

BASIL

Balancing Agroecosystem Services In Landscapes

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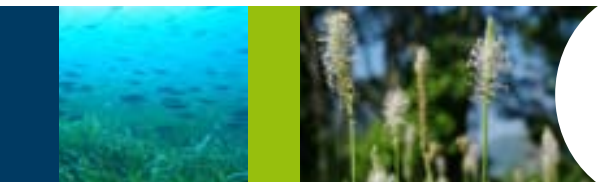
Müncheberg, Germany



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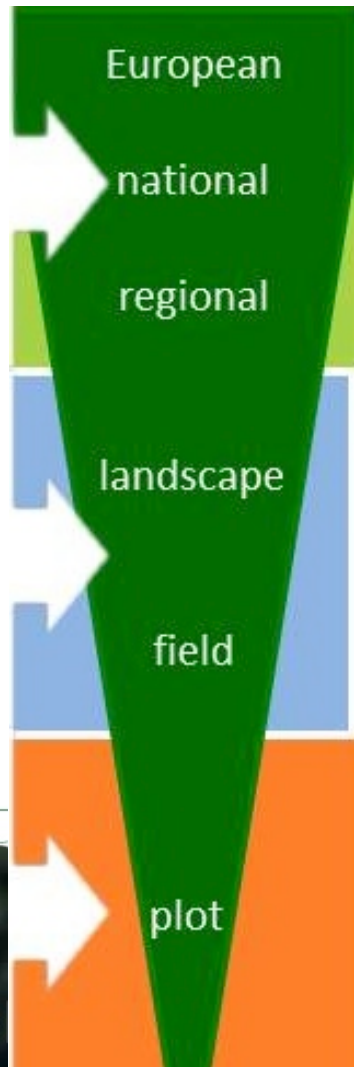
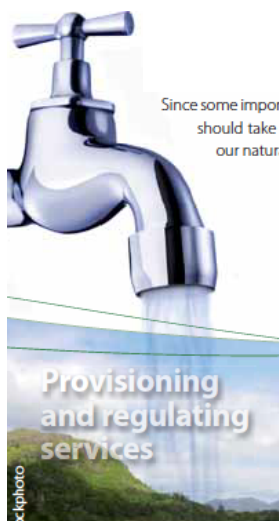
Zaragoza, Spain



Aim

Identify ecosystem services at different scales

Detect possibilities to **balance** maximal environmental and socio-economic sustainability in agricultural landscape





Ecosystem services in agricultural landscape

Supporting -
*services necessary
for production of all
other services*

- Nutrient cycling
- Soil Formation
- Primary Production

Provisioning – *products from ecosystem services*

- Goods like food, timber, fiber, fuel
- Genetic resources and habitats for organisms

Regulating – *benefits from regulation of ecosystem processes*

- Climate regulation
- Water regulation
- Regulation of biological populations including
 - detrimental organisms as pathogens and herbivores
 - beneficial organisms as pollinators and micro-symbionts

Cultural – *nonmaterial benefits from ecosystems*

- Cultural heritage, educational
- Recreation and Ecotourism
- Aesthetic, spiritual, religious

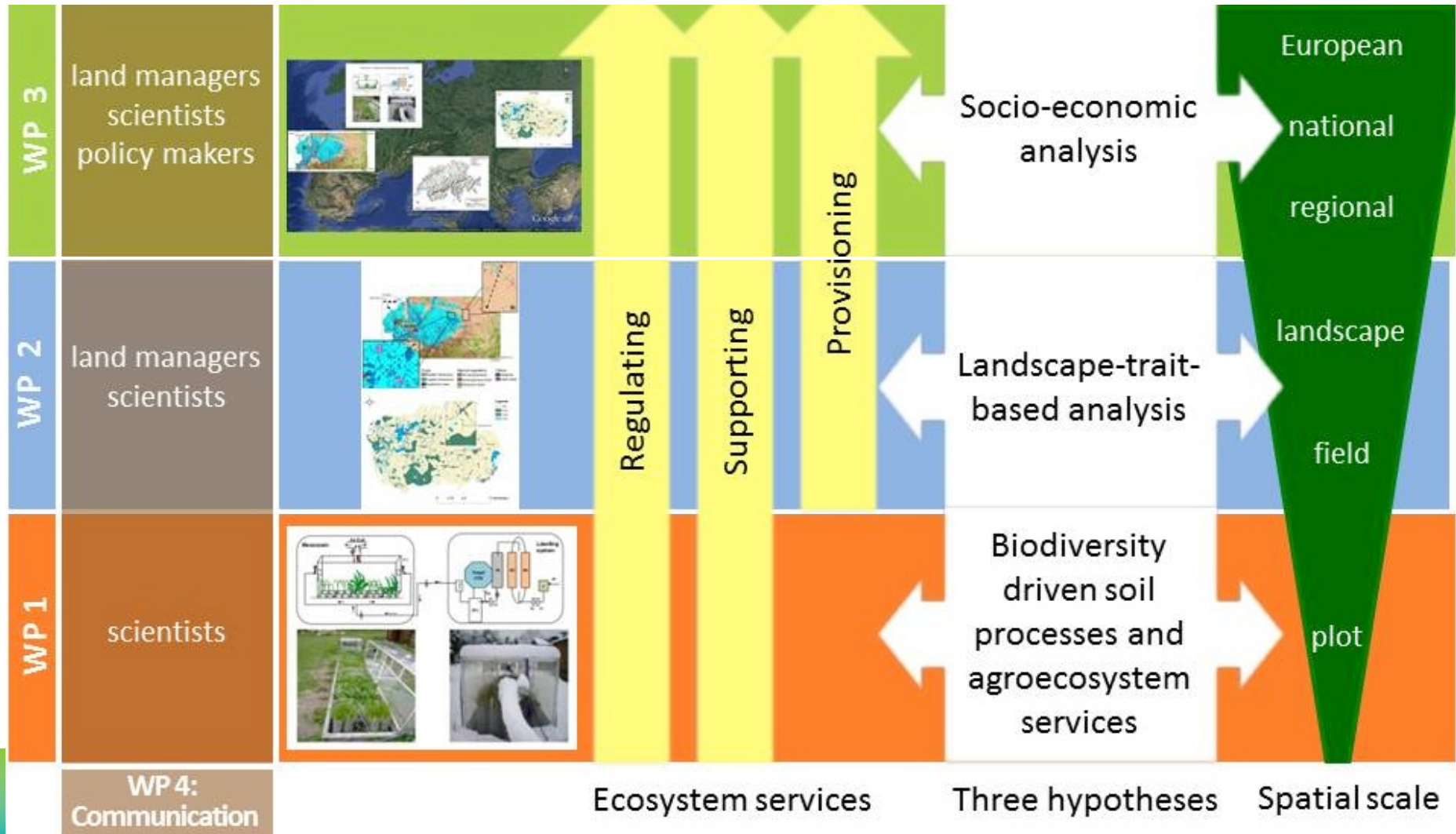
Millennium Ecosystem Assessment



biodiversa



FACCEJPI

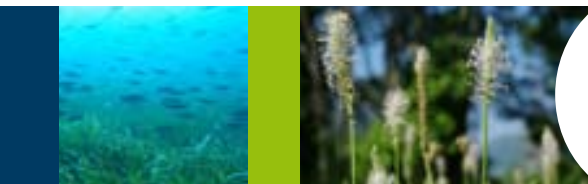




Land sharing vs. land sparing
Which mixture of intensive and extensive and natural habitats
at landscape scale
is ideal to provide ecosystem services?



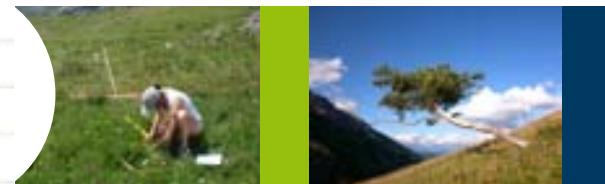
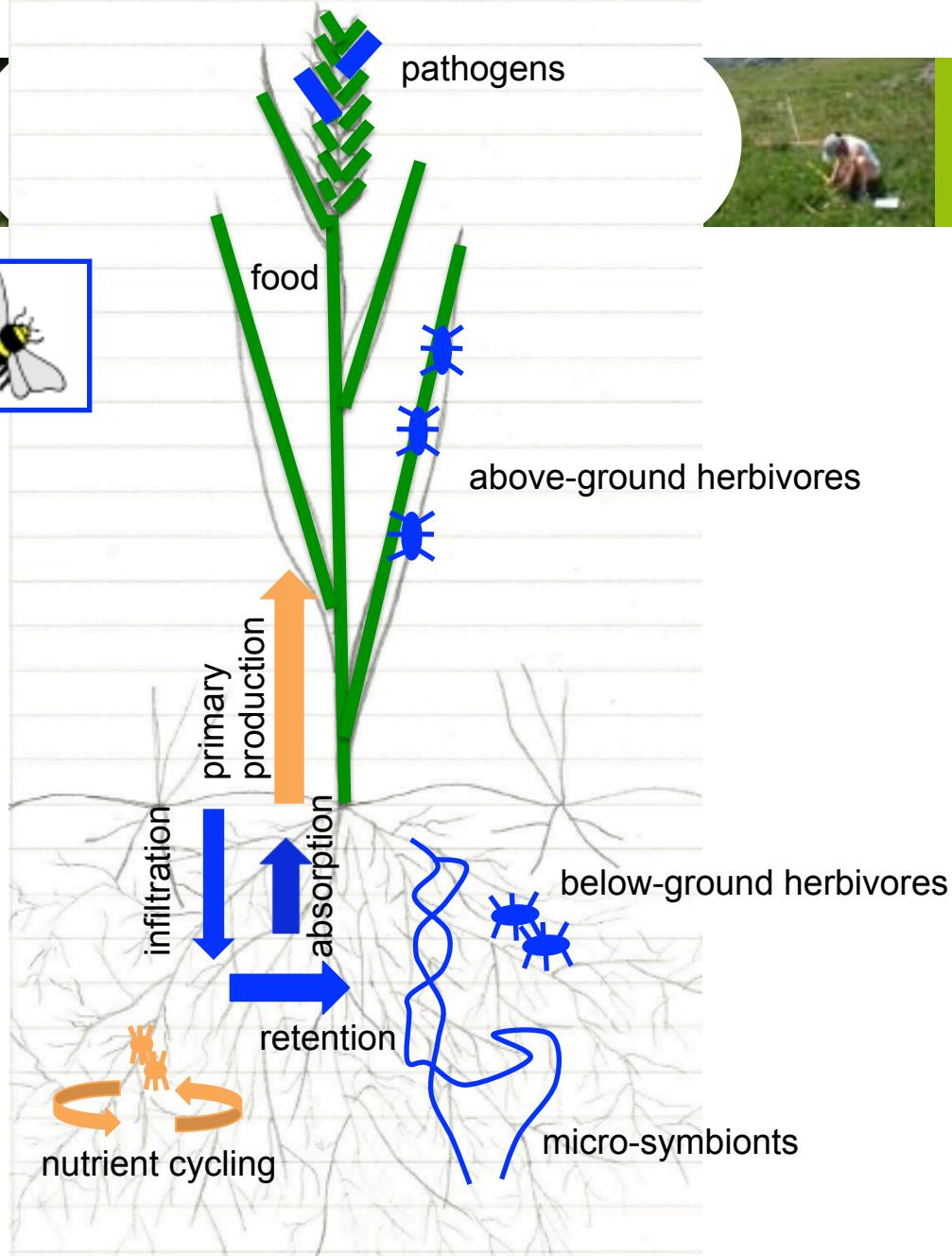
© Karin Pirhofer-Walzl



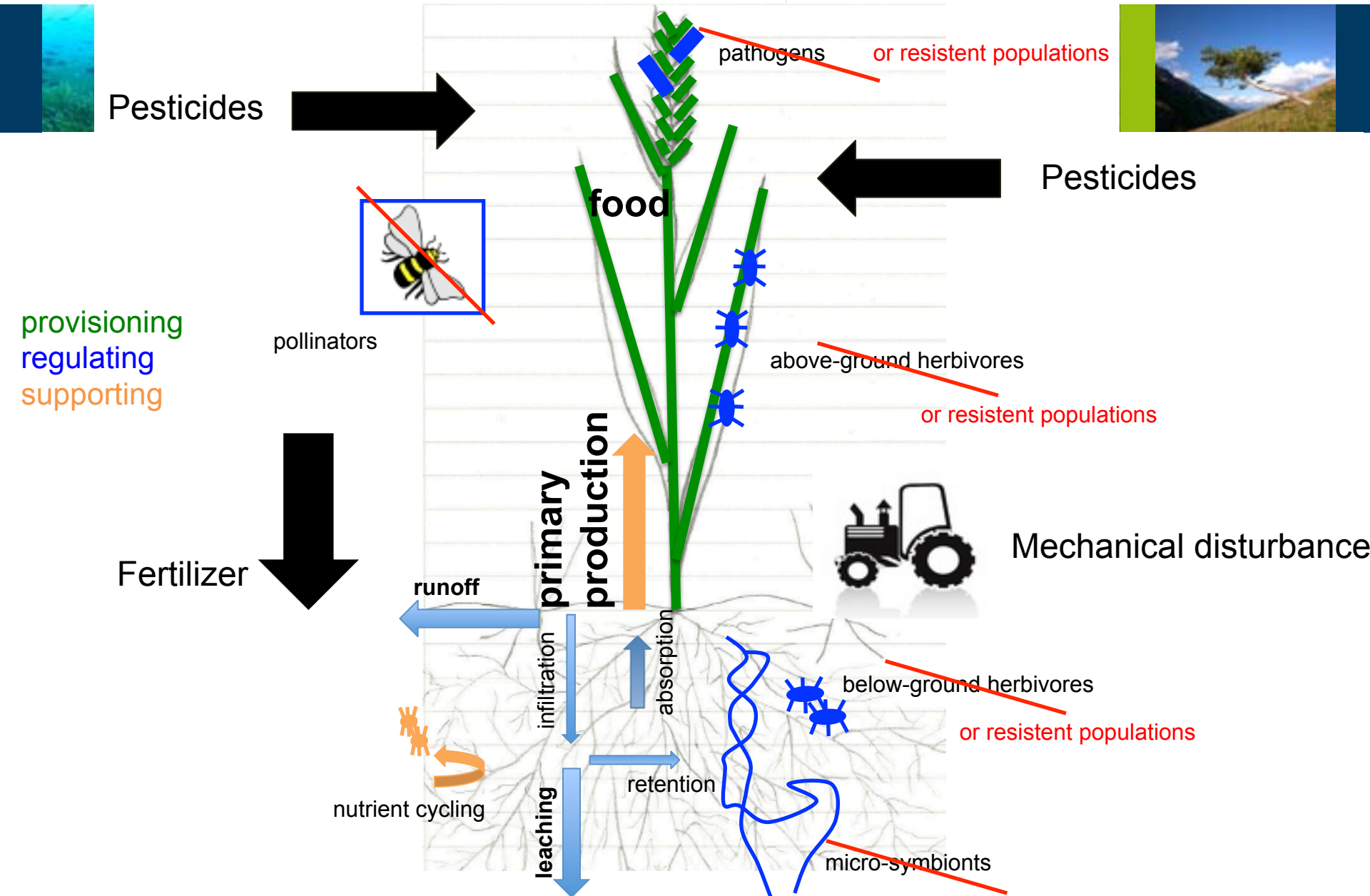
provisioning
regulating
supporting



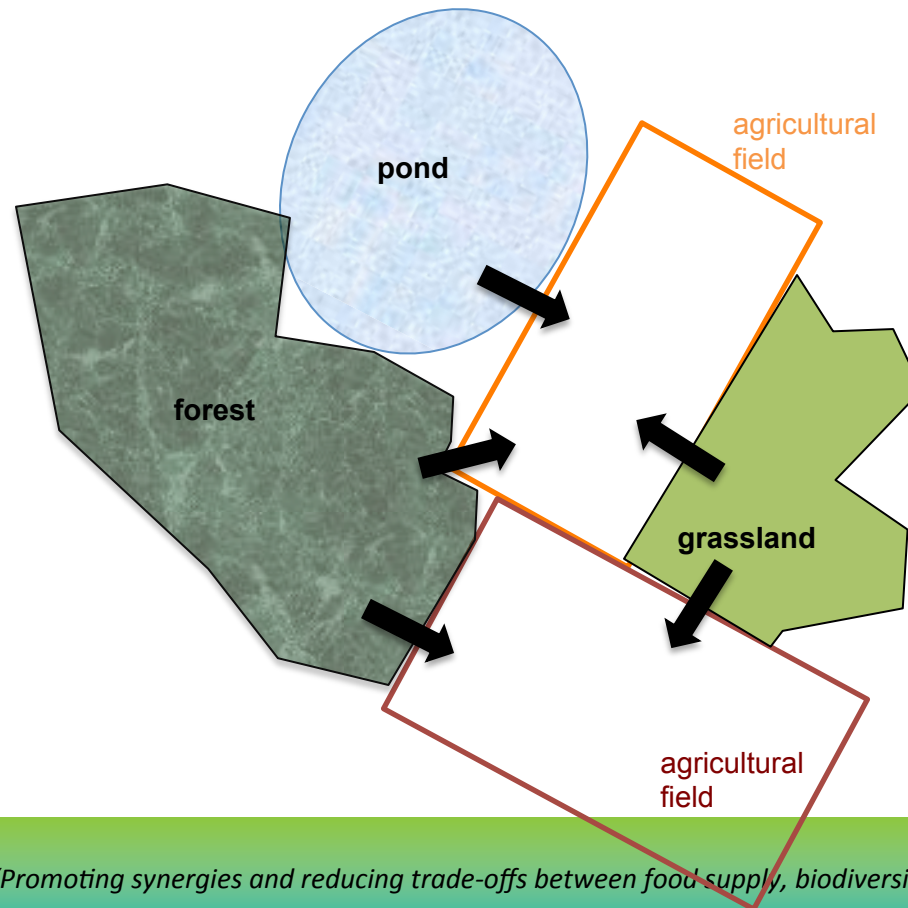
pollinators



BASIL: Balancing Agroecosystem Services In Landscapes



Idea Natural habitats within the agricultural landscape forming a heterogeneous agricultural landscape may buffer these losses and provide ecosystem services to agricultural fields





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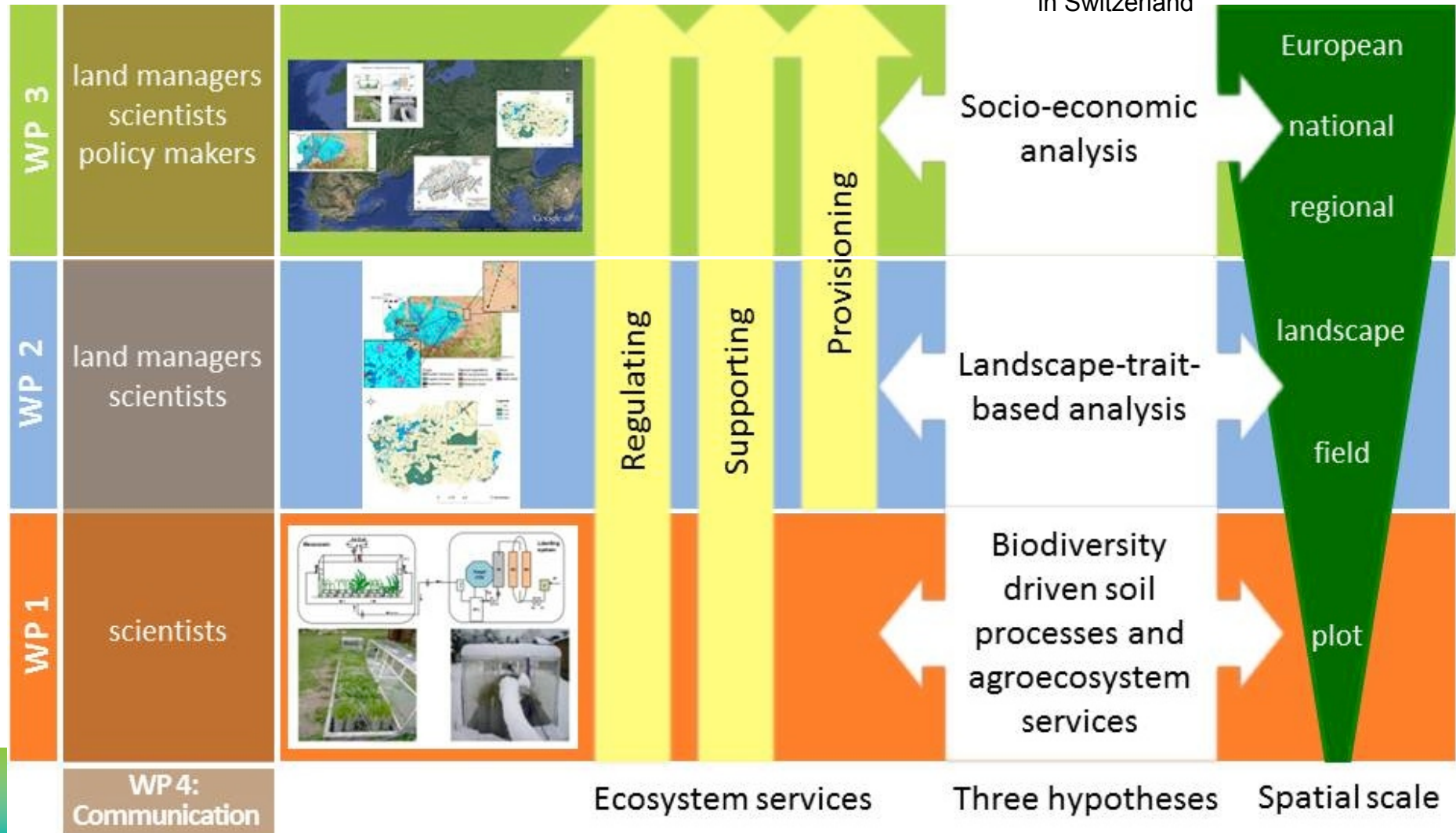
Hypotheses

- 1) extensively and intensively managed agricultural landscapes differ in their ecosystem services.
- 2) a landscape trait-based analysis can reliably integrate biodiversity in agricultural landscapes. These traits can help determine biodiversity levels to improve agricultural economic and environmental sustainability.
- 3) policies and governance systems have a significant impact on environmental and economic sustainability via agricultural landscape management.



Socio-economic aspects


regional to European scale




Socio-economic aspects

regional to European scale


German investigation area

	nitrogen fertilization: high	payment: 0 €
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Alternative: Heterogeneous intensive

	landscape diversity: high	plant & animal diversity: medium	nitrogen fertilization: high	payment: 25/50 € per year
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Alternative: Homogeneous extensive


	landscape diversity: low	plant & animal diversity: medium	nitrogen fertilization: low	payment: 50/75 € per year
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Alternative: Heterogeneous extensive


	landscape diversity: high	plant & animal diversity: high	nitrogen fertilization: low	payment: 50/75 € per year
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Spanish investigation area


Status quo: Homogeneous intensive

	landscape diversity: low	plant & animal diversity: low	nitrogen fertilization: high	payment: 0 €
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Alternative: Heterogeneous intensive

	landscape diversity: high	plant & animal diversity: medium	nitrogen fertilization: high	payment: 25/50 € per year
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Socio-economic aspects

regional to European scale

Status quo: Homogeneous intensive

	landscape diversity:	low
	plant & animal diversity:	low
	nitrogen fertilization:	high
	payment:	0 €

Alternative: Heterogeneous intensive

	landscape diversity:	high
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Alternative: Heterogeneous extensive

	landscape diversity:	high
	plant & animal diversity:	high
	nitrogen fertilization:	low
	payment:	50/75 € per year

Imagine that a non-governmental initiative wants to improve the local diversity of agricultural land use.

Therefore, a voluntary fund is to be raised.


You as a local resident are invited to contribute to this fund. The annual payment will be used as an incentive for local farmers to change their land use from status quo (homogeneous intensive) to a more diverse production system.



Socio-economic aspects


regional to European scale

Status quo: Homogeneous intensive

	landscape diversity:	low
	plant & animal diversity:	low
	nitrogen fertilization:	high
	payment:	0 €


homogeneous/ heterogeneous distribution of habitats within the agricultural landscape

Alternative: Heterogeneous intensive

	landscape diversity:	high
	plant & animal diversity:	medium
	nitrogen fertilization:	high
	payment:	25/50 € per year


species diversity in the agricultural field

Alternative: Homogeneous extensive

	landscape diversity:	low
	plant & animal diversity:	medium
	nitrogen fertilization:	low
	payment:	50/75 € per year

fertilization treatments by the farmer - agricultural management
→ influencing species diversity and with this ecosystem services

Alternative: Heterogeneous extensive

	landscape diversity:	high
	plant & animal diversity:	high
	nitrogen fertilization:	low
	payment:	50/75 € per year

the amount of money that YOU would pay annually to change the land use from status quo in the chosen alternative



Landscape trait-based analysis

field and landscape scale

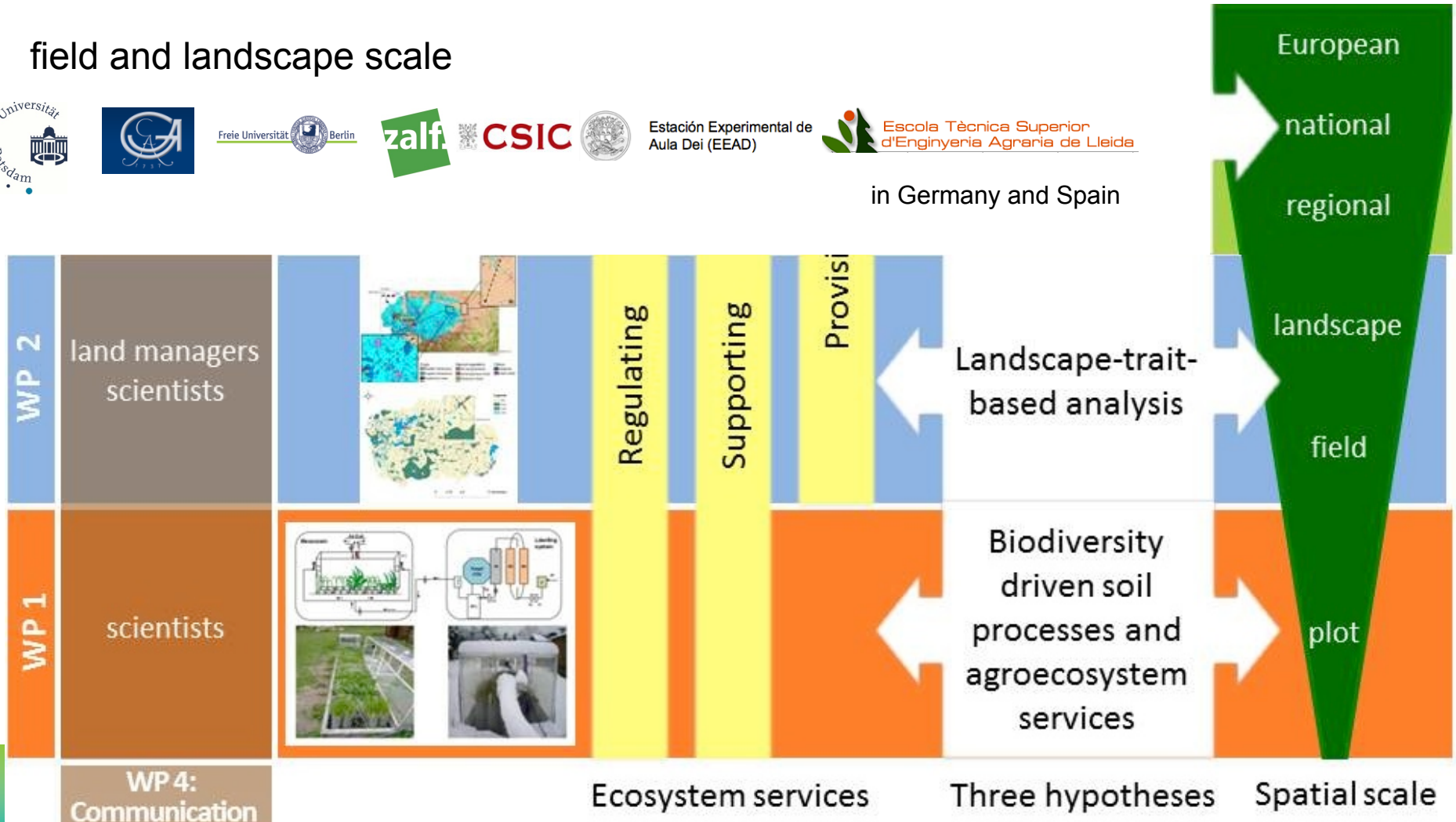


Estación Experimental de Aula Dei (EEAD)



Escola Tècnica Superior d'Enginyeria Agrària de Lleida

in Germany and Spain



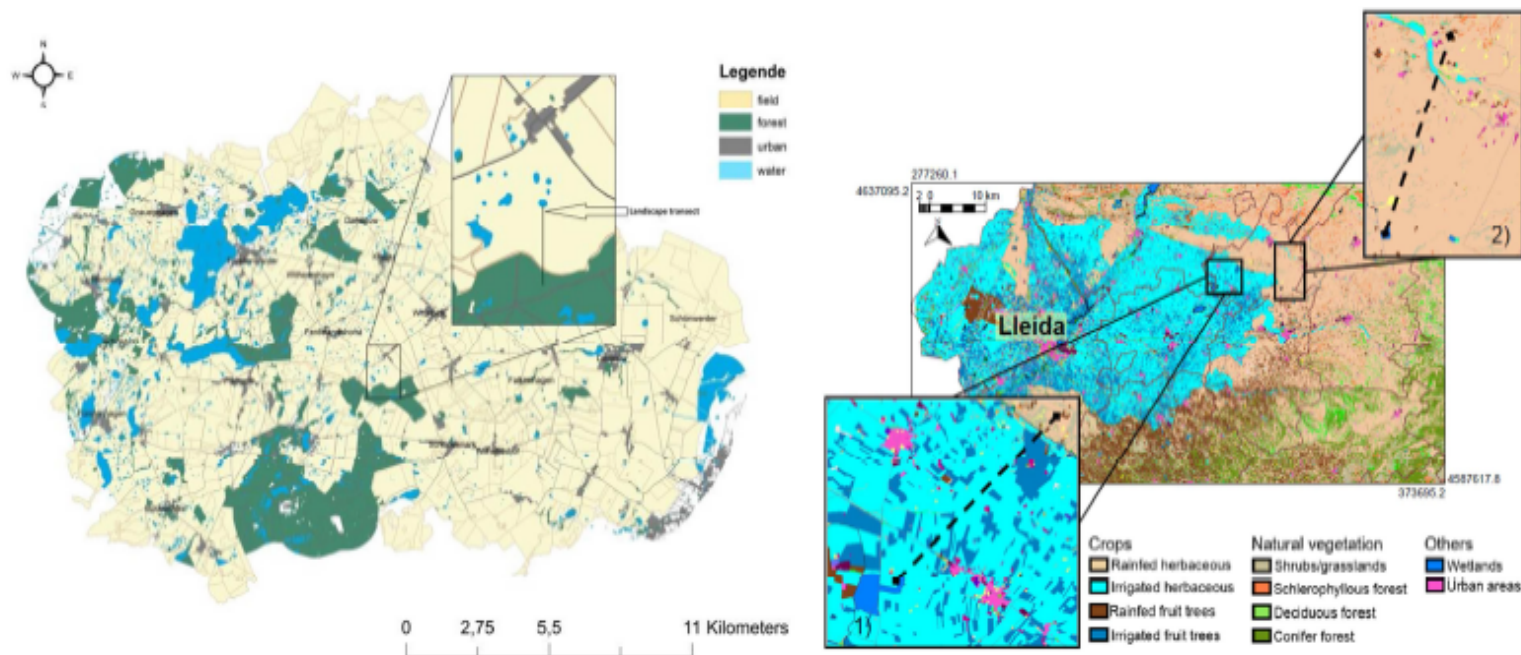
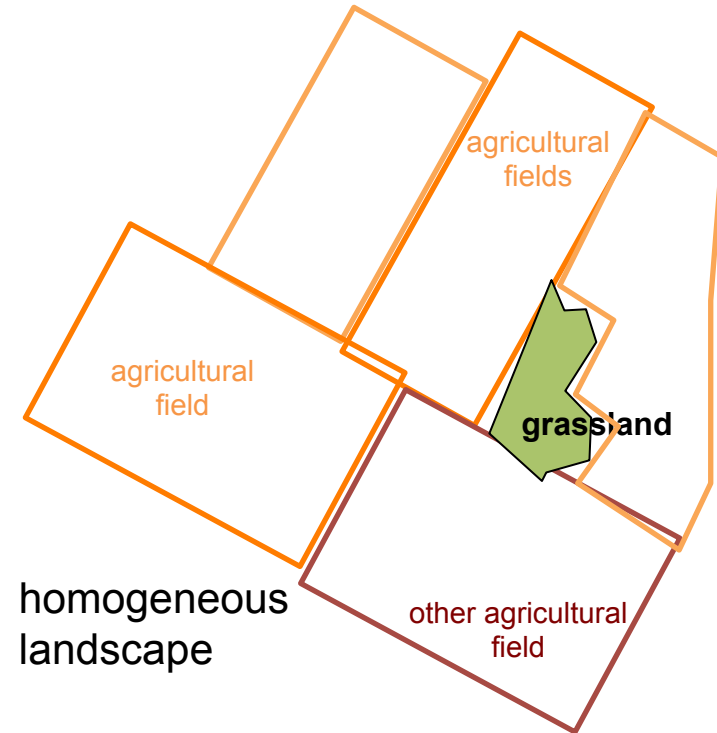
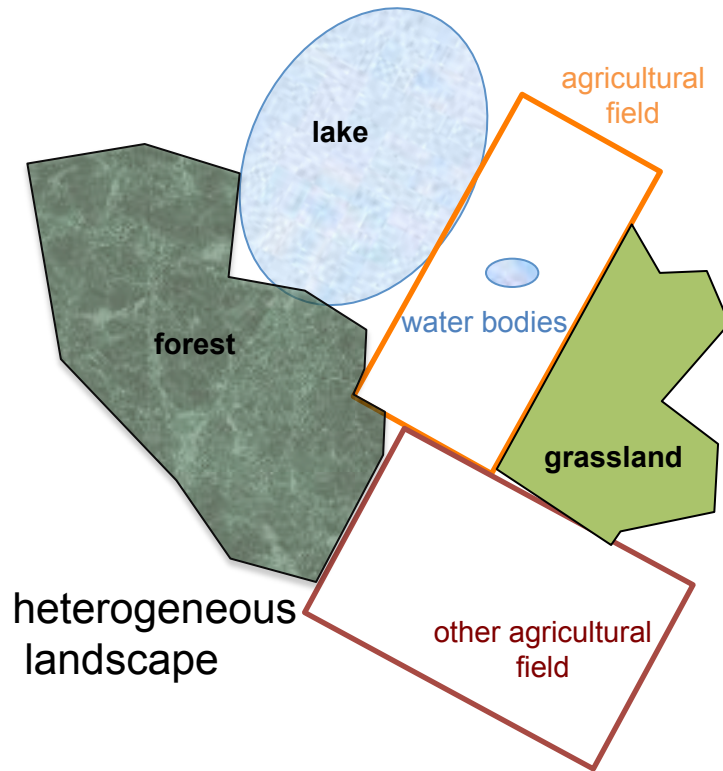


Fig.2. Study area in the Quillow catchment, NE Germany (left figure) and in the Central Ebro Basin, NE Spain (right figure) including examples of sampling landscape transects in an agricultural landscape containing different landscape types, such as forest.

Landscape trait-based analysis

field and landscape scale





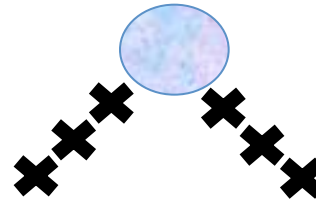
Landscape trait-based analysis

field and landscape scale

FOREST



water bodies



agricultural field

GRASSLAND

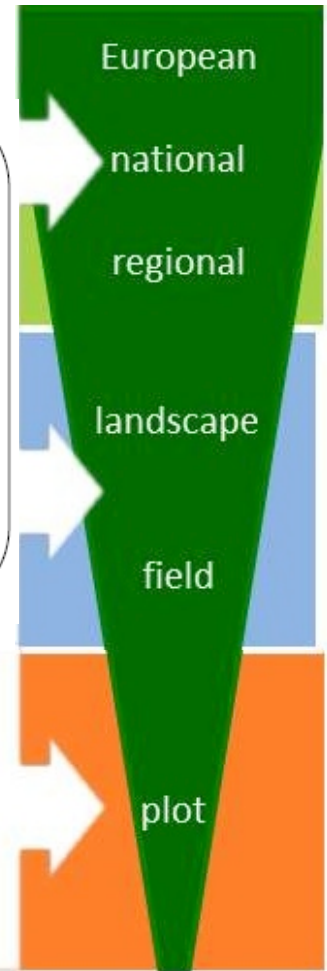
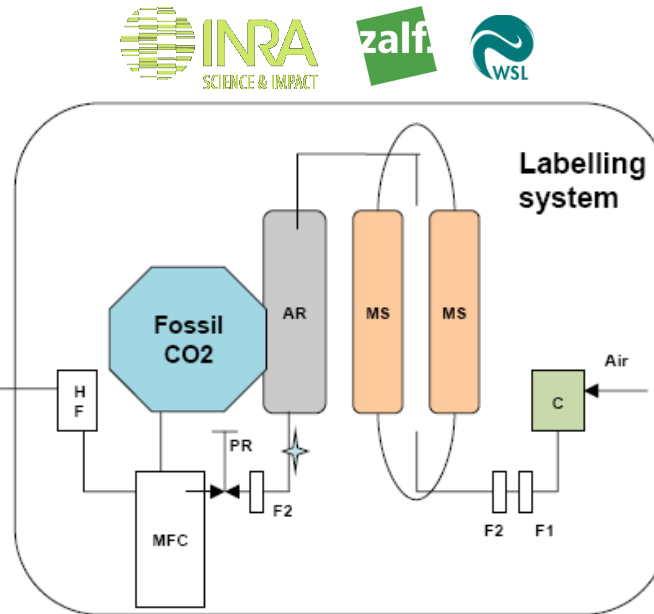
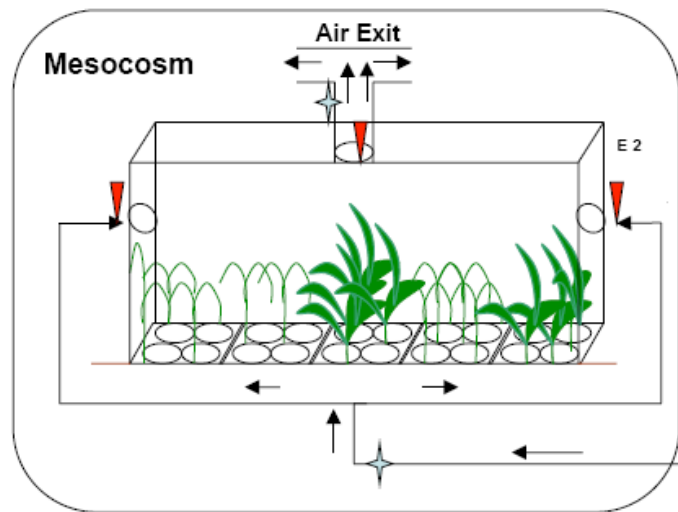
agricultural field under investigation

other
agricultural field



Mechanistic approach

plot scale with mesocosm-experiments



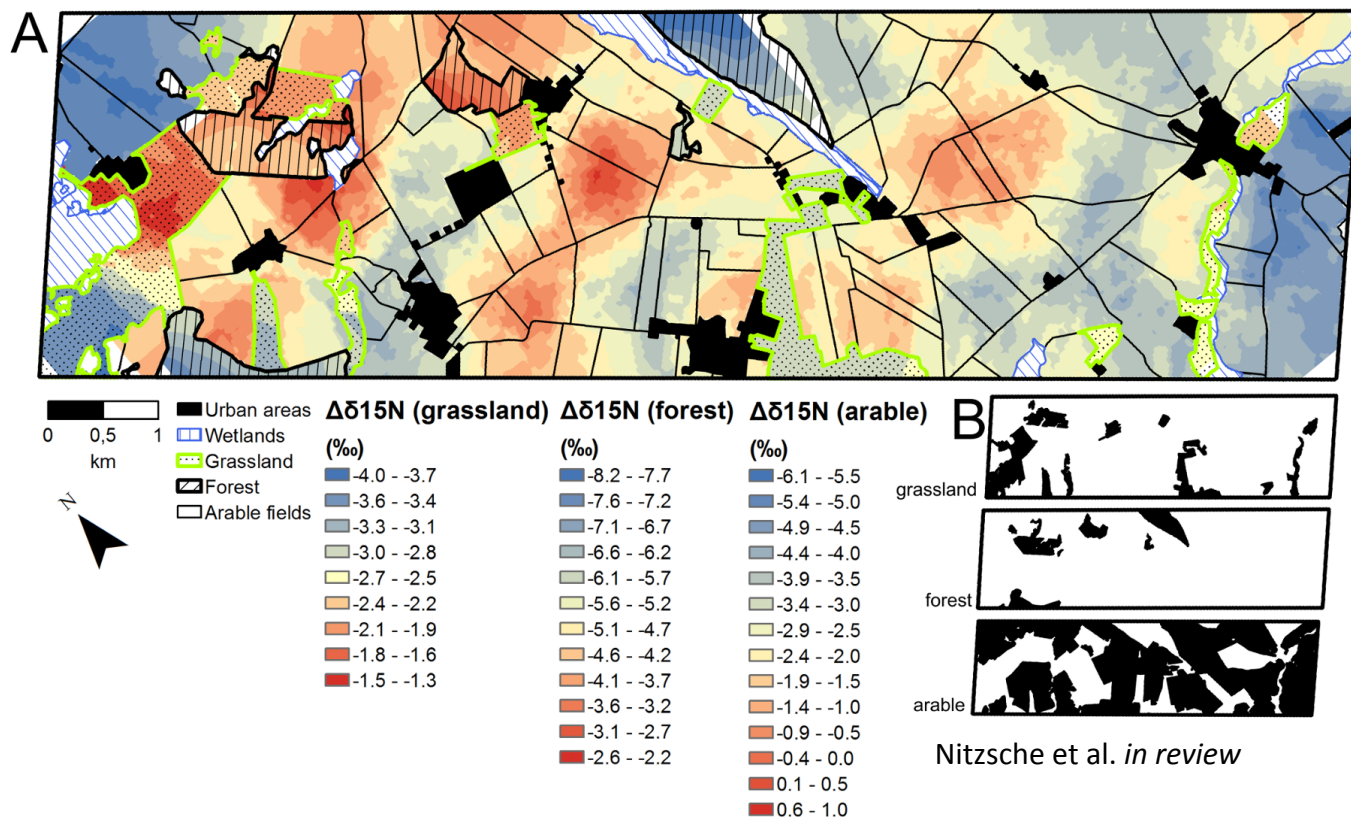
Biodiversity
driven soil
processes and
agroecosystem
services

Ecosystem services

Three hypotheses

Spatial scale

Isotopic Map of Multi-Use Agricultural Landscape



Illustrates that biogeochemical patterns are not constrained to field borders

Can we relate these patterns to functional patterns of organism and structural diversity?



Thank you very much for your interest!

