Models for regional scale farming systems evaluation of climate change mitigation and environmental impact assessment

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MACSUR Conference 2015: Integrated Climate Risk Assessment in Agriculture & Food. University of Reading, UK. Wednesday 8th – Thursday 9th April 2015

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Program

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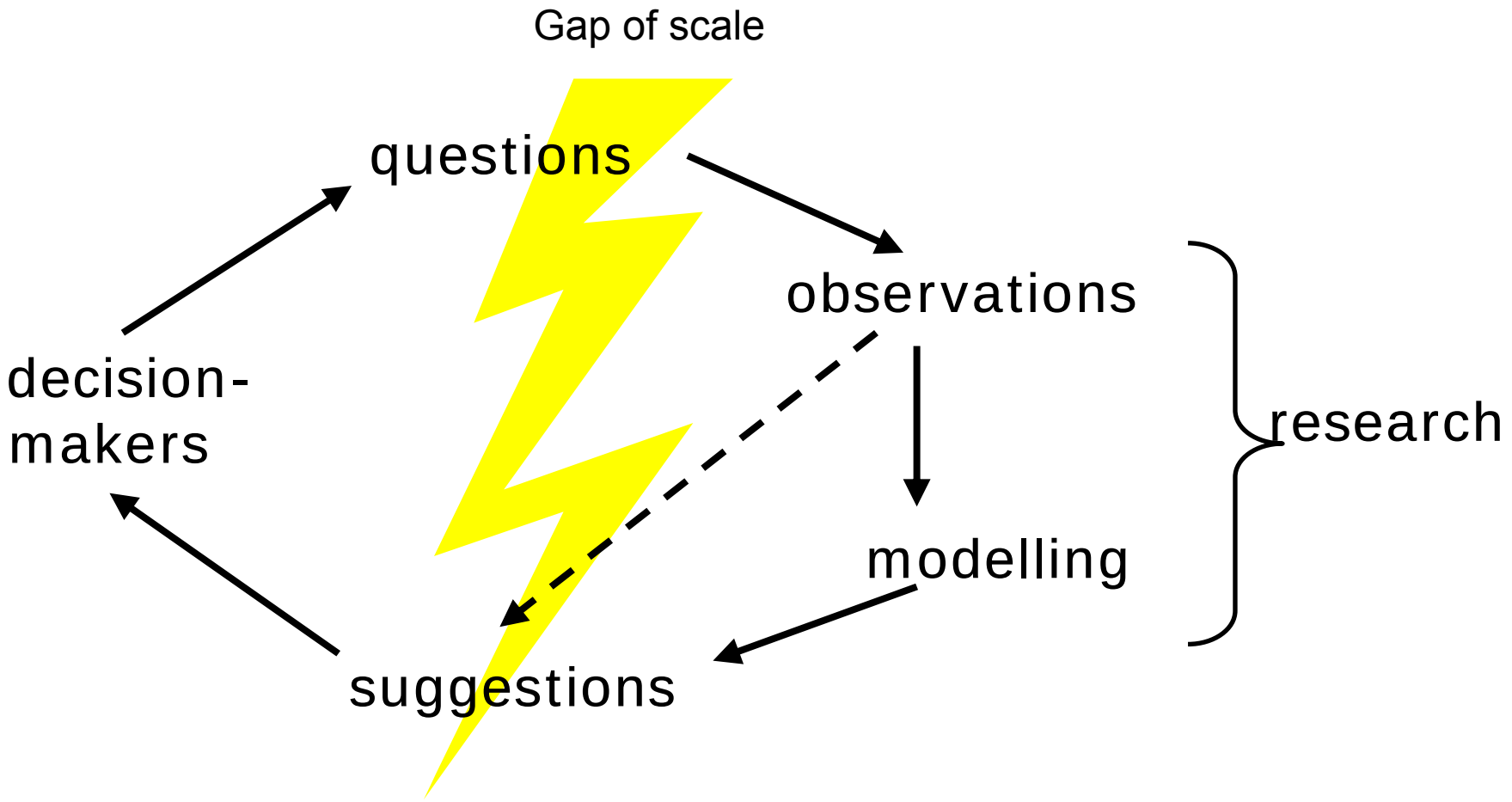
- **Introduction**
- **The cycle of applied research**
- **Modelling results**
  - Temporal heterogeneity
  - Spatial heterogeneity
- **Perspectives for future research**

The cycle of applied research



Bierkens et al. (2000)

Examples from Macsur

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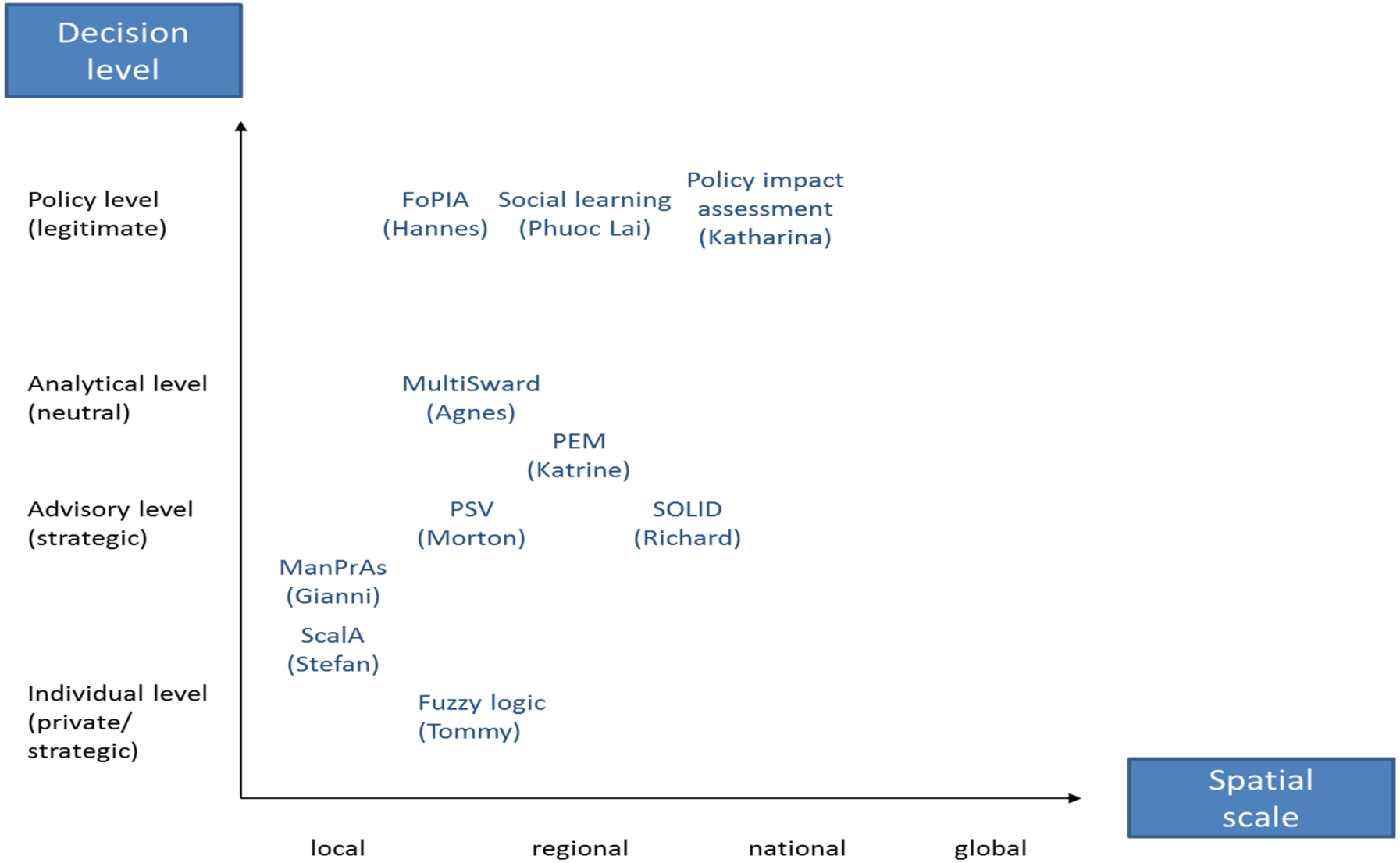

Koenig et al. (2015, under submission)

Farm study case landscapes in Denmark and the EU

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dNmark research alliance

See also: www.dNmark.org

Farm modelling

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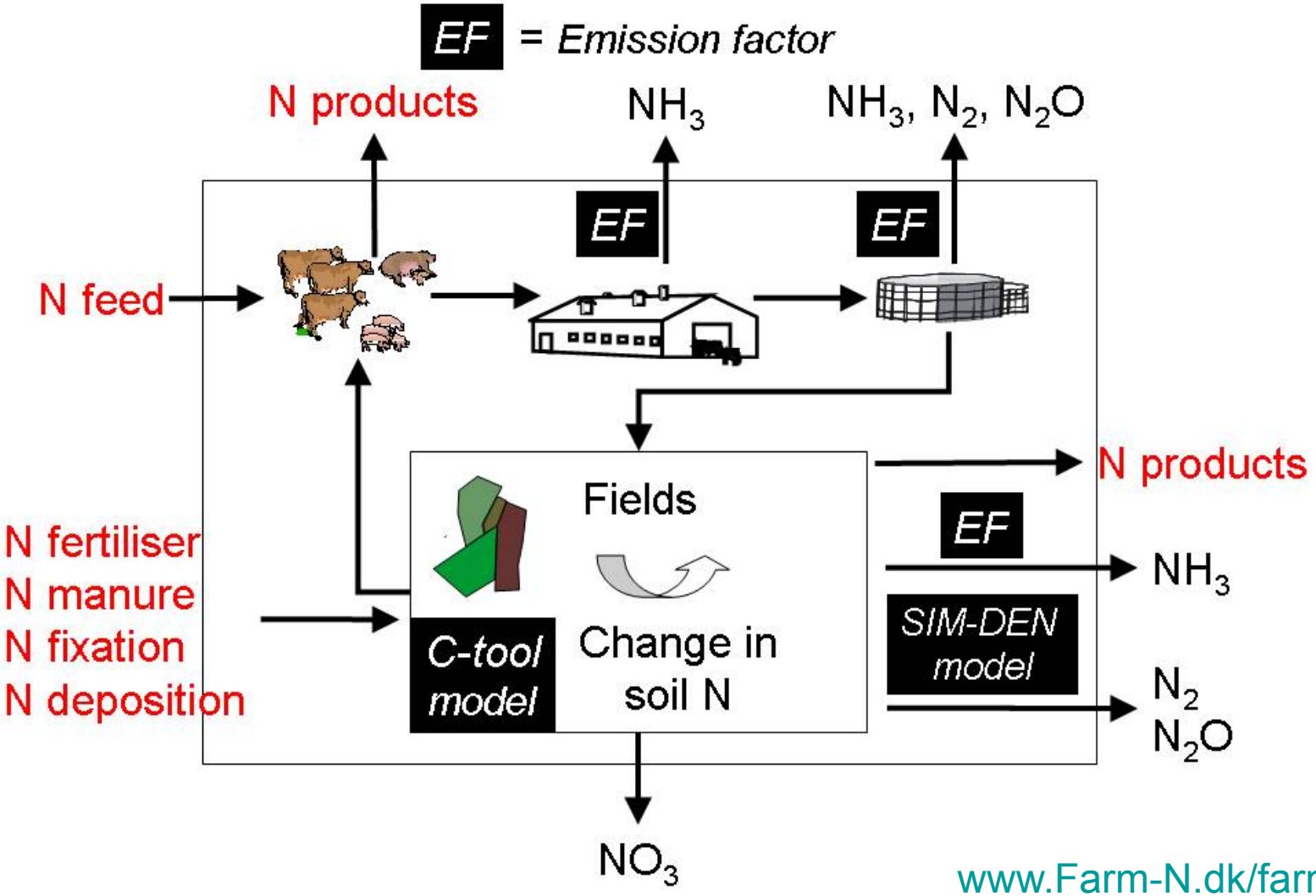

www.Farm-N.dk/farmNtool

EU farm study case landscapes
- variation in farm N surplus

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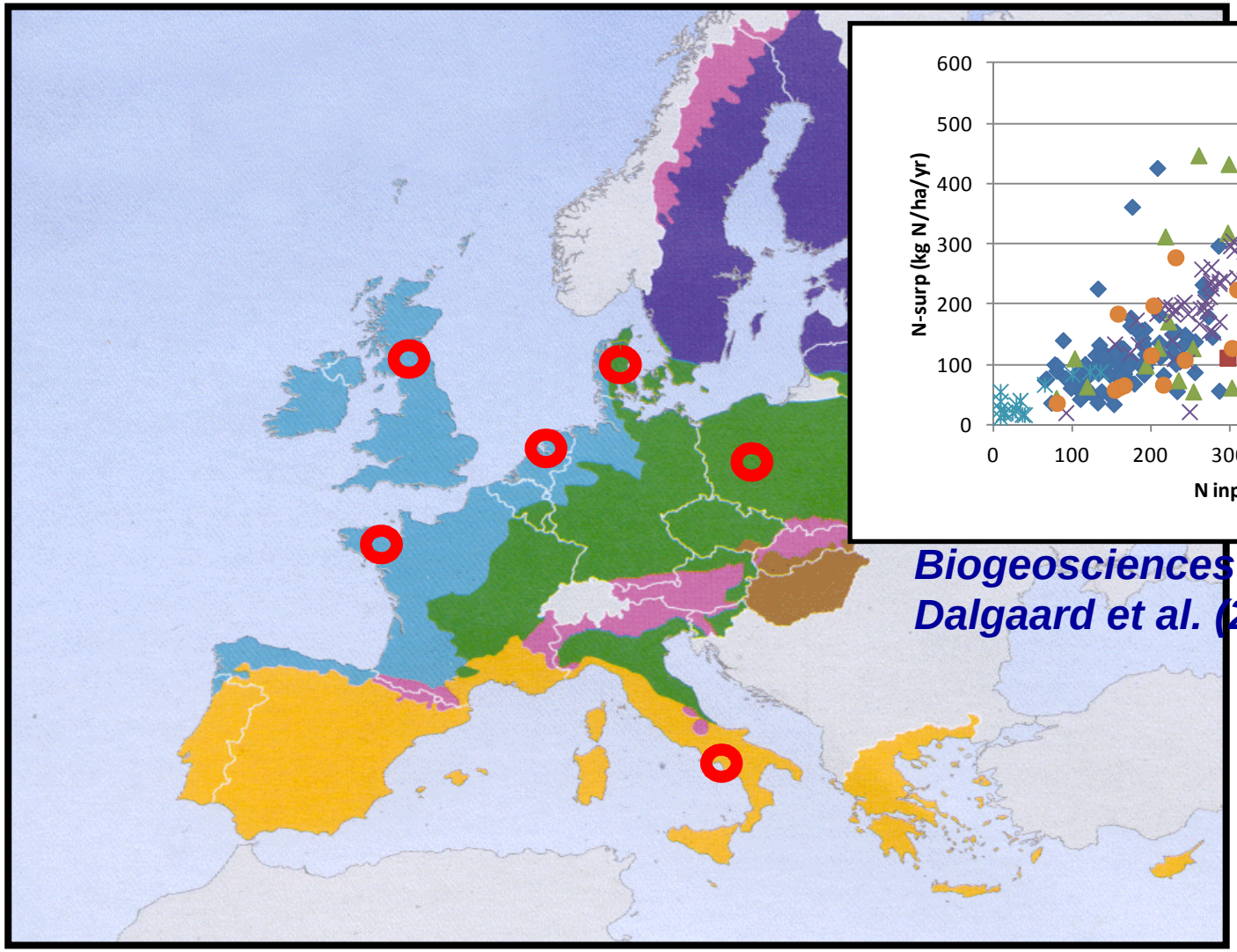

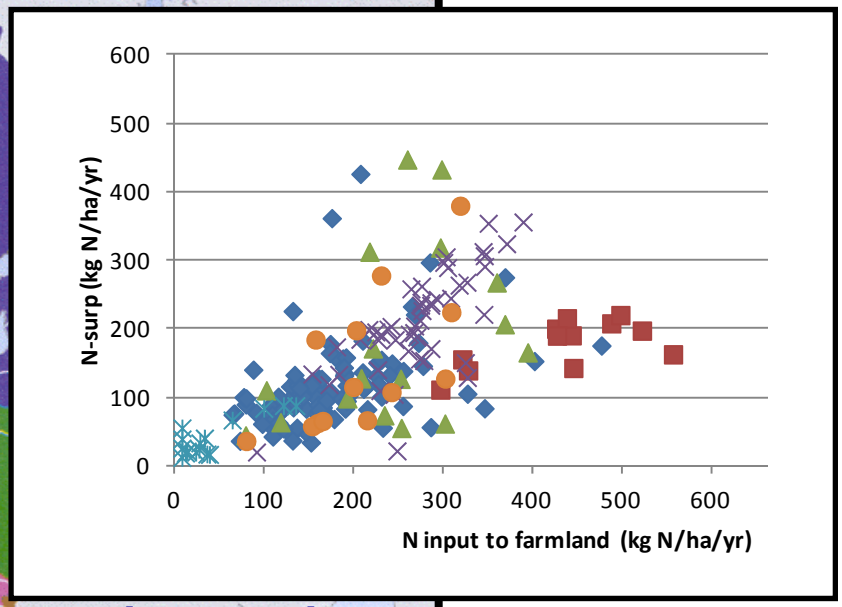

Biogeosciences 9, 5303–5321
Dalgaard et al. (2012)

NitroEurope IP

Simulated farm N-balances

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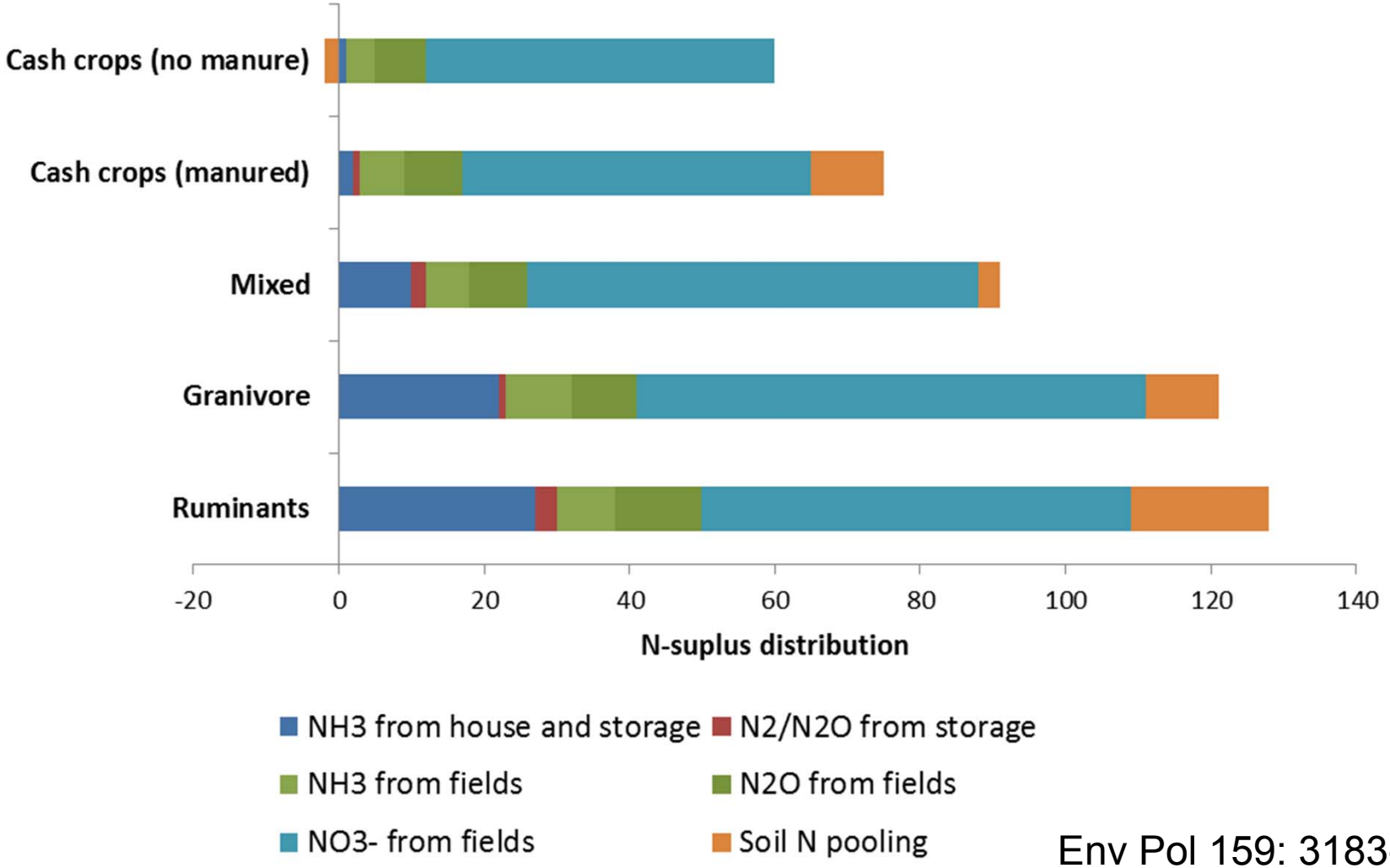

Env Pol 159: 3183-3192.
Dalgaard et al. (2011)

Temporal heterogeneity
example: livestock farm in DK and DE

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			River Gudenaa, Denmark		Brandenburg, Germany	
Crop Rotation	Unit	Field area (ha)	Fertilisation Organic (kg N ha^{-1})	Fertilisation Inorganic (kg N ha^{-1})	Fertilisation Organic (kg N ha^{-1})	Fertilisation Inorganic (kg N ha^{-1})
Set aside		42	0	0	0	0
Set aside		42	0	0	0	0
Winter wheat		42	150	54	150	72
Winter rape		42	150	59	150	77
Winter wheat		42	150	27	150	45
Winter wheat		42	150	54	150	72
Winter barley		42	118	63	118	79
Winter rye		42	102	45	102	58
Winter rape		42	150	59	150	77
Winter wheat		42	150	27	150	45
Winter wheat		42	150	54	150	72
Winter barley		42	118	63	118	79
Set aside		42	0	0	0	0
		546	58283	21009	58283	28378

Temporal heterogeneity example

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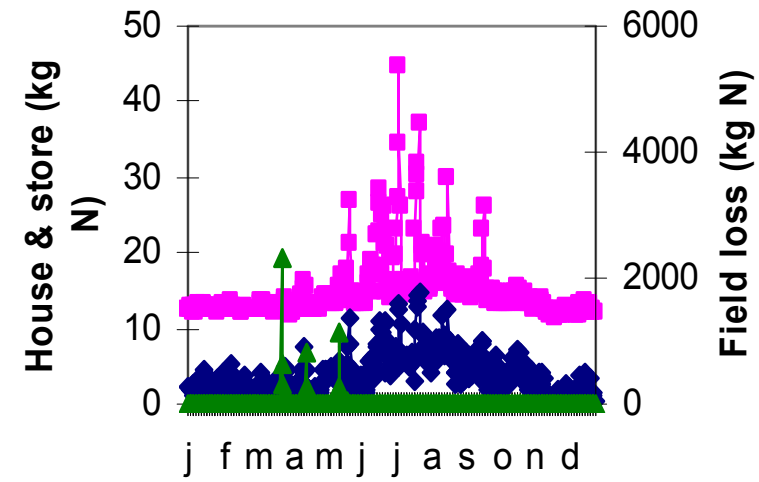
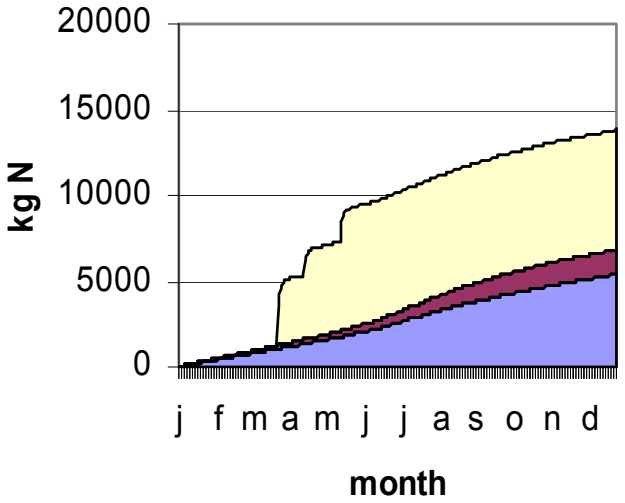
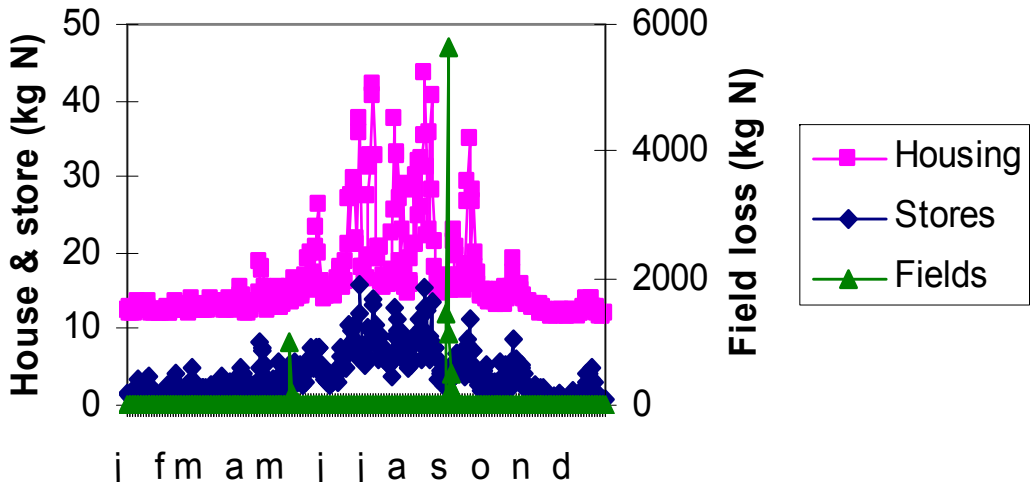
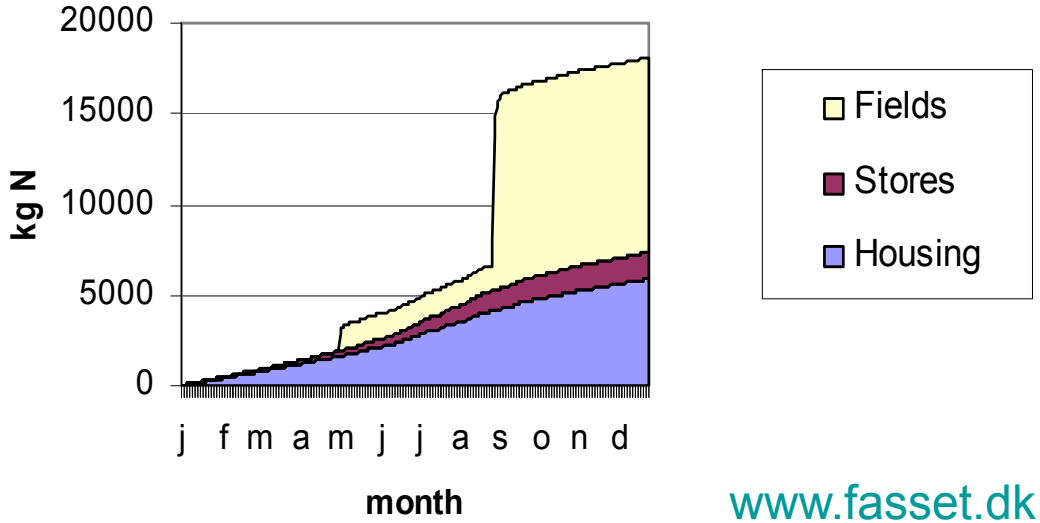
Pig Bacon - River Gudenaa



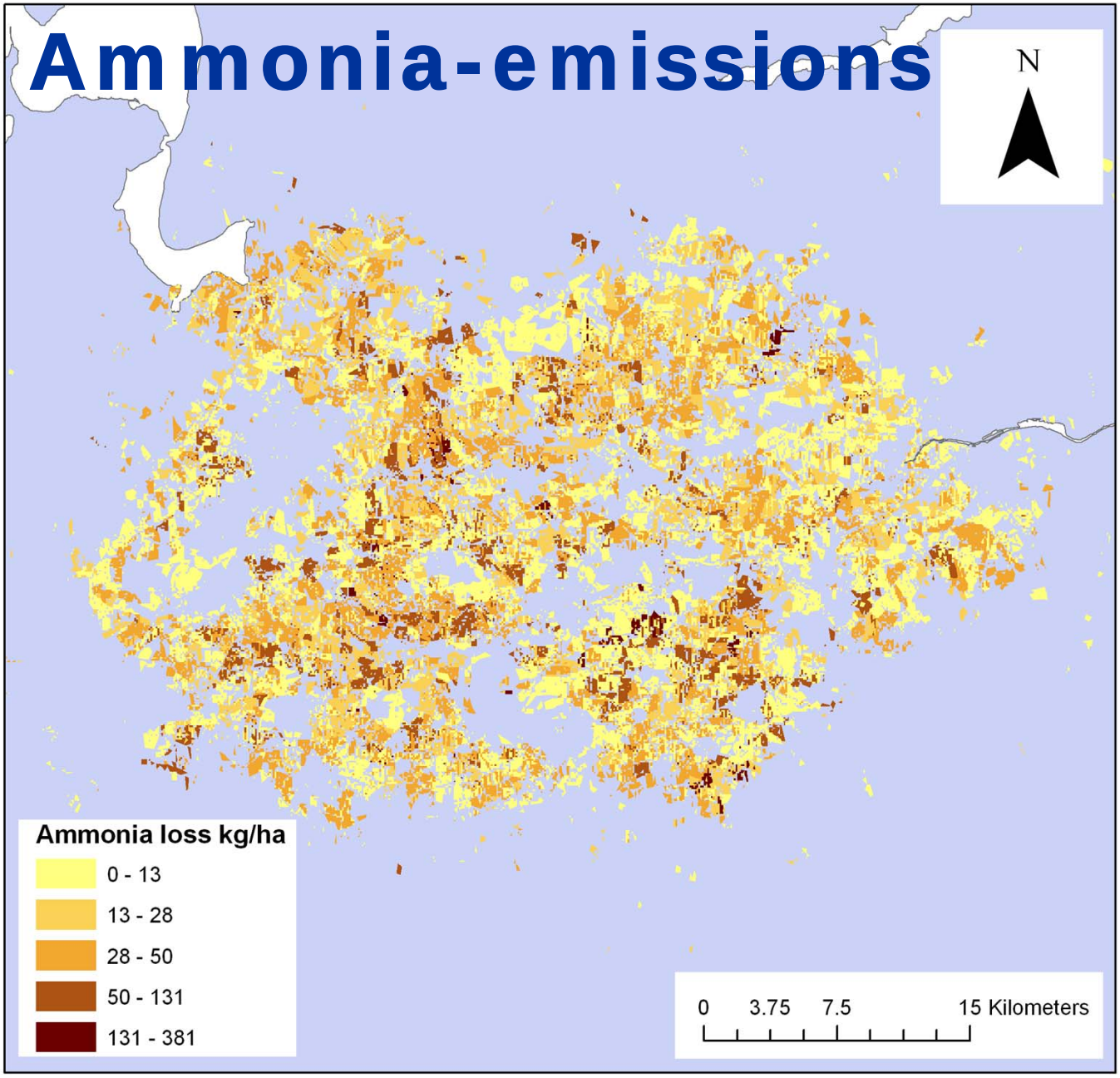


Pig Bacon - Brandenburg





www.fasset.dk



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Spatial hetero-geneity effects the total emission

Env Pol 159: 3183-3192.

Farms heterogenuity:
Ammonia emission example

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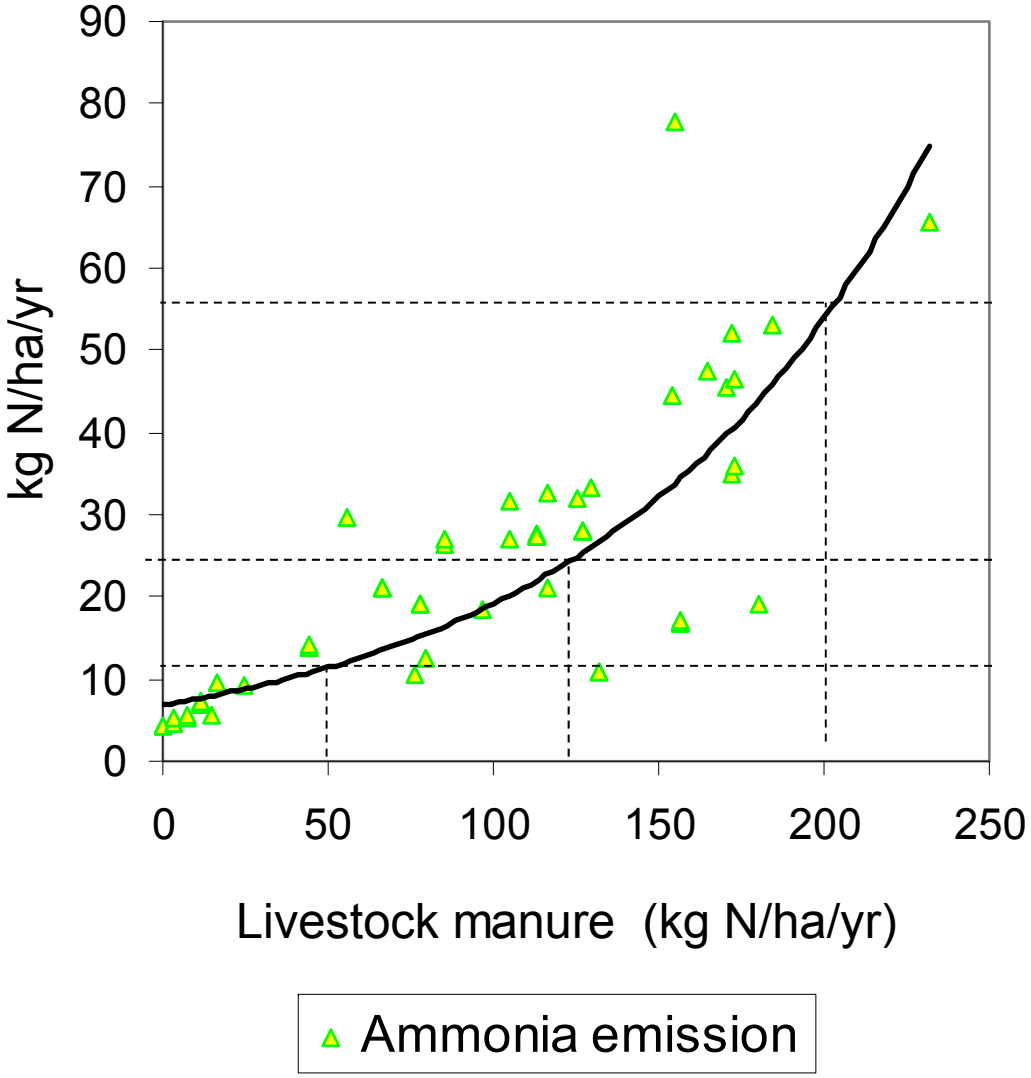

(55+12)/2= 33½

≠

26

Env Pol 159: 3183-3192.
Dalgaard et al. (2011)

Geographically targetted measures needed

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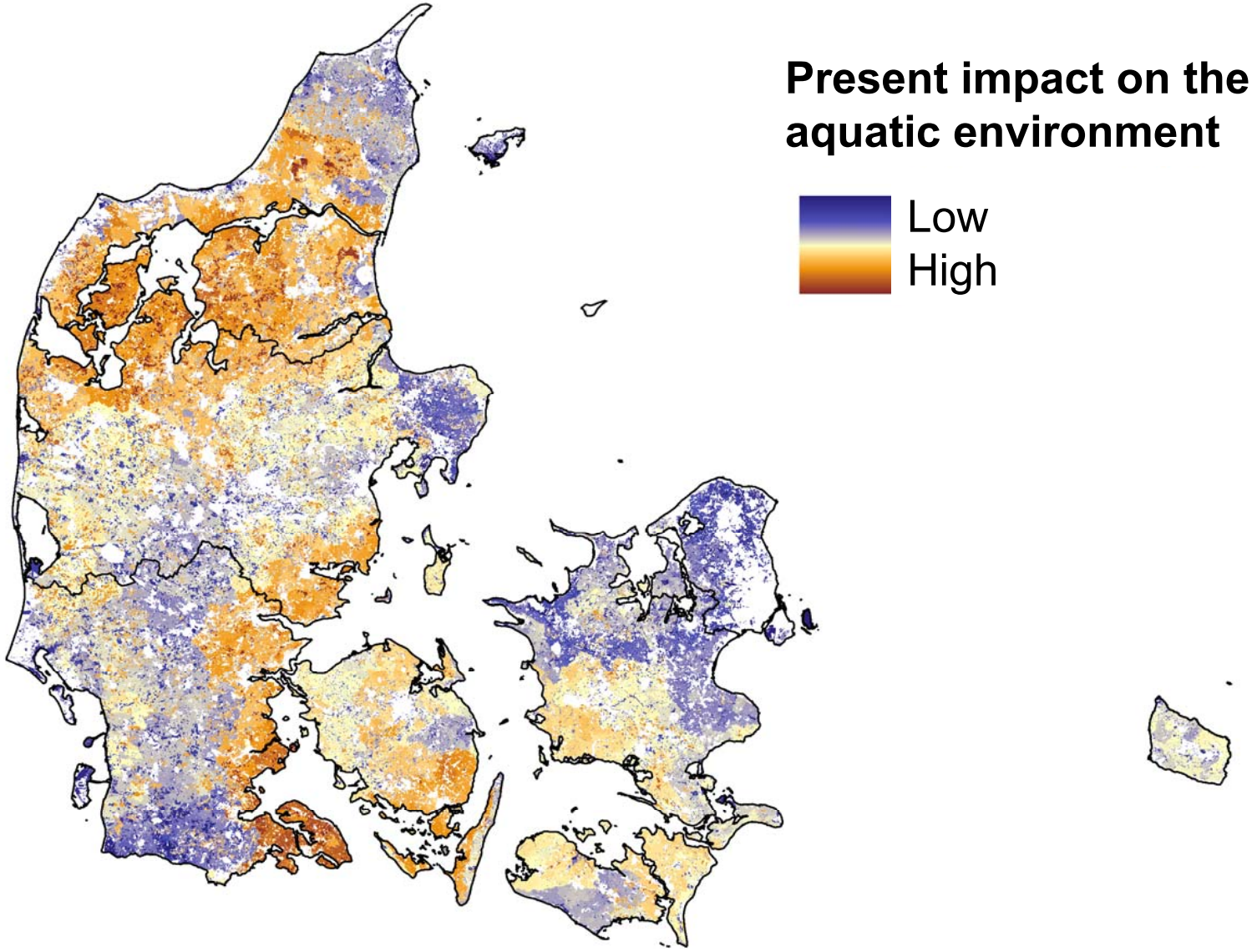

Present impact on the coastal aquatic environment

Low
High

Geographically targetted measures needed

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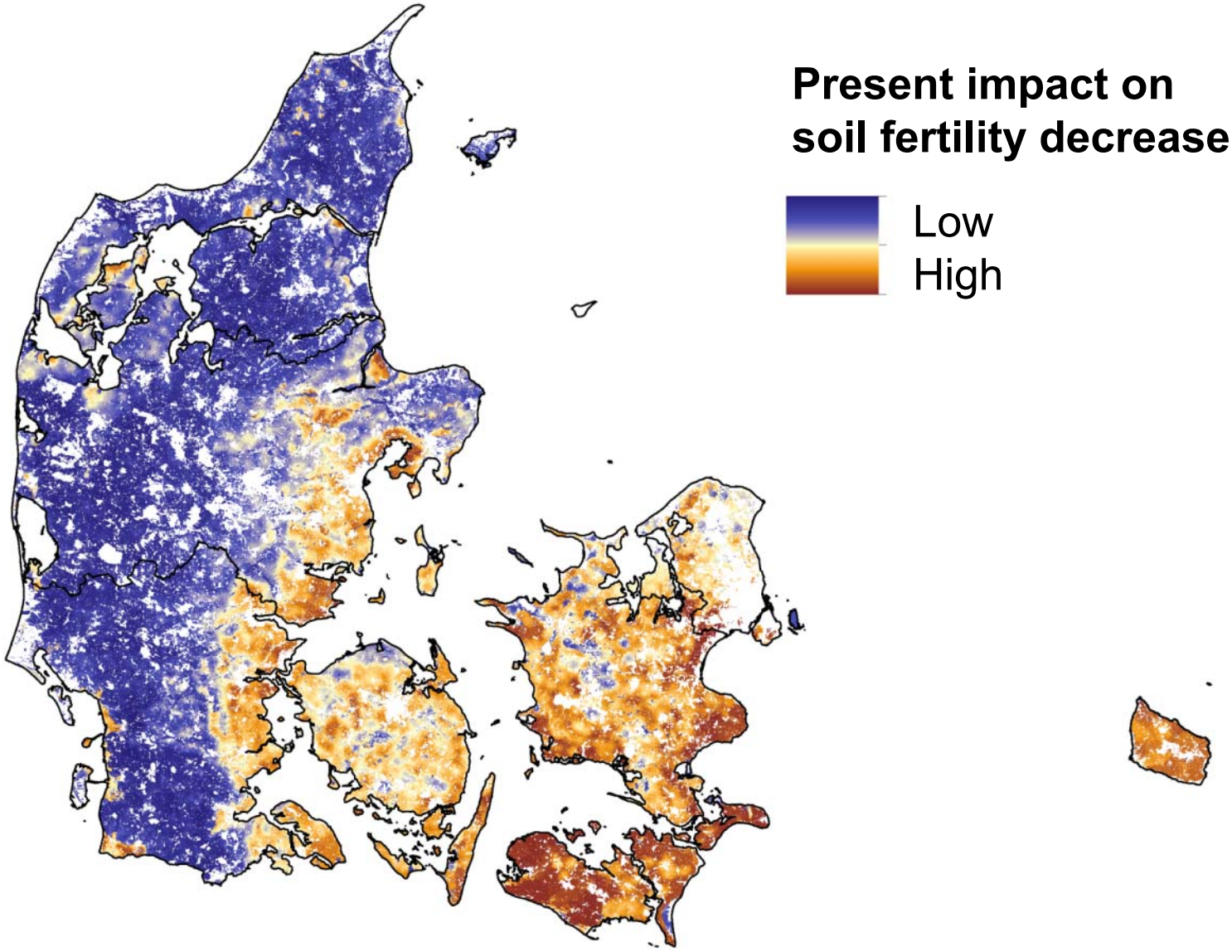

The challenge of sensitive ecosystems in Europe

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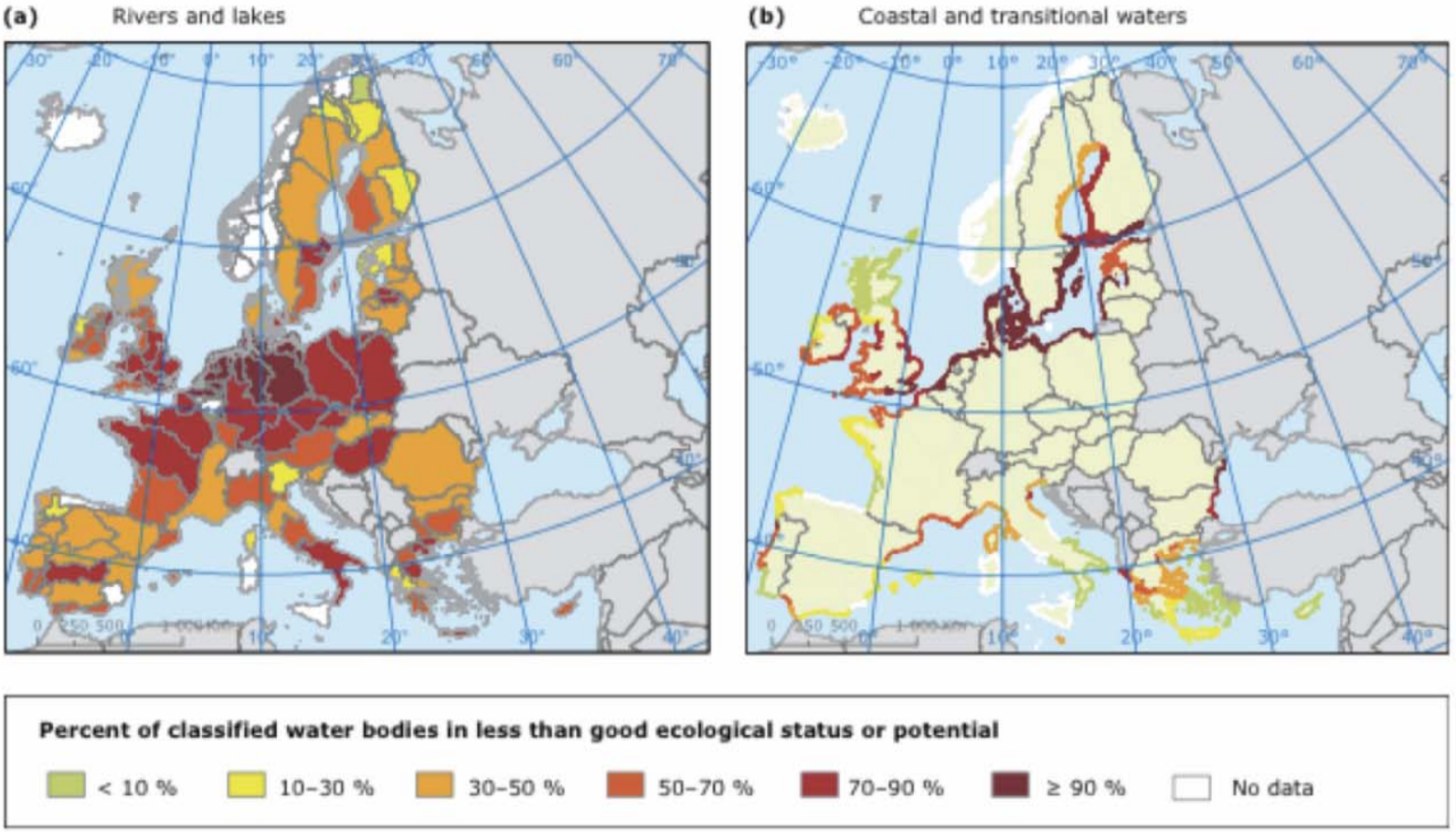

Source: EEA.eu

L4 Cross-cutting activities and integration at regional level

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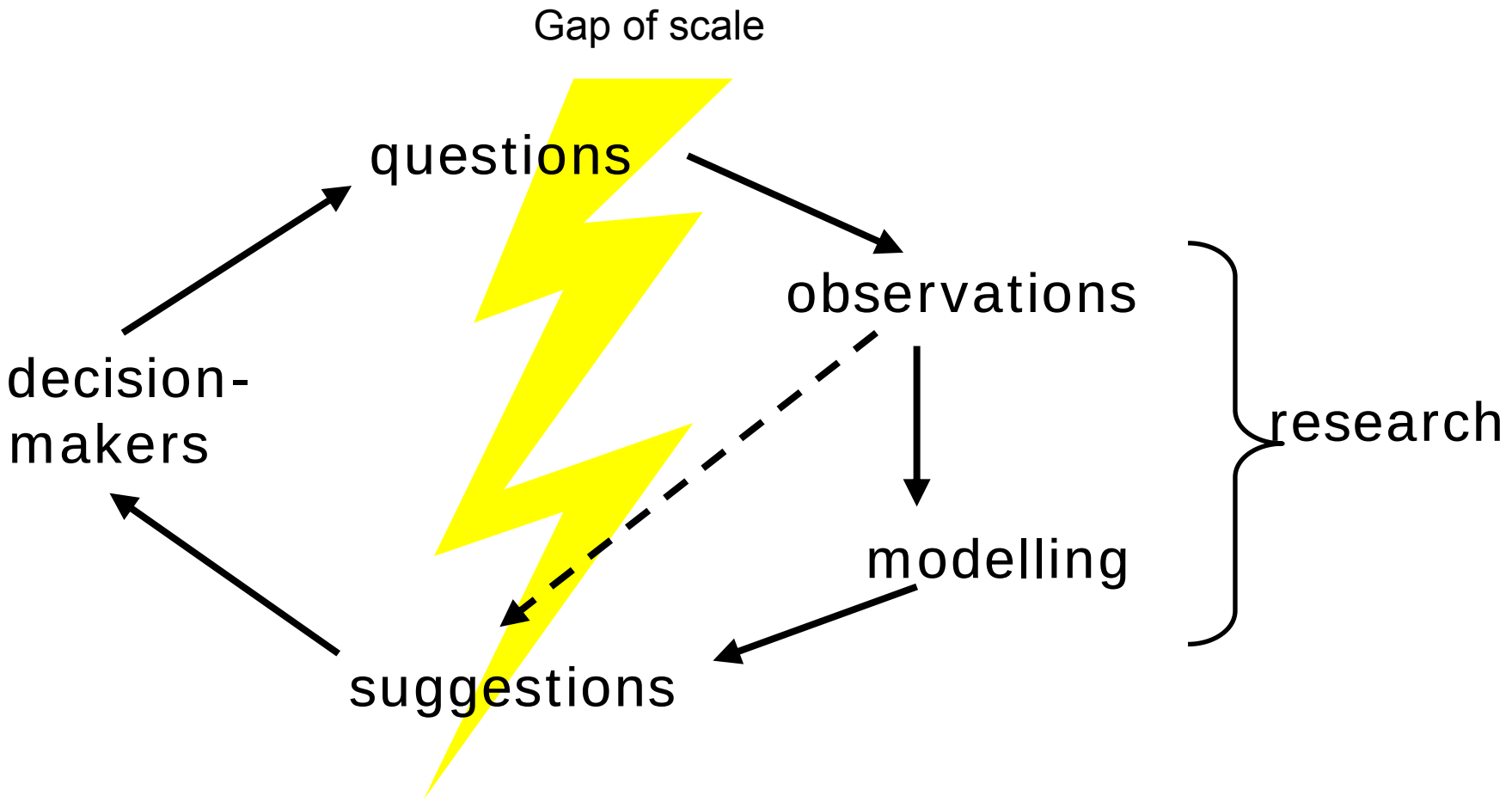
- L 4.1 Methods of regional scale modelling of livestock farms and adaption to climate change
- L 4.2 Methods for stakeholder involvement in climate-related policy measures applied at the regional scale
- L 4.3 Multidisciplinary approach to the assessment of climate change in the dairy sector

The cycle of applied research



Bierkens et al. (2000)