

## Land Systems research, and the upscaling of farm level information

*Perspectives from DIAS Land Systems Research 1996-2010*

By Tommy Dalgaard, Chris Kjeldsen, Nick Hutchings, Jørgen E. Olesen, Peder K. Bocher & Inge T. Kristensen. LaSyS workshop. Tine Landboskole Oct 24-26 2005.

## Program


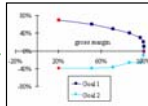

- Land Systems research and scaling
- Examples from research projects:
  - EU research projects 2004-2010
  - National research projects 1996-2004
- Perspectives for future research

## DIAS Department of Agroecology

## Land Systems and Scale

## Example 1: MEA-scope

## MEA-scope farming models

 AgriPoliS Agent based	 MODAM Linear programming	 FASSET Matter flow
<ul style="list-style-type: none"> <li>• Economic production</li> <li>• Land market</li> <li>• Structural development</li> </ul>	<ul style="list-style-type: none"> <li>• Farm management decisions</li> <li>• Ressource allocation</li> <li>• Trade-off econ./ecol. goals</li> </ul>	<ul style="list-style-type: none"> <li>• Farm input/output</li> <li>• Nutrient turnover/losses</li> <li>• Greenhouse gas emissions</li> </ul>

### Indicators for multifunctional farming

Functional category	Selected NCO/externality		
Economic	Employment		
	Income		
	Rural enterprises		
Environmental	Abiotic resources		
	Biotic resources		
	Landscape and land use		
Social	Cultural heritage		
	Non-farming activities		
	Social infrastructure		
	Recreation in rural areas		
	Healthy food/food safety		

**Indicator list:**

Hourly wage    x   x

Subsidies        x   x

Off-farm          x

....                ..

**In models:**

Relevant:        ..

After Warts (2005) and Piorr et al. (2005)

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**In models:**

Relevant:        ..

**Landscape A**

**Landscape B, etc...**

### Farm typology

	Structure	Economy
_____	Type 1	
_____	Type 2	
_____	...	
_____	...	
_____	Type 20	

### Farm typology

Structural data:	Structure	Economy
farms	_____	Type 1
ha area	_____	Type 2
ha grassland	_____	...
dairy cows	_____	...
beef cattle	_____	...
sows	_____	Type 20
....	_____	
size distribution	_____	

### Farm typology

Structural data:	Weight:	Structure	Economy
farms	X	Type 1	
ha area	Y	Type 2	
ha grassland		...	
dairy cows		...	
beef cattle		...	
sows		...	
....		...	
size distribution	Z	Type 20	

Solver

### Farm typology → Site typology

Weight:	
Landscape A	
Q	Farm type 1
P	Farm type 2
...	
...	
R	Farm type 20

allocation

**Natural conditions:**

- Soil fertility
- biotope type (land cover)
- topography
- demography

**Site typology**

**Political interests:**

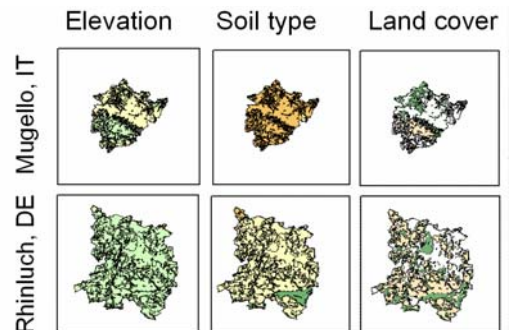
- Natura 2000
- Water protection
- Less favoured

## Site typology

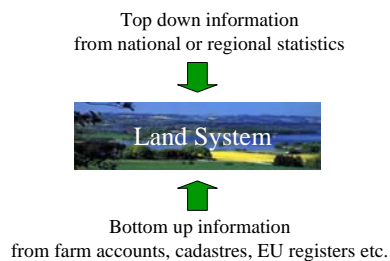
	Variable	Classes
1. Primary landscape structure	Climate	1-7) One per region
	Elevation	1) <500 m 2) >=500 m
	Soil	1) Organic soils 2) Sandy soils 3) Sandy/loamy soils 4) Clayey soils
2. Secondary landscape structure	Land Cover	0) Non-agricultural areas 1) Arable land ex grassland 2) Pastures/Natural grasslands
3. Tertiary landscape structure	Designation	1) Natura 2000 2) Not Natura 2000



## Site classification



## Perspectives for future research



## Problems in top-down information

- Based on statistical samples too coarse for land systems analysis
- Geo-referenced coupling difficult
- Do not fit directly for (agent based) single farm models



## Problems in bottom-up information

- Expensive to collect
- The available types of information are often scarce
- Or the information are only available for smaller areas
- BUT: New opportunities in digital registers and GIS/GEO-data techniques

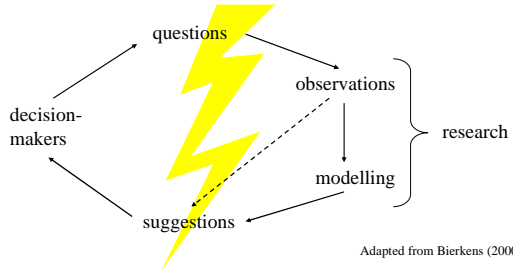


## Examples on land systems research

- |    |                                                                                                                                             |
|----|---------------------------------------------------------------------------------------------------------------------------------------------|
| EU | <ul style="list-style-type: none"> <li>• Nitro Europe (2006-2010)</li> <li>• MEA-scope (2004-2007)</li> <li>• SENSOR (2005-2009)</li> </ul> |
| DK |                                                                                                                                             |
|    |                                                                                                                                             |



## Closing the gap of scale



Adapted from Bierkens (2000)