Spatio-temporal characteristics of ecosystem services and governance in rural landscapes

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cp³ funding scheme:

cp³ national funders:

Civil-Public-Private-Partnerships project (cp^3)

- **Recent trends:**
  - from government to governance
  - cooperation of multiple actors in governance of agricultural areas
- **Hypothesis:** collaborative governance approaches better suited to reach specific ecosystem services, food production and biodiversity targets in rural landscapes

Case study areas

Biosphere reserve Spreewald

- 475 km²
- UNESCO status since 1991
- >200 small navigable channels
- Focus on protection

Nature park Jauerling-Wachau

- 11,500 ha
- National park since 1984
- Protection, recreation, education and regional development in equal ways

Municipality Berg en Dal

- 93 km²
- Part of National Landscape Gelderse Poort since 2004
- Varied cultural landscape

Case study areas: basic facts

	Spreewald, DE	Berg en Dal, NL	Jauerling-Wachau, AT
Area:	475 km²	93 km²	115 km²
Inhabitants:	50 000	34 000	8 488
Population density:	105/km²	396/km²	74/km²
Administrative units:	3 counties, 17 municipalities	1 municipality	7 municipalities
Protection areas:	475 km² (100%)	13 km² (14%)	115 km² (100%)
Land use:	27% Forest 24% Arable land 38% Grassland 3% Water areas 8% Other (Vegetables)	20% Forest 18% Arable land 35% Grassland 8% Water areas 19% Other (Vineyards)	(→ Differences between municipalities) 7-18% Arable land 3-28% Grassland 0,3-6,3% Christmas trees

Aim of this research

- Understand if collaborative governance approaches provide **a better fit** than top-down or market-based governance approaches for ecosystem service provision
- Special focus: Compare the **spatial** relationships of ecosystem services with spatial characteristics current governance models

Methods

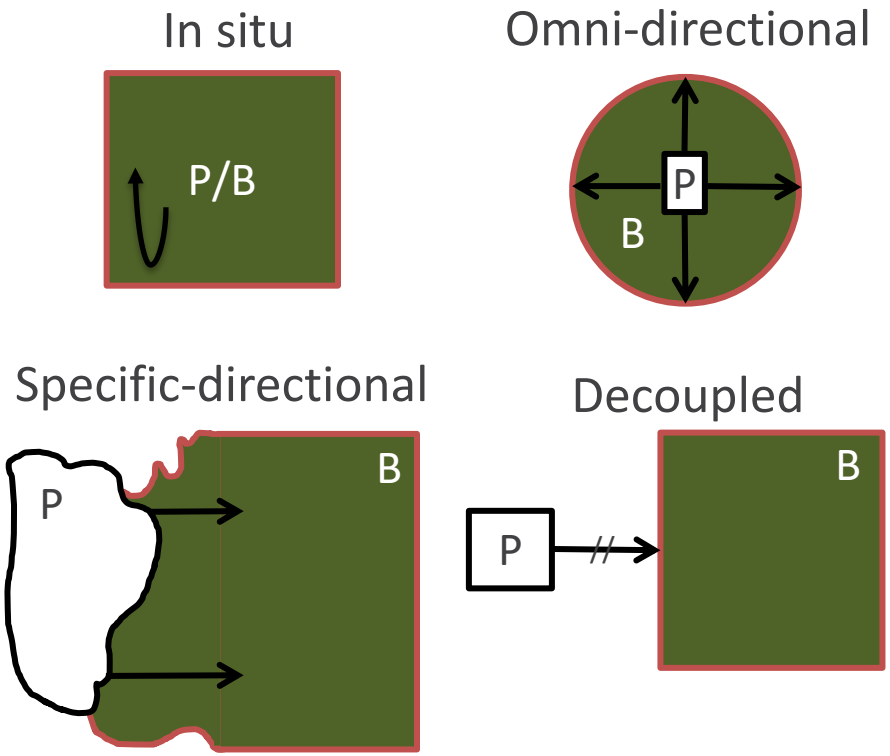
Classification of governance approaches:

- **Type** of governance approach:
  - Top-down approaches
  - Incentive or market-based approaches
  - Collaborative approaches
- **Spatial scale** to which approach mainly refers:
  - national, sub-national (province/county), local (municipality or below)
- Main **ecosystem service** of concern

Methods

- Mapping of ecosystem services based on look-up tables, processes-based models, etc.
- Spatio-temporal relationships of ecosystem services defined by literature research and expert knowledge

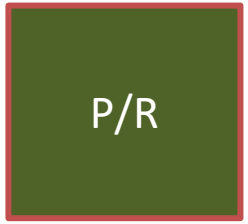
Spatial relationships between service production (P) and benefit areas (B)



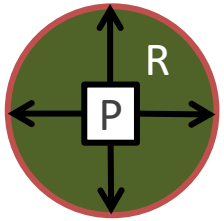
Adapted from: Fisher et al. (200

Temporal relationships between provision (P) and receipt of service (R)

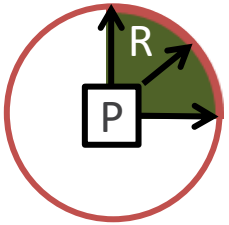
Short time



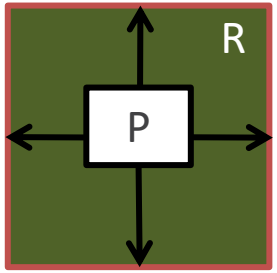
Short time, no seasonality



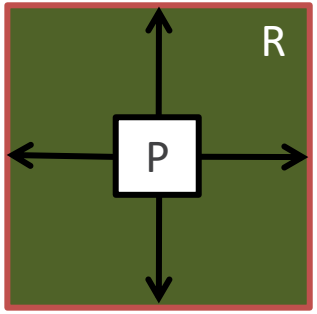
Short time, seasonality



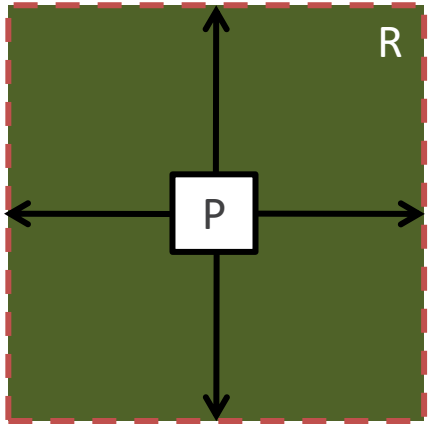
Mid-short time



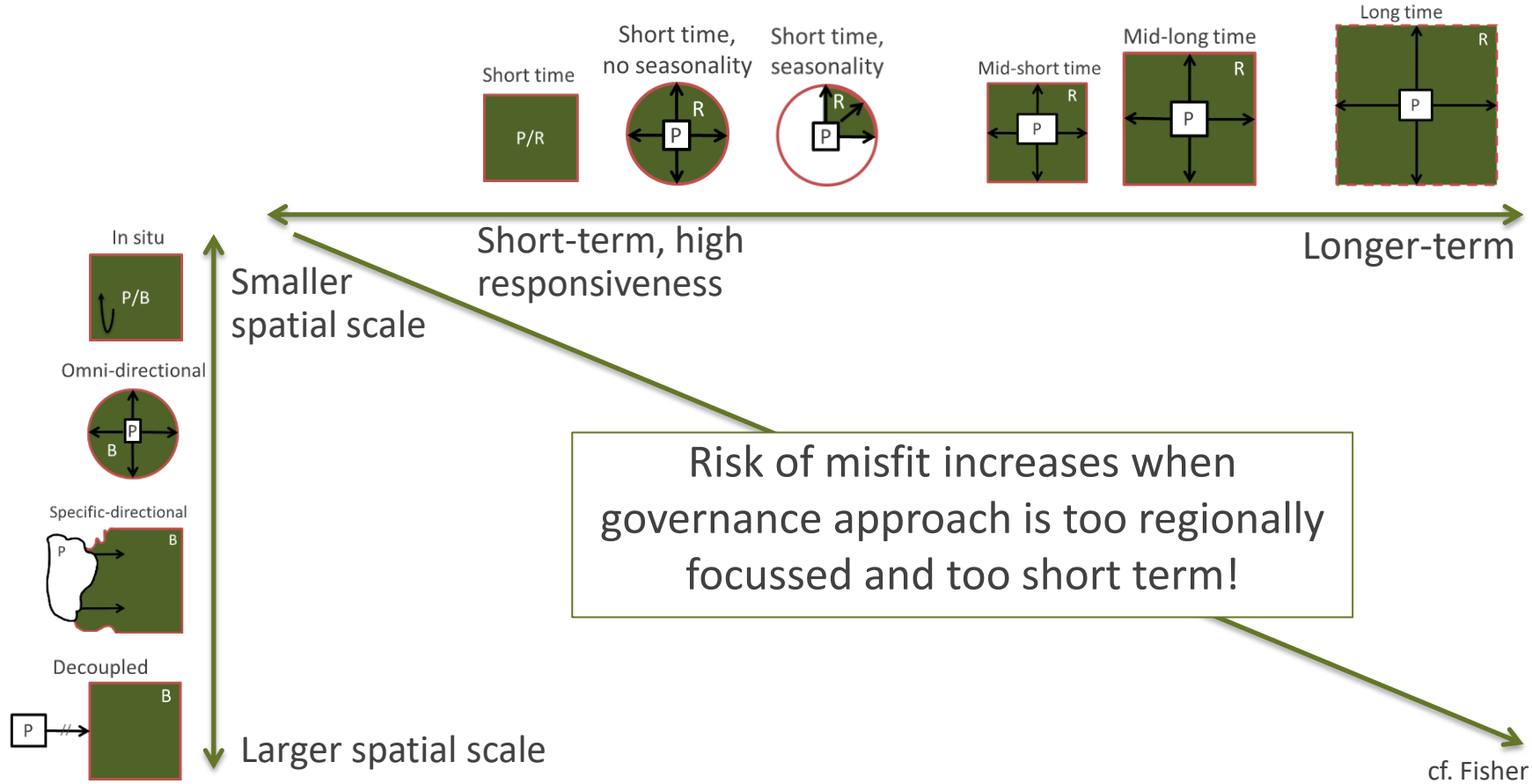
Mid-long time



Long time



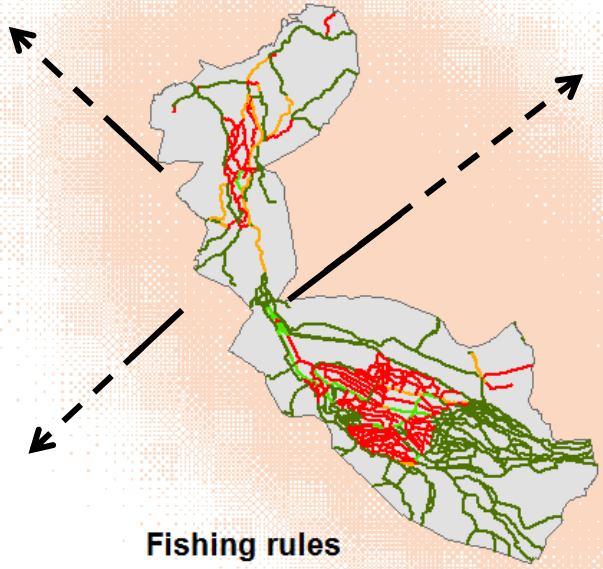
Different governance requirements and risk of misfit



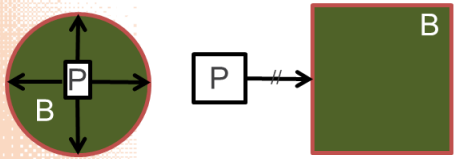
cf. Fisher et al. (2009)

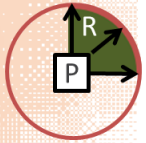
Example ecosystem services

Spreewald (mostly) plus Berlin and Brandenburg region, processed fish marketed nationally

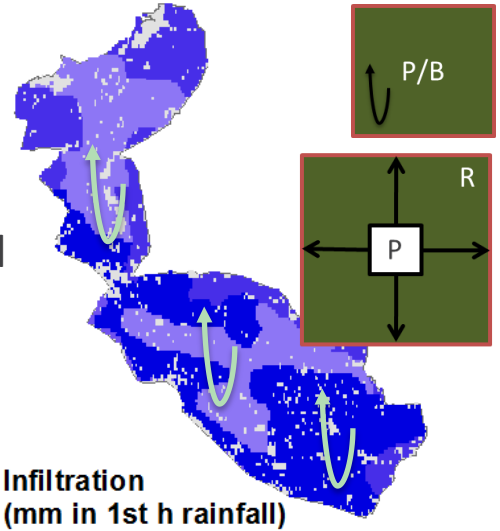


Local omni-directional and decoupled



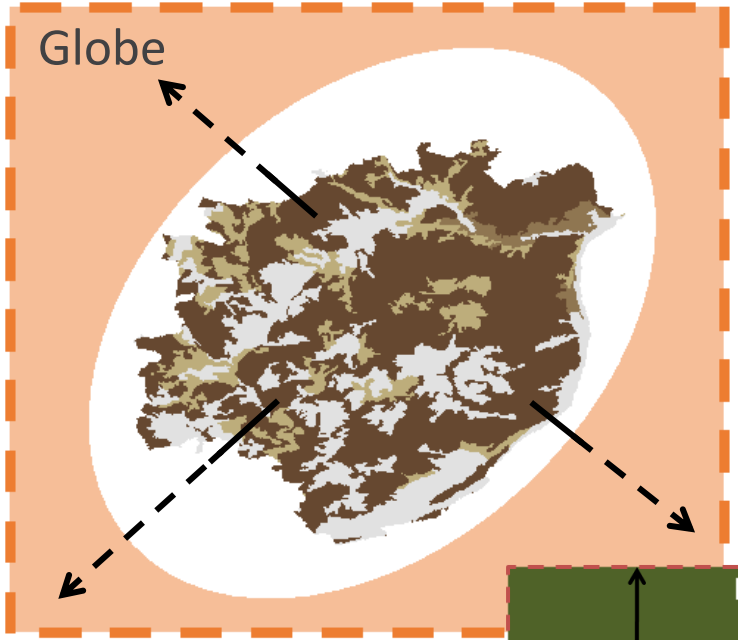


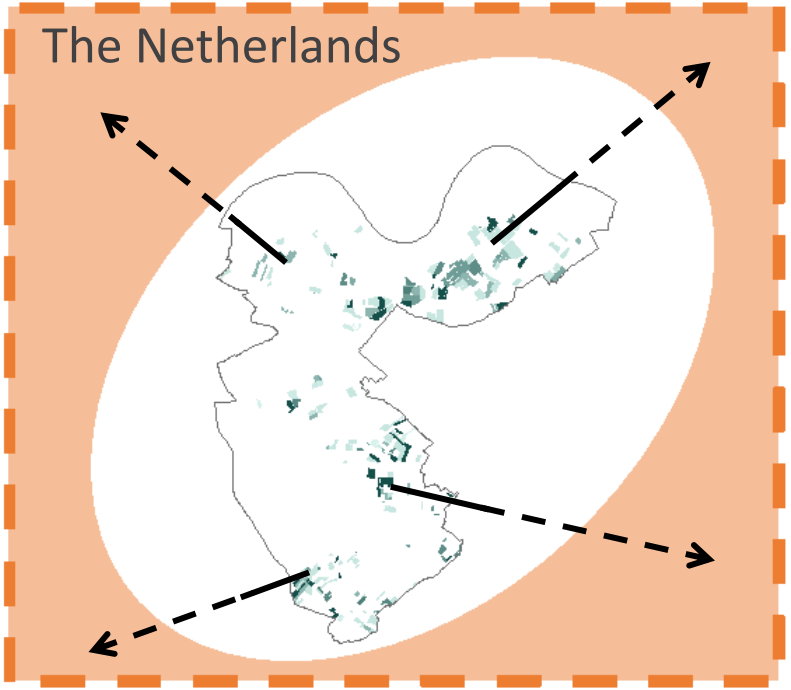
Short time with some seasonality



Based on data from the state of Brandenburg, State Office of Environment

Example ecosystem services

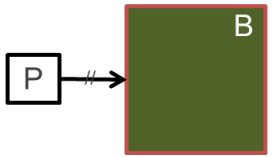


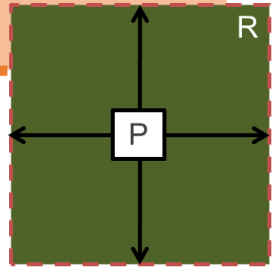


Carbon sequestration (t/ha)

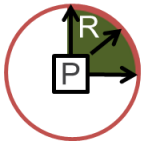
- 0
- 0 - 0.25
- 0.25 - 0.50
- > 0.5

Decoupled





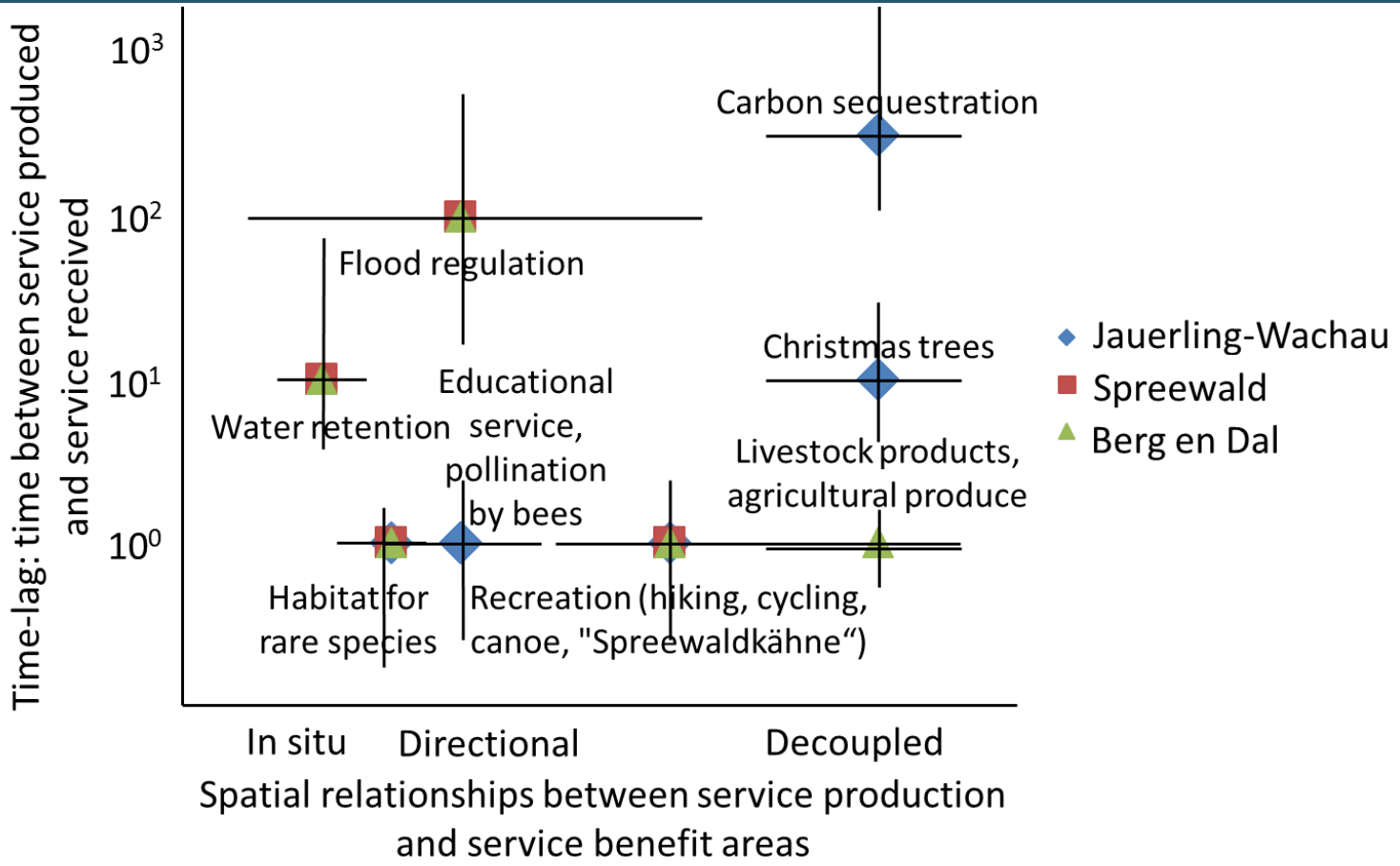
Long time



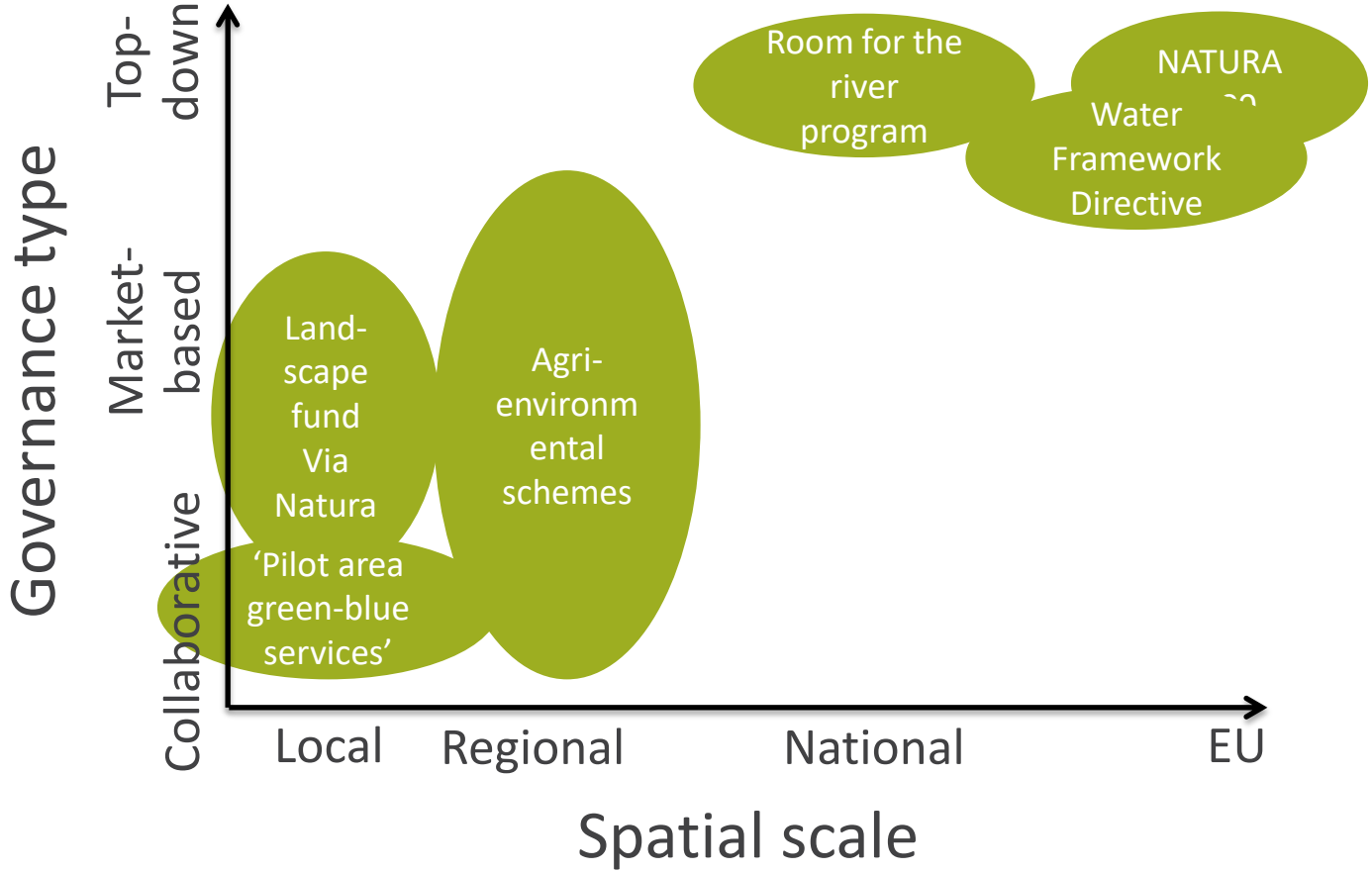
Short time, with seasonality

Crop production (t/ha) potatoes and cereals

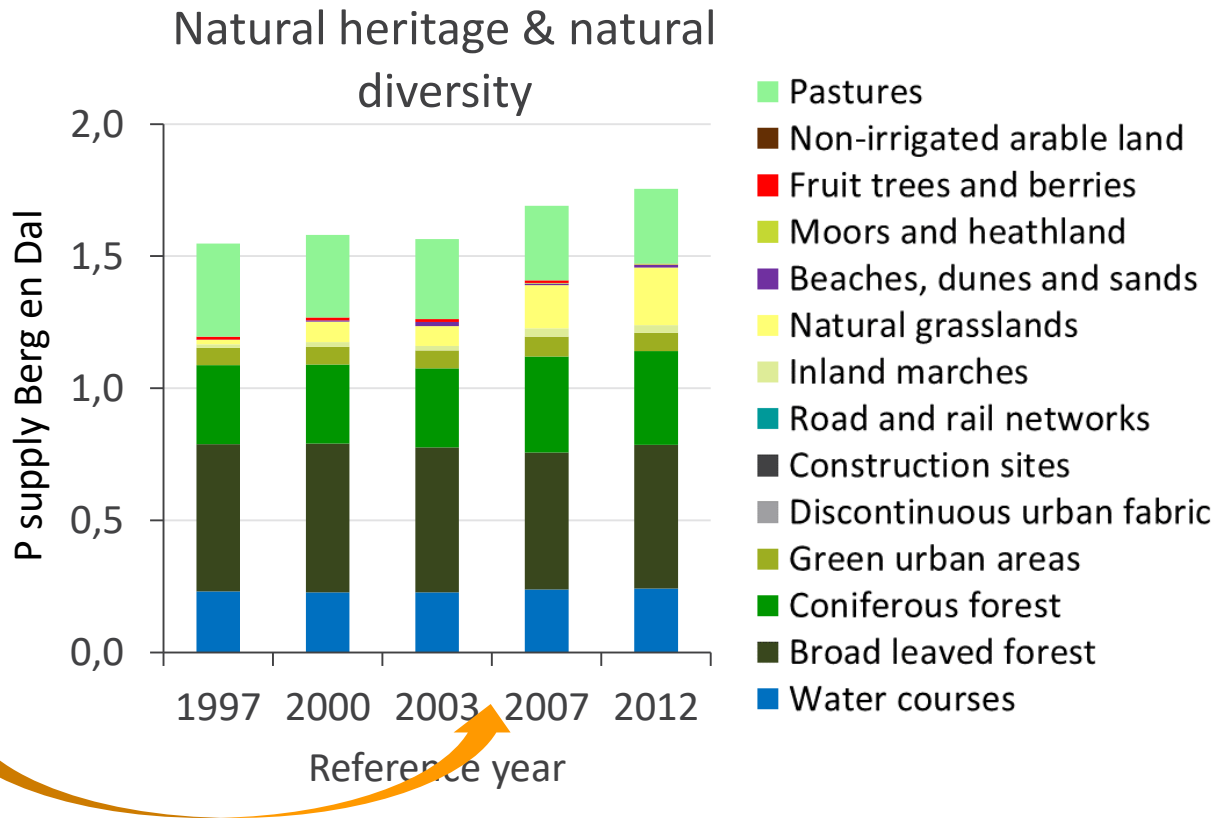
Spatial and temporal relationships ecosystem services



Classification of governance approaches

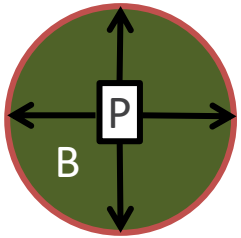


Temporal dynamics of ecosystem service provision



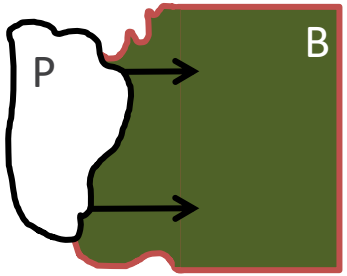
Start of Pilot Green Blue services

Spatial match and mismatch: Habitat for rare species



- Ecosystem service spatial relationship: in-situ to directional ecosystem service
- Mismatch: market-based governance approach with regional focus not considering spatial patterns, e.g. AES
- Match: collaborative governance approach with local focus, e.g. ‘Pilot Green blue services’, spatially matches the landscape structures

Spatial match and mismatch: flood management



- Ecosystem service spatial relationship: specific directional
- Mismatch: hierarchical approach with solemn focus on one administrative unit not taking into account effects on adjacent units, e.g. water management authority of one county
- Match: cross-county collaboration with participation of all concerned stakeholders/ land users, e.g. water management boards with advisory function for the authority

Lessons learned and remaining questions

- Spatial match results in increase in ecosystem service provision
- Governing at landscape scale especially important for directional ecosystem services, because of spatial interdependencies
- How to characterize the temporal scale of governance models?
  - Time-lag ecosystem service provision important?
  - Or time required to produce ecosystem service? Or both?

Thank you!

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