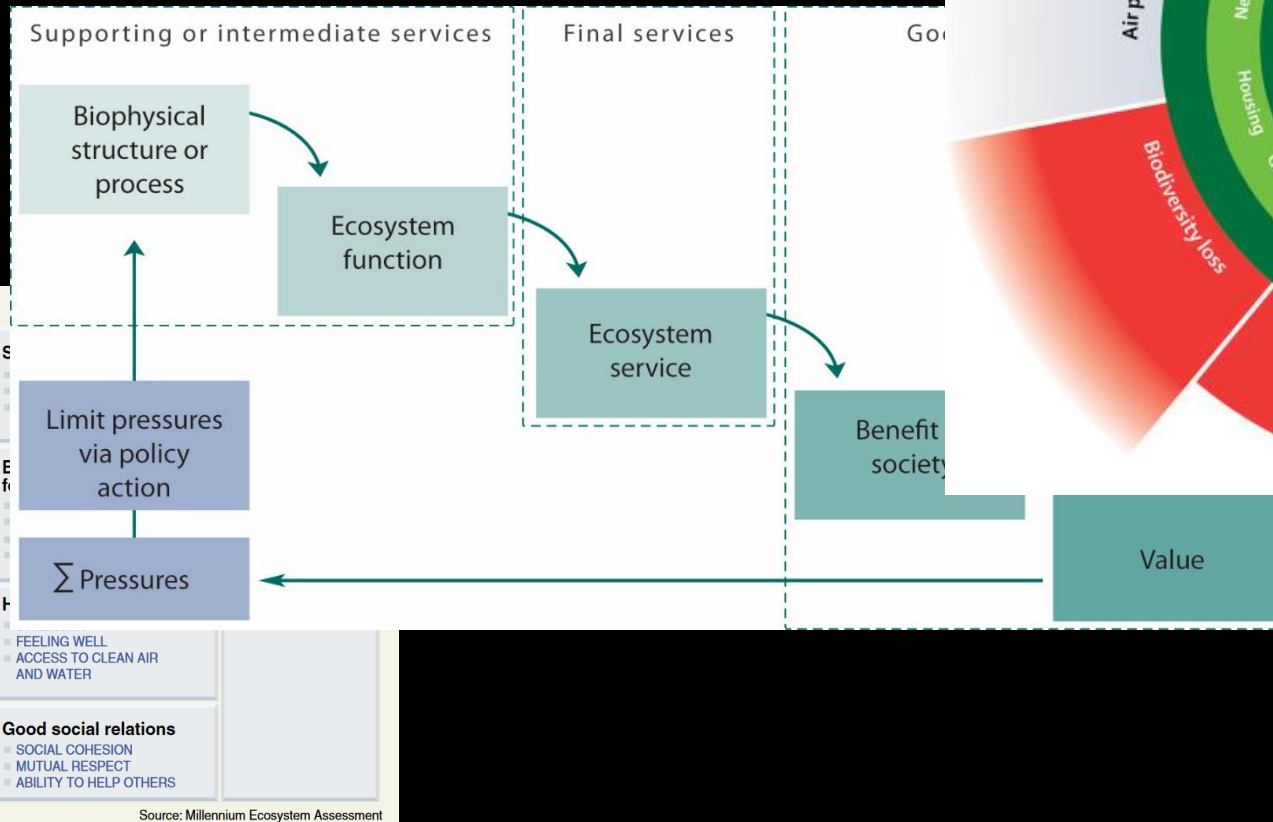
Food Security

Food and Nutrition Education

Food Culture

Functions and demand

What does the food system deliver and what do we need from it?



■ Beyond the boundary
■ Boundary not quantified

ECOSYSTEM SERVICES	
Supporting	Provisioning ■ FOOD ■ FRESH WATER ■ WOOD AND FIBER ■ FUEL ■ ...
	Regulating ■ CLIMATE REGULATION ■ FLOOD REGULATION ■ DISEASE REGULATION ■ WATER PURIFICATION ■ ...
	Cultural ■ AESTHETIC ■ SPIRITUAL ■ EDUCATIONAL ■ RECREATIONAL ■ ...
LIFE ON EARTH - BIODIVERSITY	

ARROW'S COLOR
Potential for mediation by socioeconomic factors

ARROW'S WIDTH
Intensity of linkages between ecosystem services and human well-being

Low Medium High

Weak Medium Strong

Source: Millennium Ecosystem Assessment

Performance

Biomass yields per ha and year



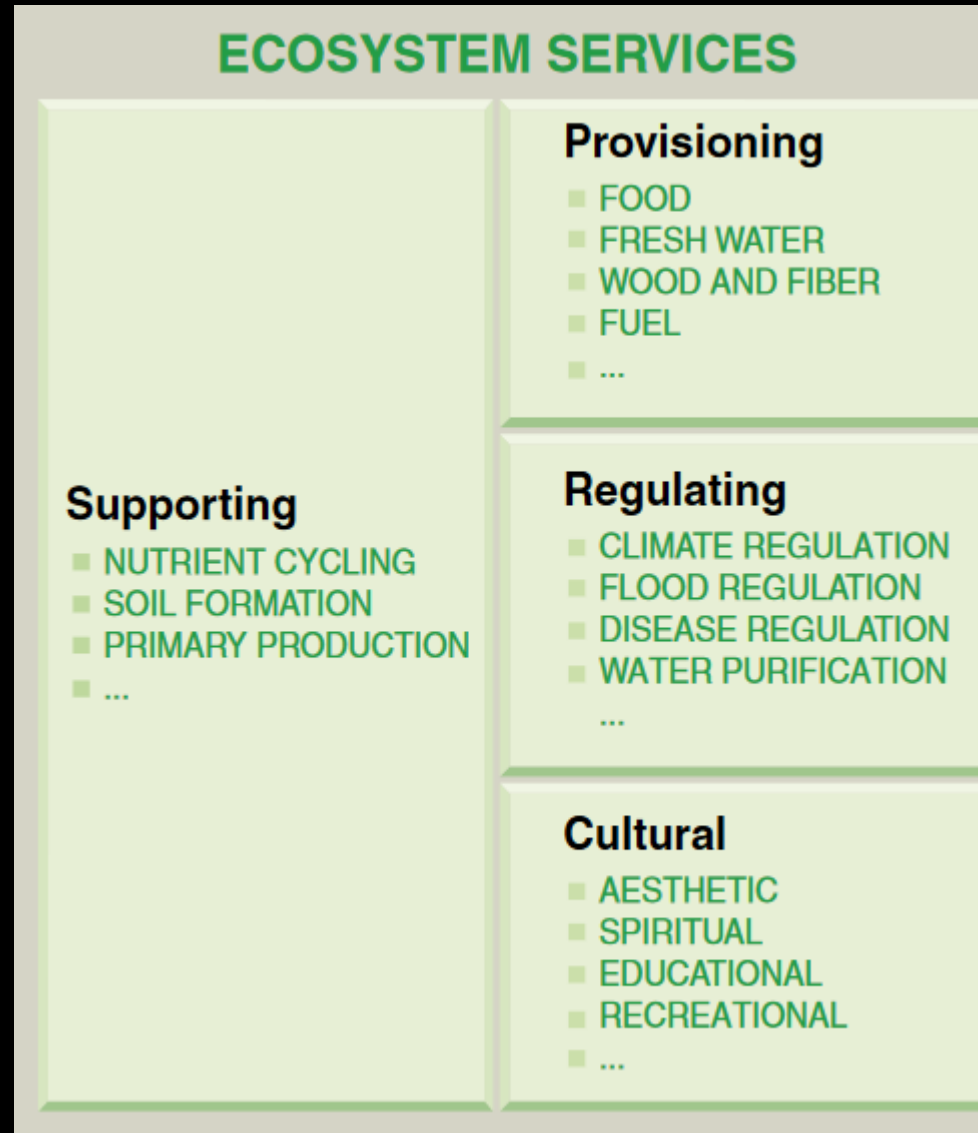
vs.



Total human edible protein
from a larger area
averaged over crop rotations/several years

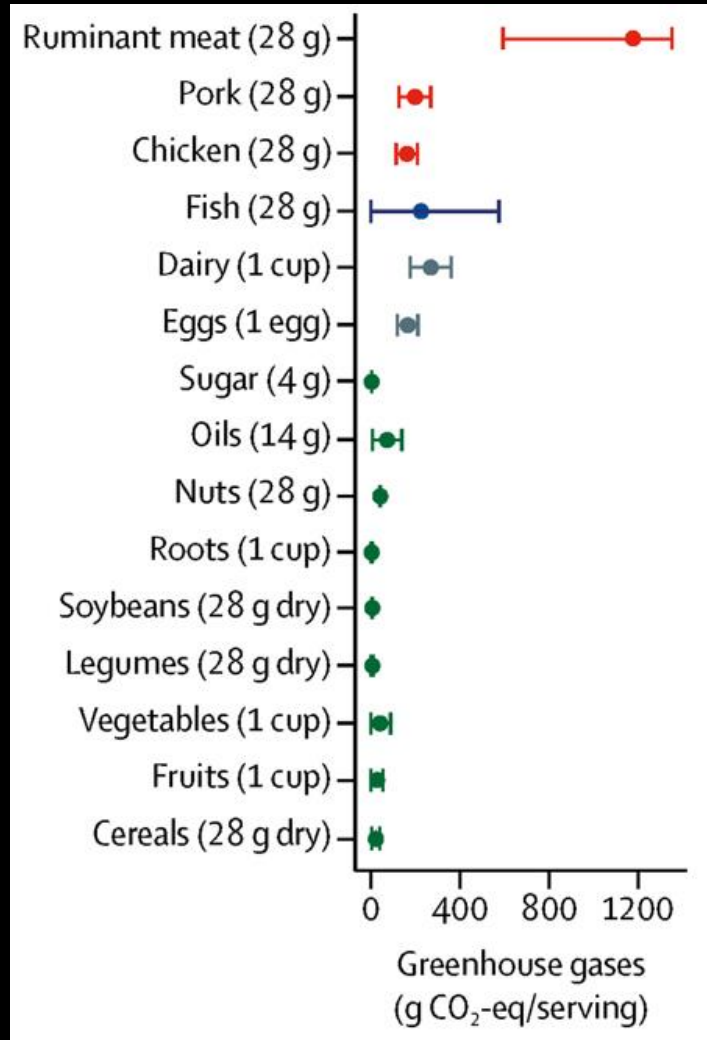
Performance

Various ecosystem services:
trade-offs and synergies

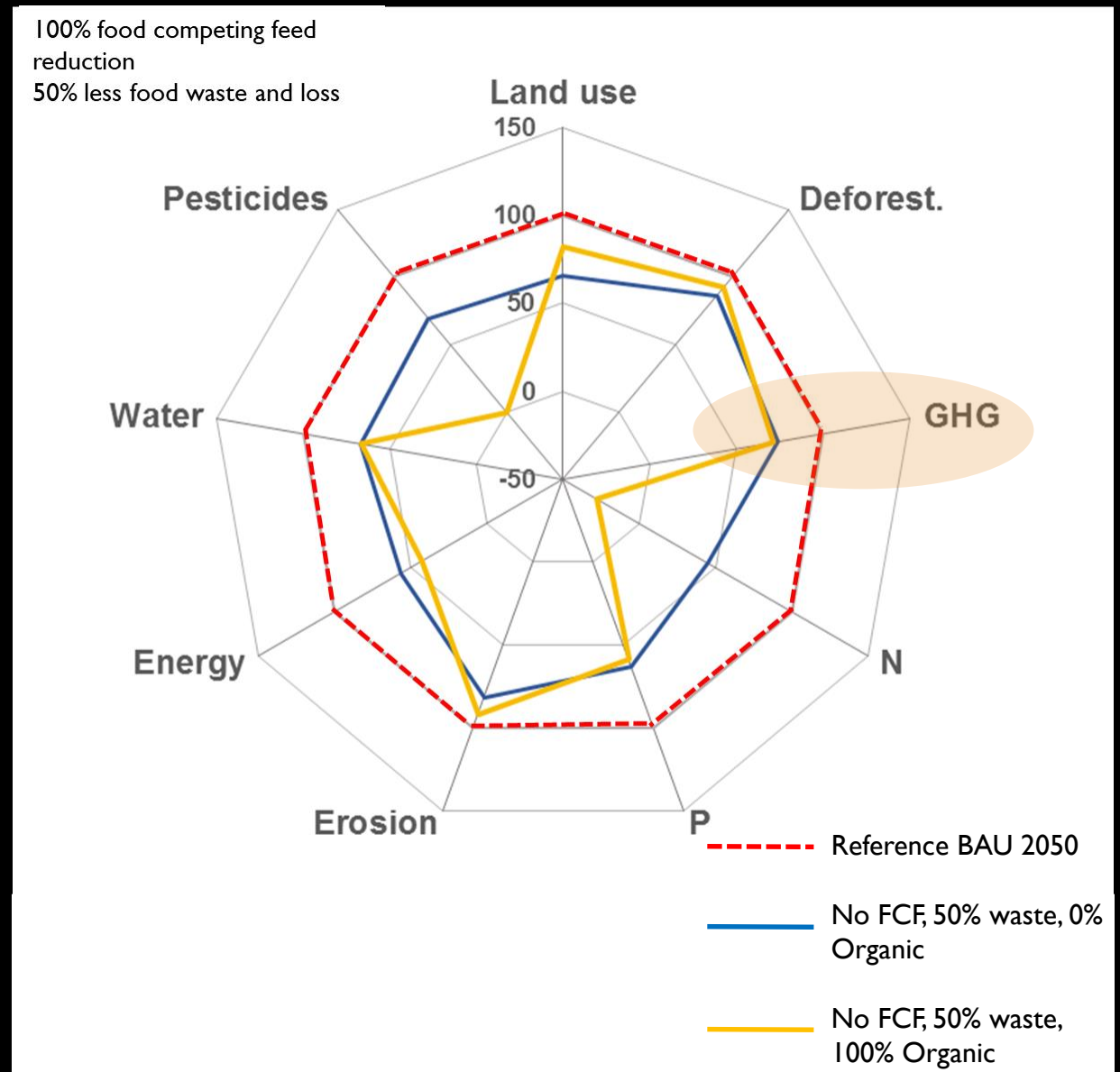


Performance

GHG emissions per kg



vs.



Total GHG emissions

Recap

- Scale
- Scope
- Functions
- Performance

Suggestions for sessions

- Scale
- Aspects of scope and providing different functions and services: trade-offs and synergies
- Metrics for circular food systems