FOREST & LANDSCAPE

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Strategies and tools for urban development and sustainable peri-urban land use relationships (PLUREL)

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University of Copenhagen - LIFE

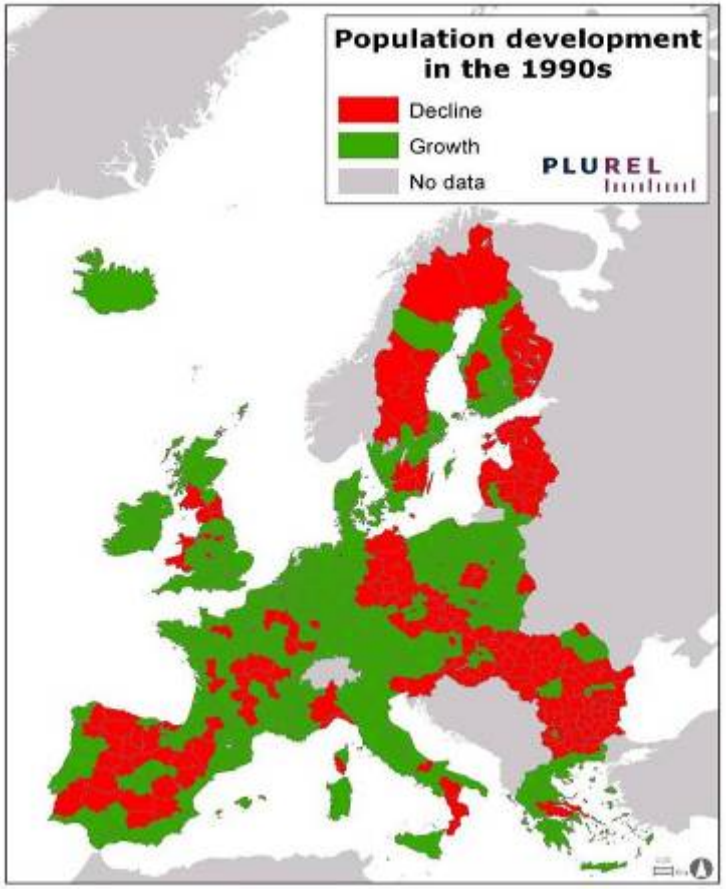
”A spectre is haunting Europe . . .”

Urban sprawl – a dream that turned into a nightmare

Urban Growth & Shrinkage

Since the mid 1950s European cities have expanded on average by 78 %, whereas the population has grown only by 33 %

(EEA 2006)



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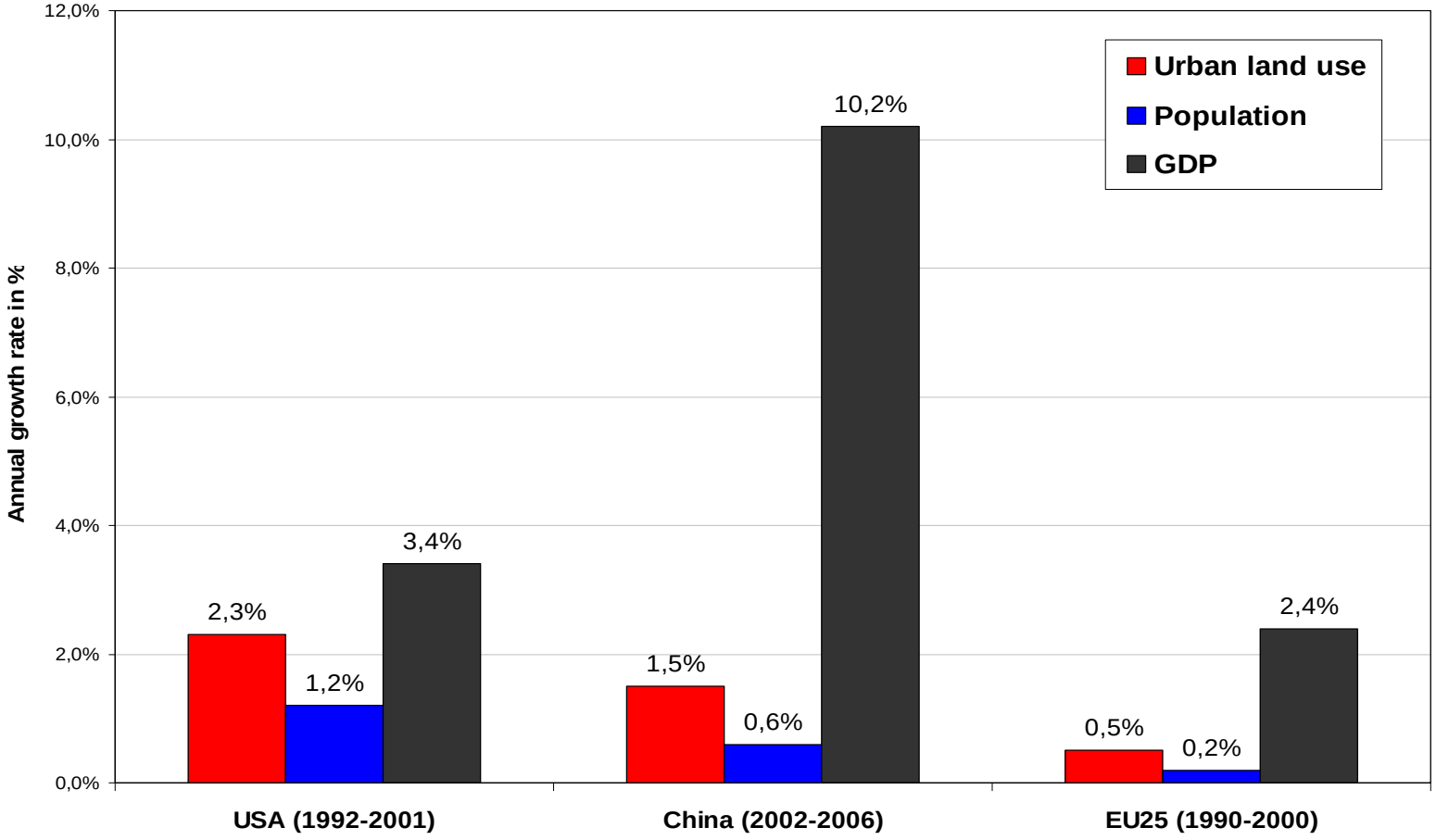
Urbanization on the edges of existing agglomerations

Leipzig - Halle, DE

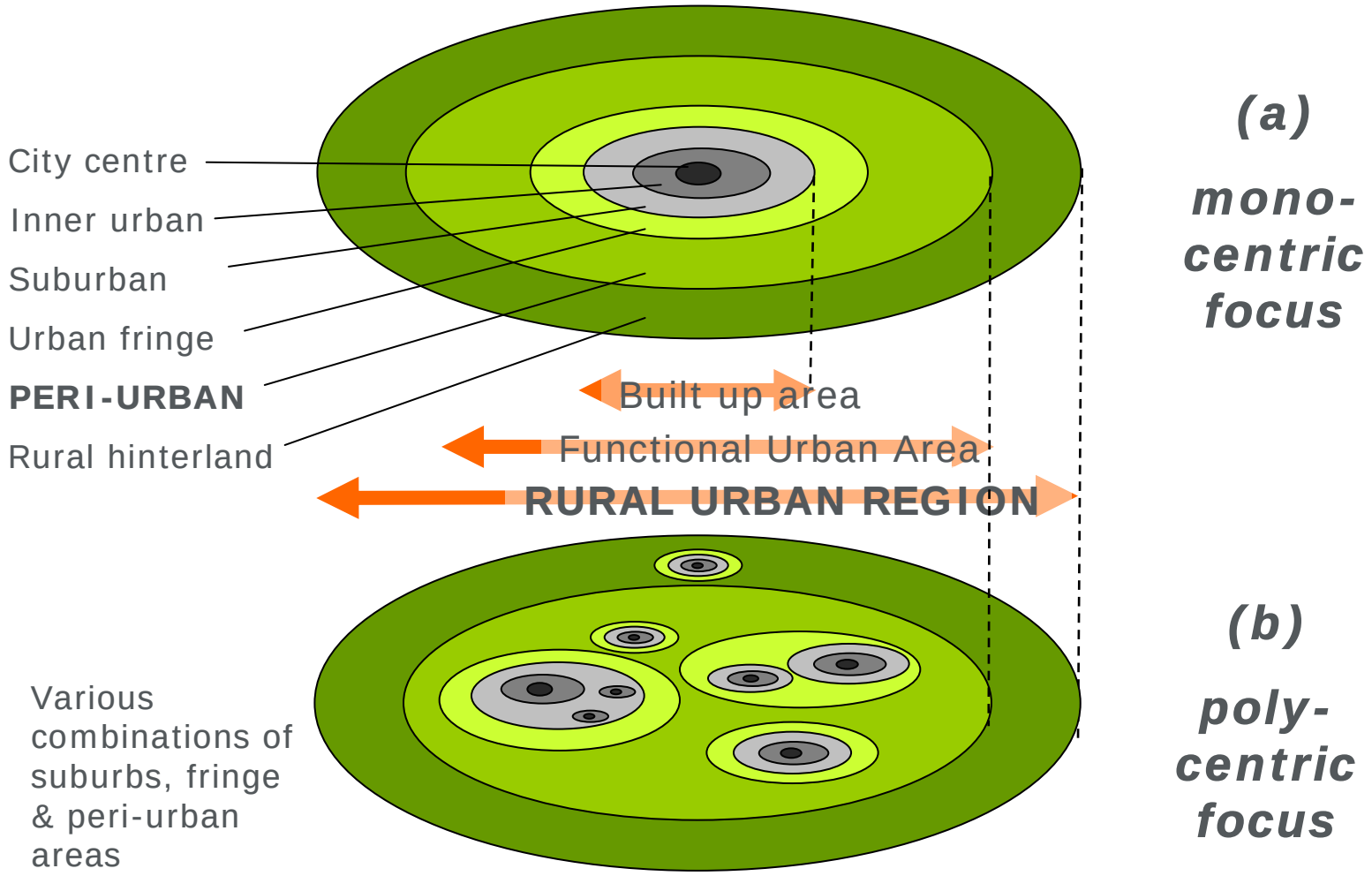
Copenhagen – October 2010

Growth rates: US, CN and EU



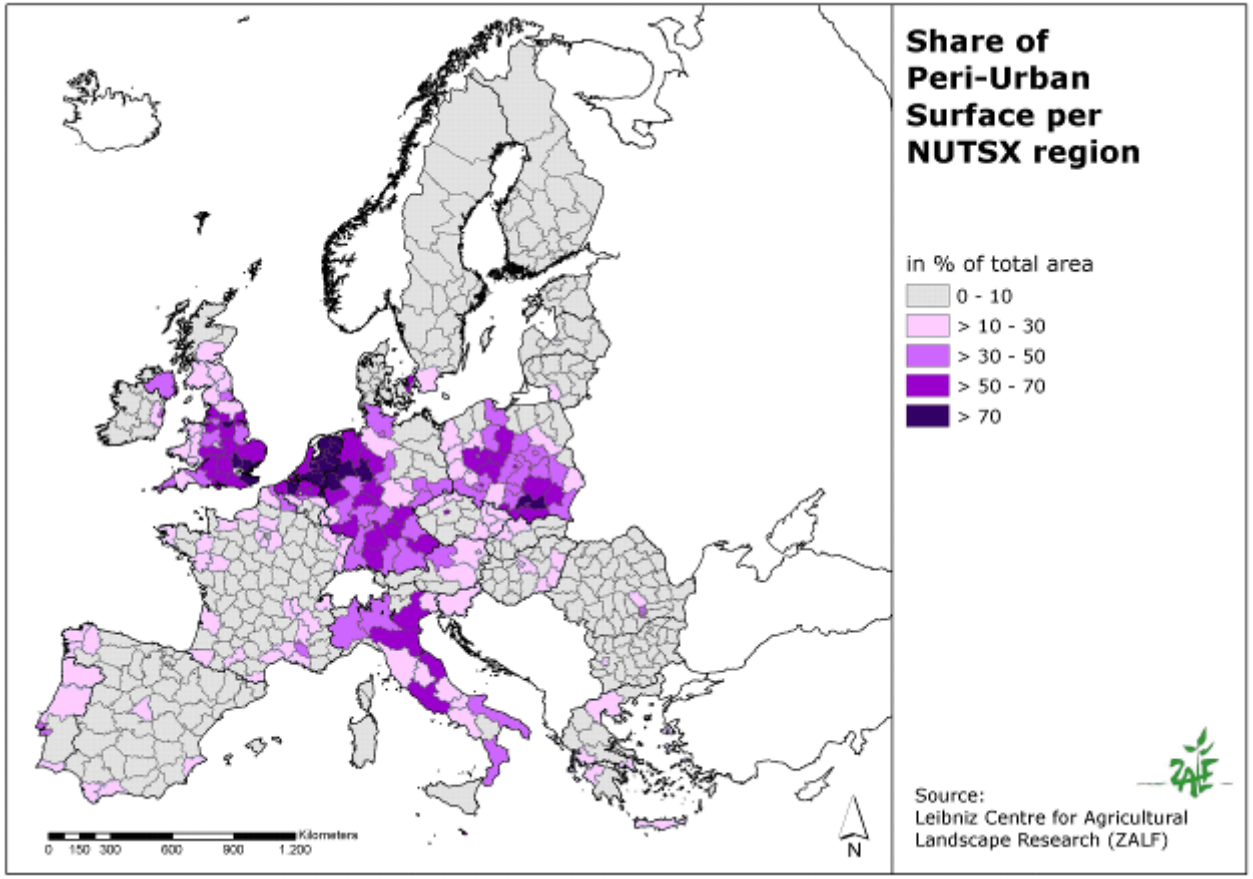
Source: Thomas S. Nielsen (UC) 2009)

Peri-urban area & 'Rural-Urban-Region' (RUR)



Source: Joe Ravetz (UM) 2010

Peri-urbanisation in Europe



NUTSX Code	NUTSX Name	Peri-urban Area (RUR2) in %	Artificial Surface CLC in %
NL21	Overijssel	88,51	8,02
NL13	Drenthe	88,37	5,52
NL12	Friesland (NL)	87,30	5,23
DEA3	Muenster	86,09	9,88
NL11	Groningen	85,20	7,08
NL42	Limburg (NL)	83,37	14,50
UKH3	Essex	82,64	10,22
NL41	Noord-Brabant	82,18	13,00
PL211	Krakowsko-tarnowski	78,15	4,45
DEA4	Detmold	78,00	9,67
BE23	Prov. Oost-Vlaanderen	77,67	24,86
UKJ4	Kent	75,11	10,48
UKH2	Bedfordshire, Hertfordshire	74,10	13,31
NL23	Flevoland	73,91	5,53
NL31	Utrecht	72,85	17,01
NL22	Gelderland	72,72	9,21
UKE3	South Yorkshire	71,56	20,96
DEA1	Duesseldorf	70,24	23,74
PL612	Torunsko-wloclawski	69,36	1,83
UKJ1	Berkshire, Bucks and Oxfordshire	68,05	10,27

SRES variant scenarios

Global

B1 – Smart growth (peak oil)

Shock – peak oil & energy price

A1 – High growth (hyper-tech)

Shock – rapid ICT development

Environ-mental

Economic

B2 – Fragmentation (green enclaves)

Shock – pandemic & social exclusion

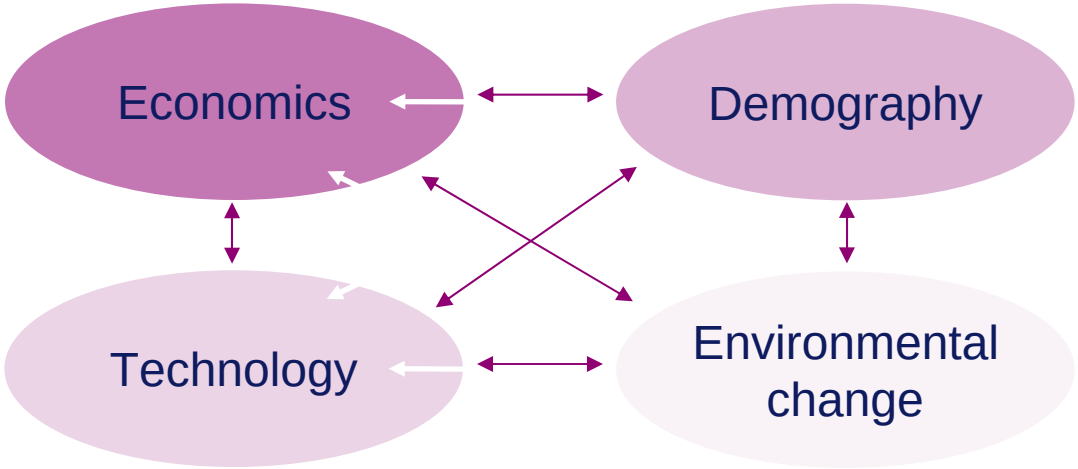
A2 – Self-reliance (extreme water)

Shock – climate change & water crises

Regional

Source: Ravetz (UM) & Rounsevell (UE) 2008

European land use drivers

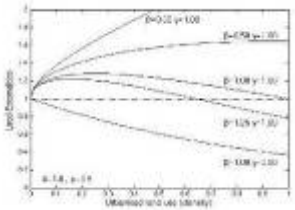


Scenario framework

Modelling land use change (RUG)

local externalities

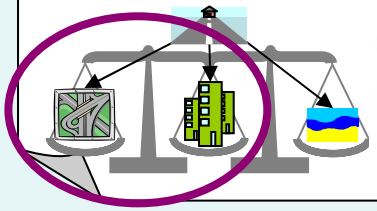
$$LX_{ij} = e^{(\gamma . L_{ij}^{\phi} - \beta . L_{ij}^{\theta})}$$

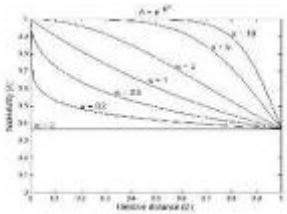


Household preferences

accessibility

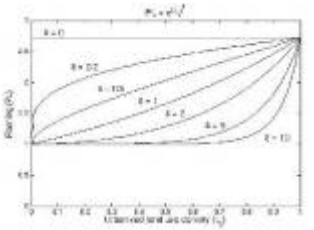
$$A_{ij} = \sum_{d} w_d . e^{-\left(\frac{D_{d,ij}}{D_{d,max}}\right)^{\alpha_d}}$$





concentration

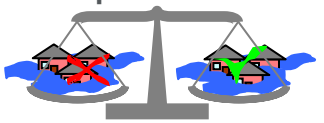
$$PL_{ij} = e^{(L_{ij})^{\delta}}$$

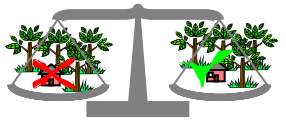


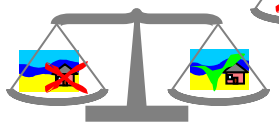
Planning preferences

restrictions

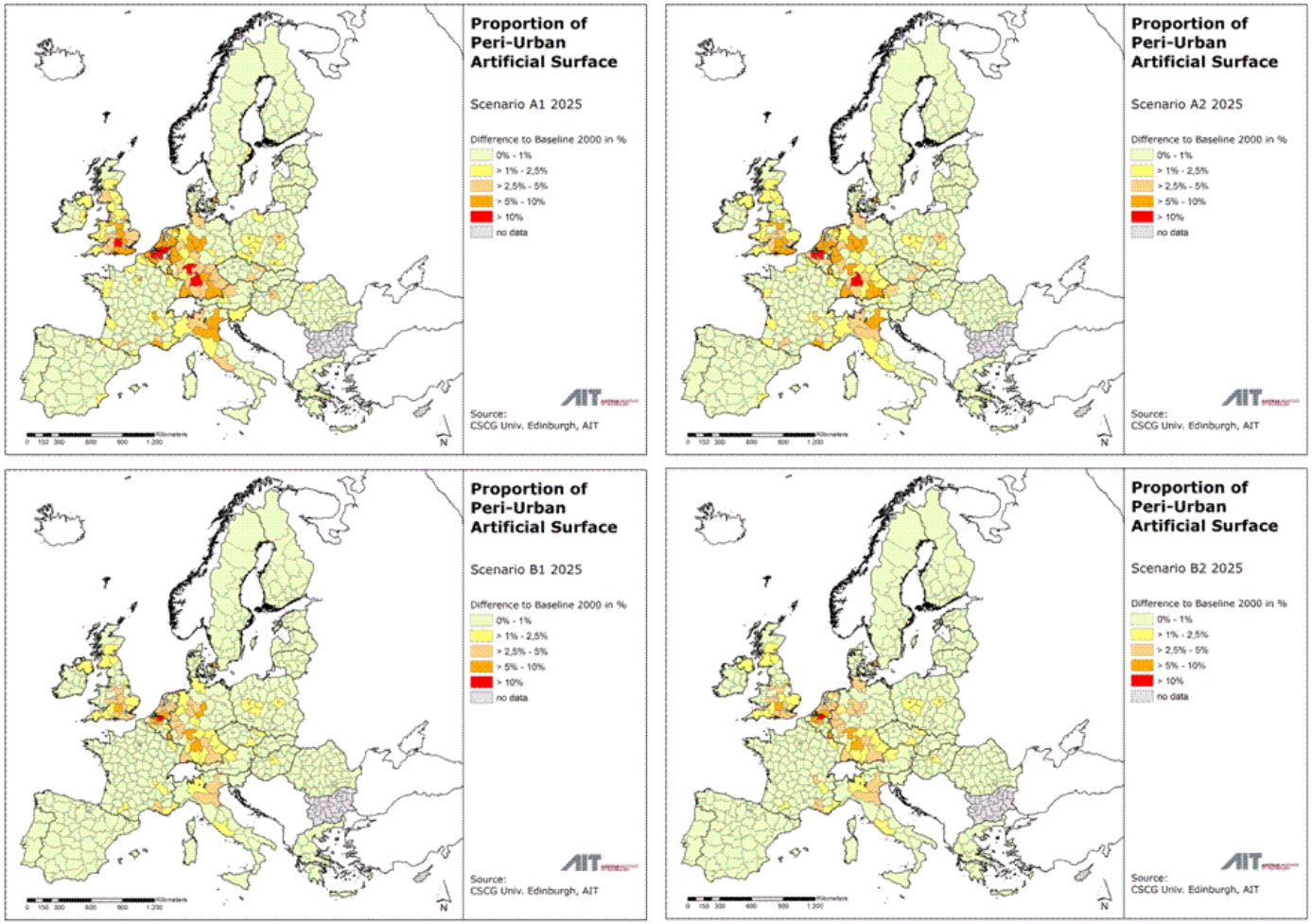
presence/absence





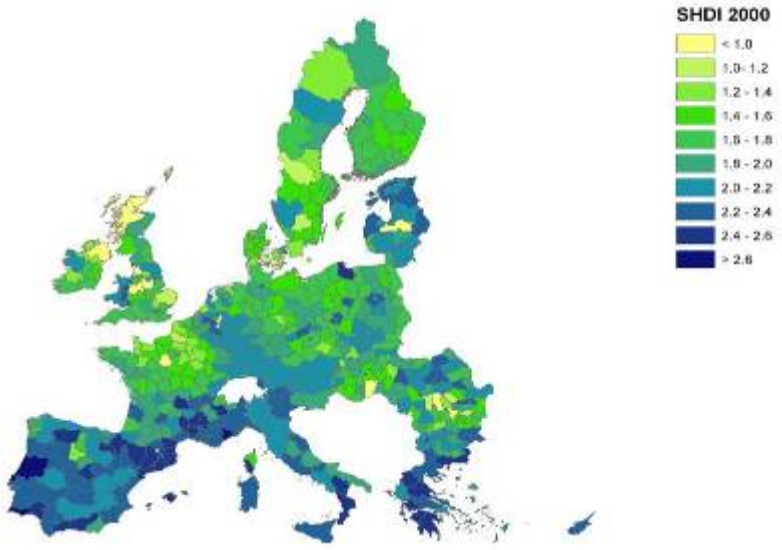


Peri-urban share of artificial surfaces

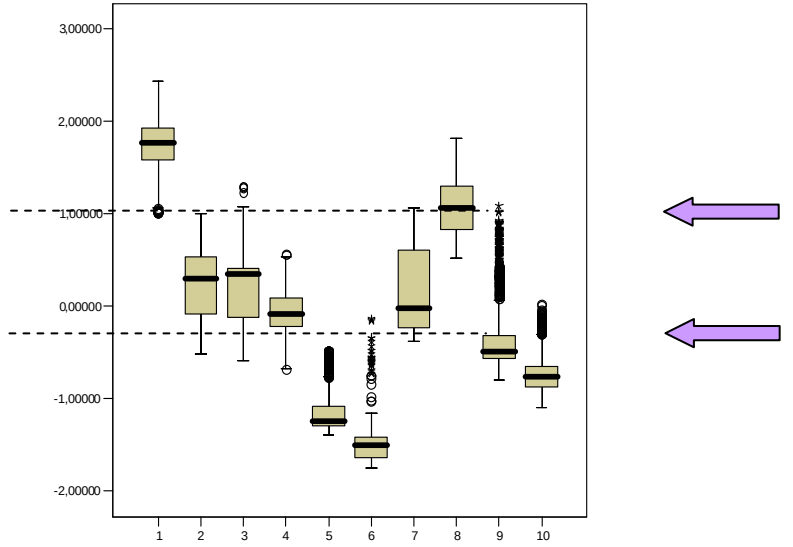


Urbanisation related LUC impacts at NUTSX

Response functions can be applied at NUTSX.
By the application of diffrent typologies, they allow for cross-thematical comparisons



Response function application at NUTSX: Landscape fragmentation index in response to urbanisation



Cross-thematical, cross-country, cross-regional analysis (NUTX):
Application of typologies (RUR types, subregions, geographical conditions, palnning and governance, hazards areas, accessibility etc.)

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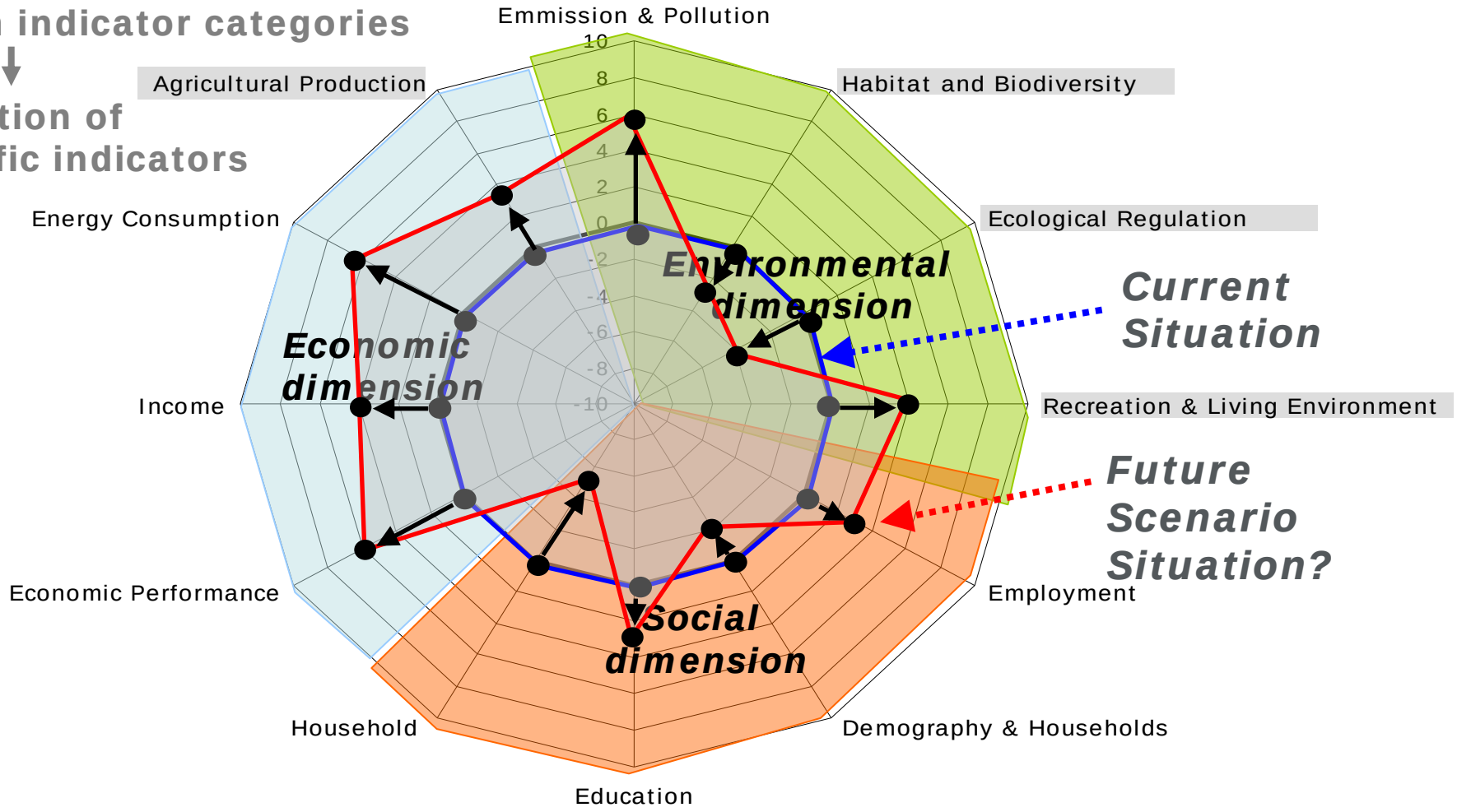
Integrated analysis of urbanizationy impacts on sustainability

Main indicator categories

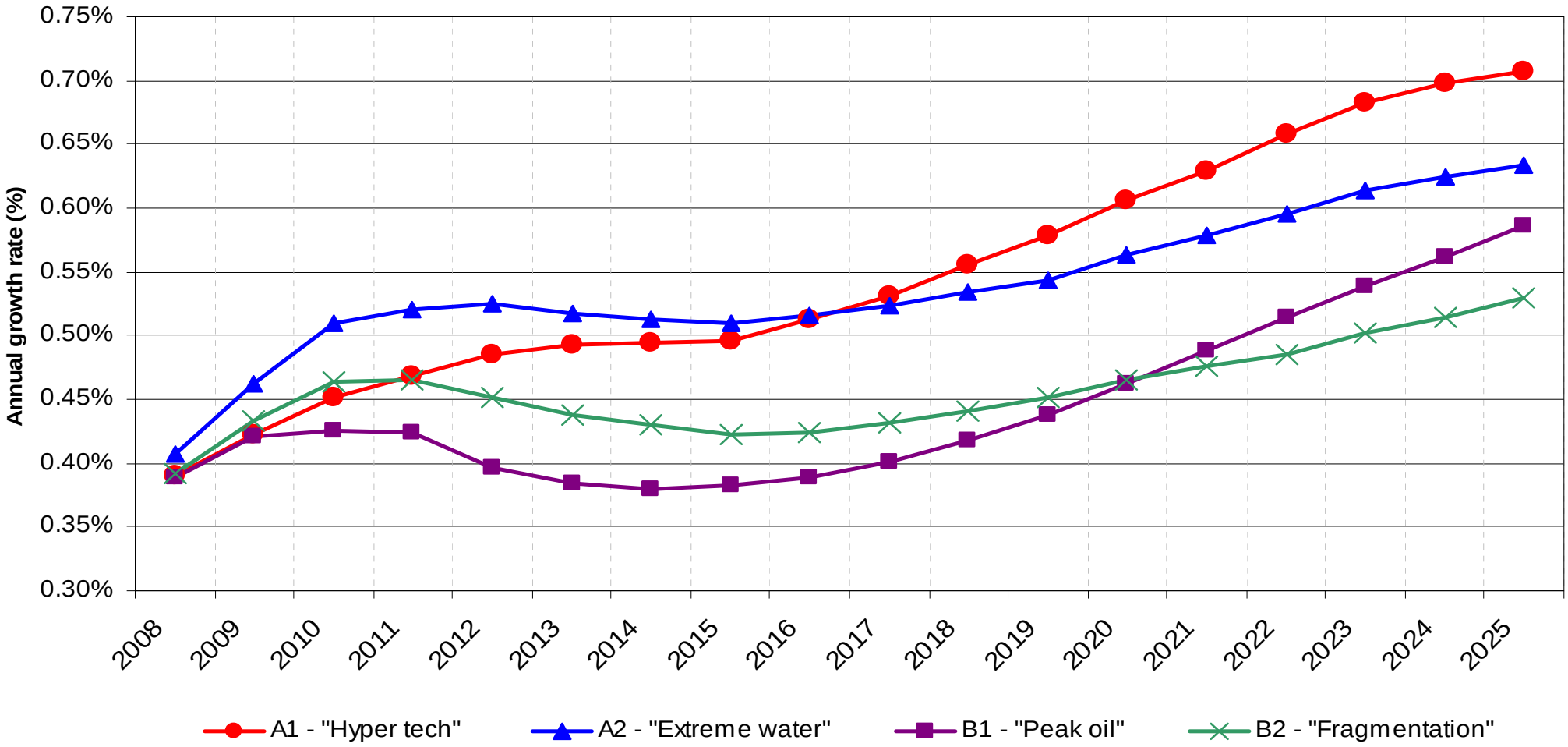
↓

Selection of specific indicators



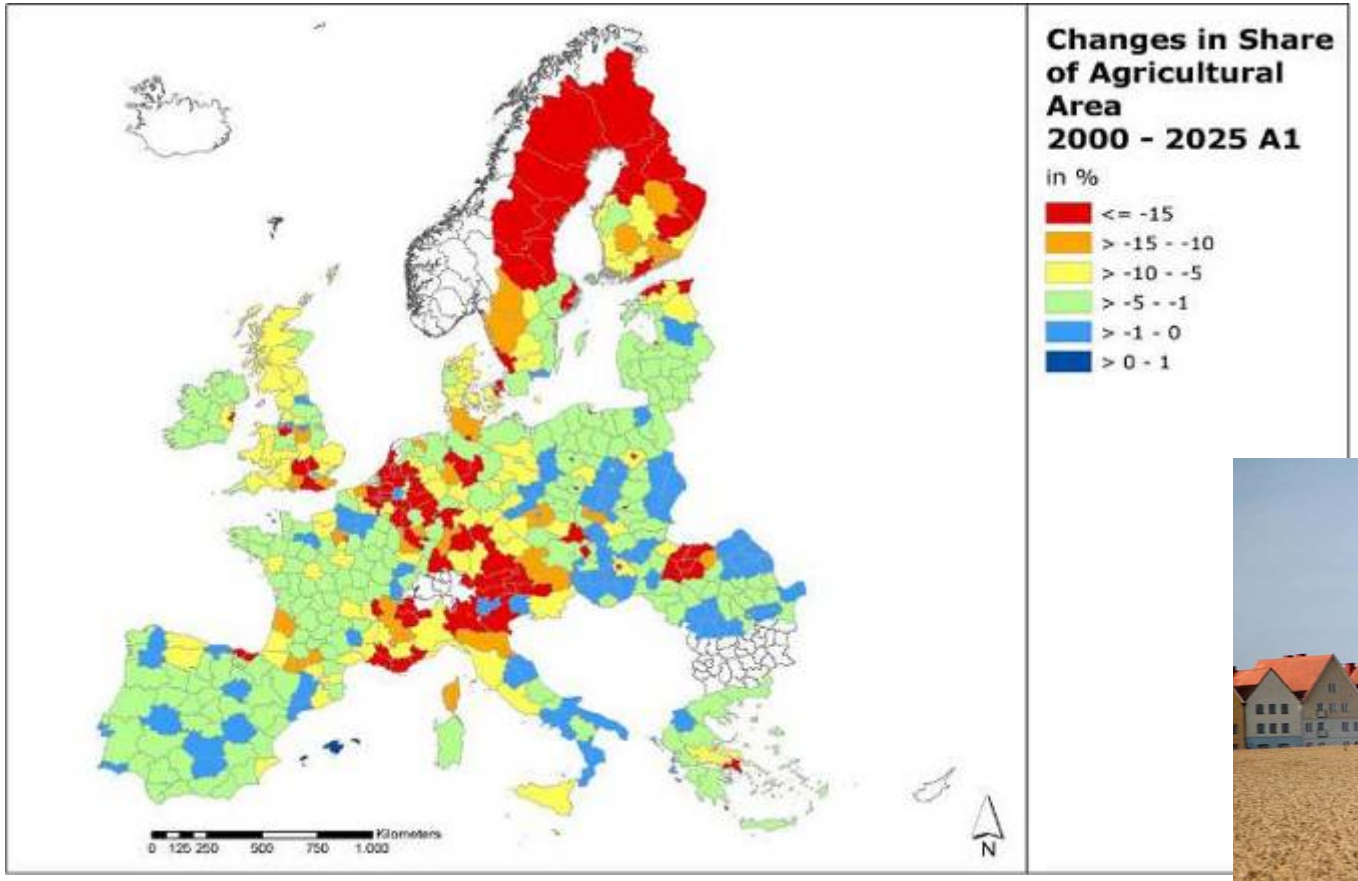
(Zasada et al. 2009)

European Built-up area



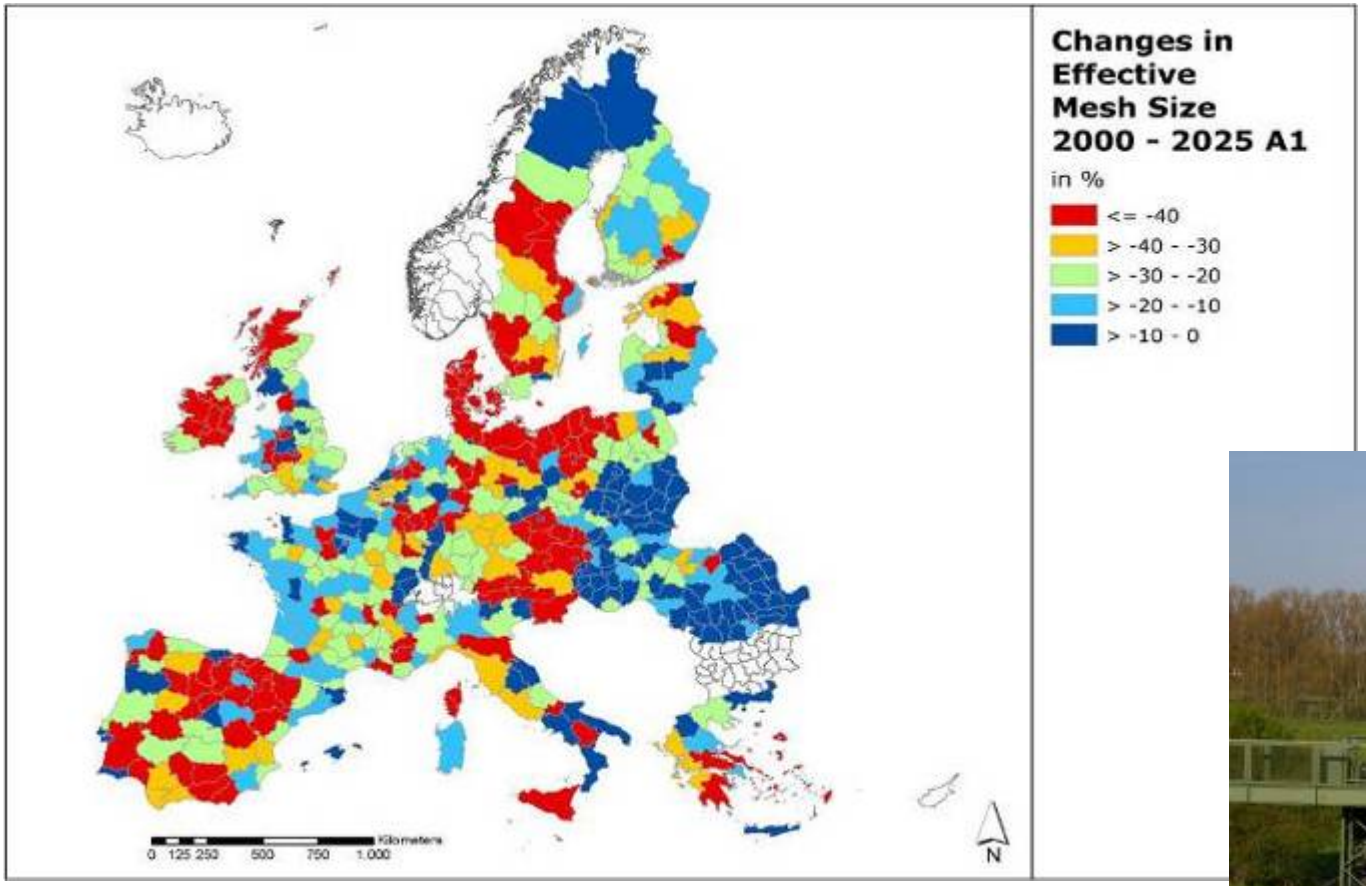
Source: NEMESIS

Agricultural area



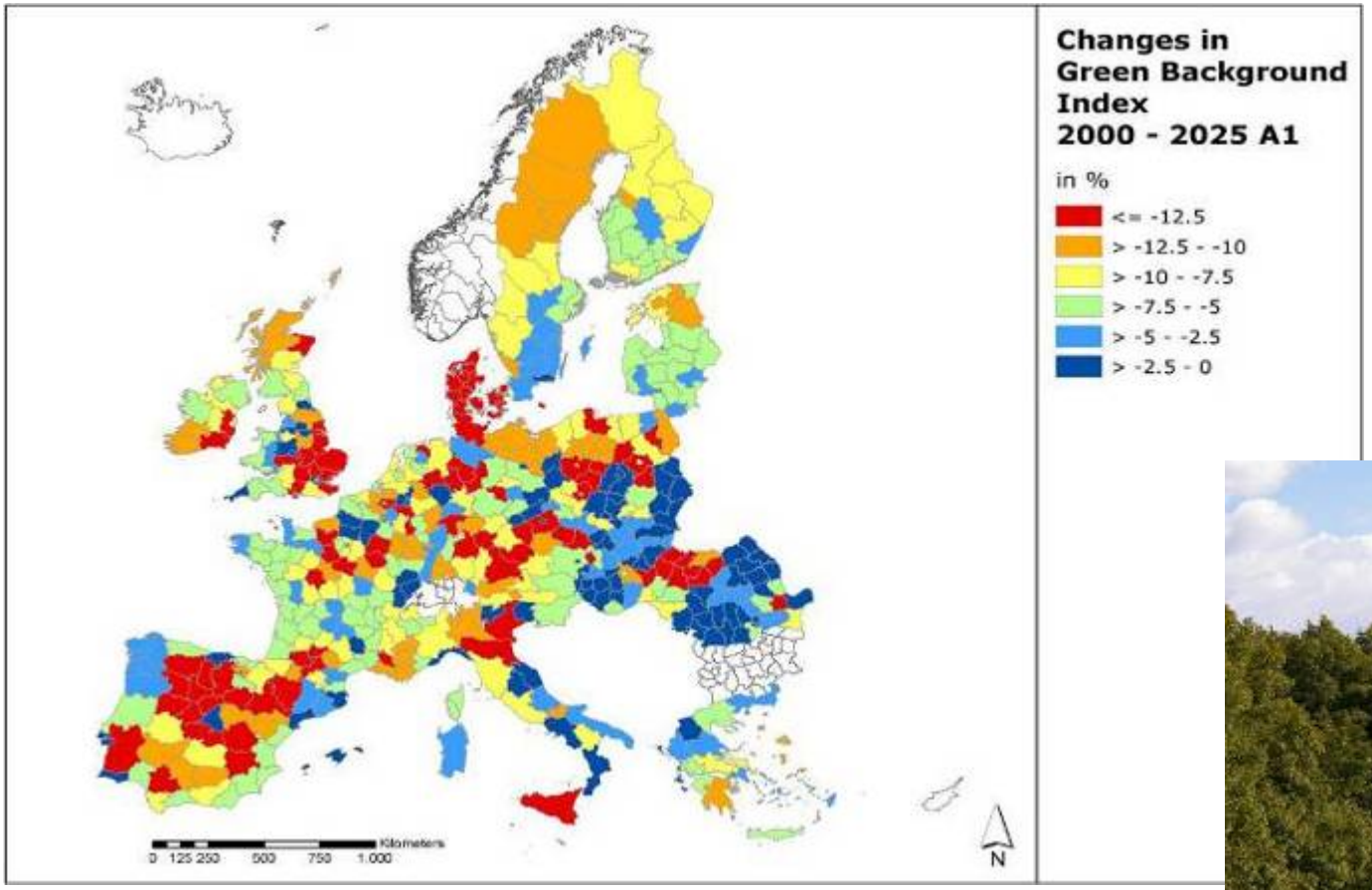
Source: Zasada, Piorr, Berges (ZALF) 2010

Landscape Fragmentation



Source: Zasada, Piorr, Berges (ZALF) 2010

Recreation



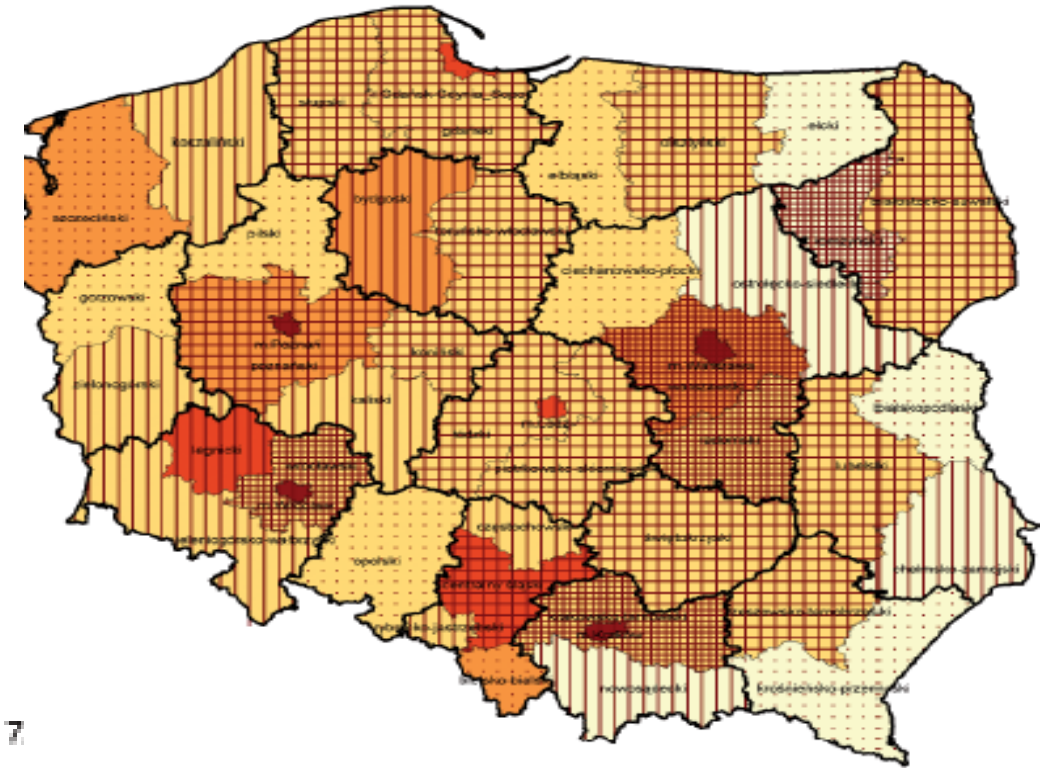
Source: Zasada, Piorr, Berges (ZALF) 2010

Warsaw Metropolitan Area

GDP per capita in Warsaw 4 to 5x that of rural areas in Poland

Warsaw growth

Residents find it noisy, busy, too little green open space



Source: Grochowski (PAS) 2009

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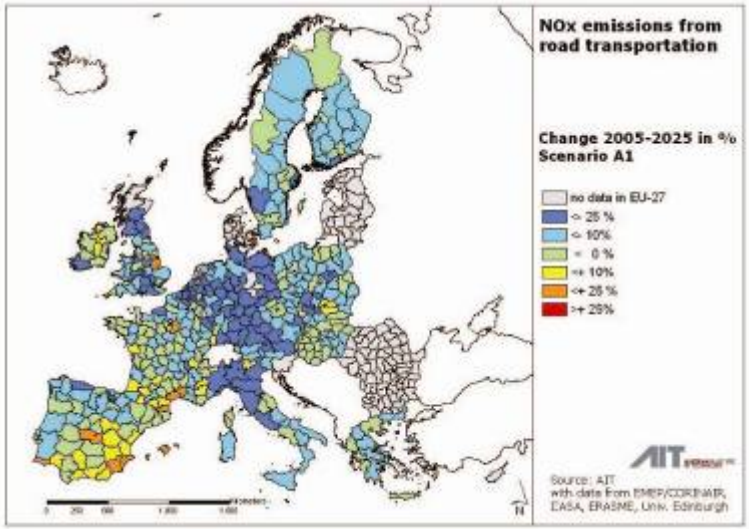
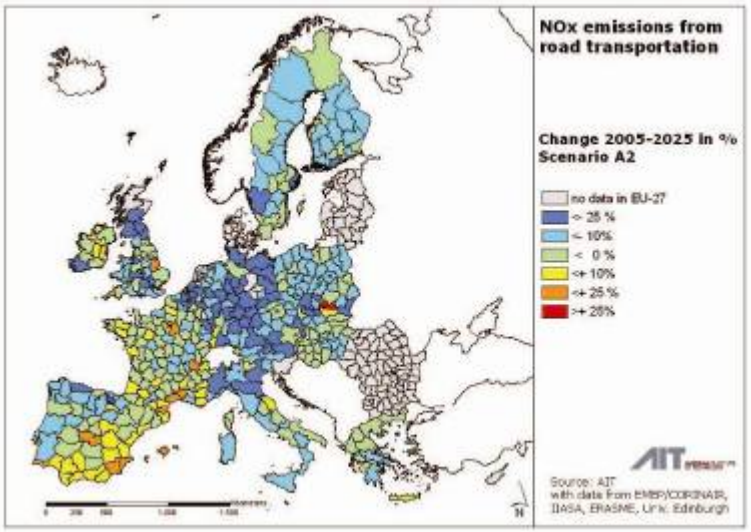
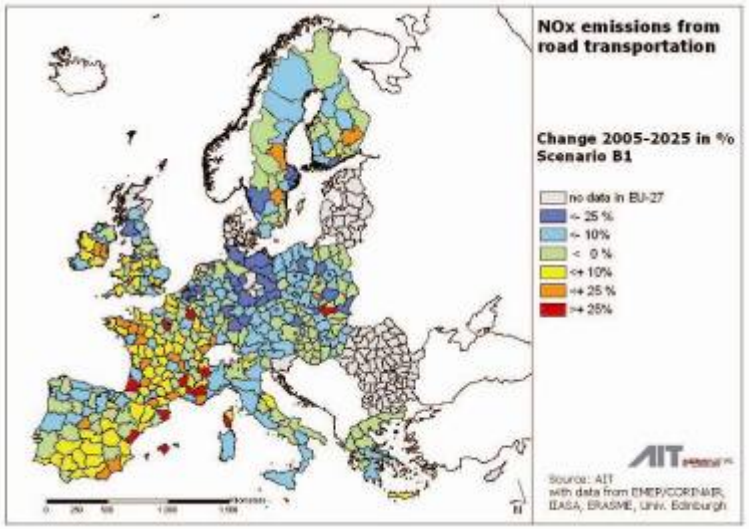
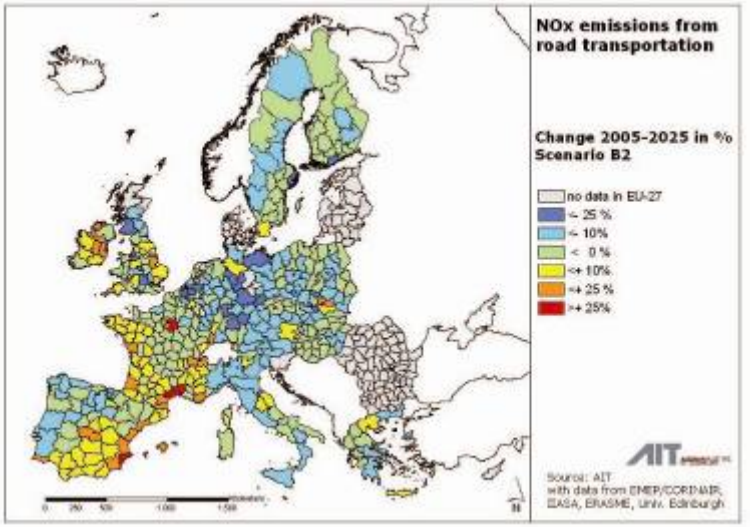
Then they rather live in the urban fringe

Air pollution









Source: Loibl, Orthofer, Köstl (AIT) 2010

Peri-urbanisation
- negative consequences

- Consumption of land, loss of high-productive agricultural land
- Destruction of biotopes and fragmentation of ecosystems
- Increase of the use of private car, traffic congestion, longer commuting times and distances
- Less open space, longer distance to attractive recreational areas
- Unhealthy life styles
- Decay of downtown areas
- Social segregation and reduction of social interaction

Peri-urbanisation - potentials

- Fulfilment of people's living preferences
- Under smart growth: attractive and competitive urban environments
- Proximity to consumers & potential for eco-friendly lifestyles
- Access to nature
- More life to rural communities

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Case study regions

Manchester

Haaglanden

Leipzig

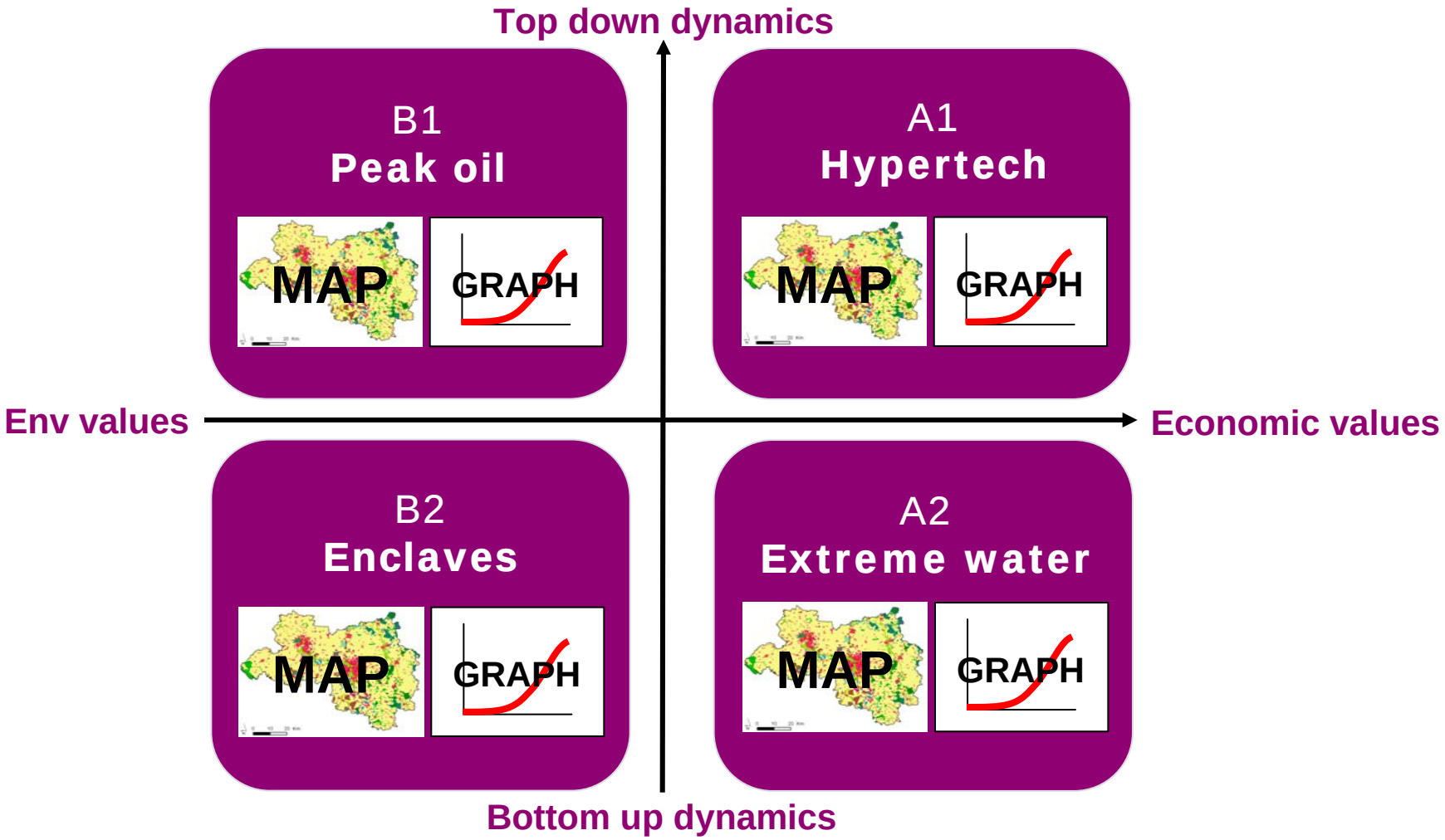
Warsaw

Montpellier

Koper

Hangzhou

Simulated Futures to study effects of land use change on regional sustainability



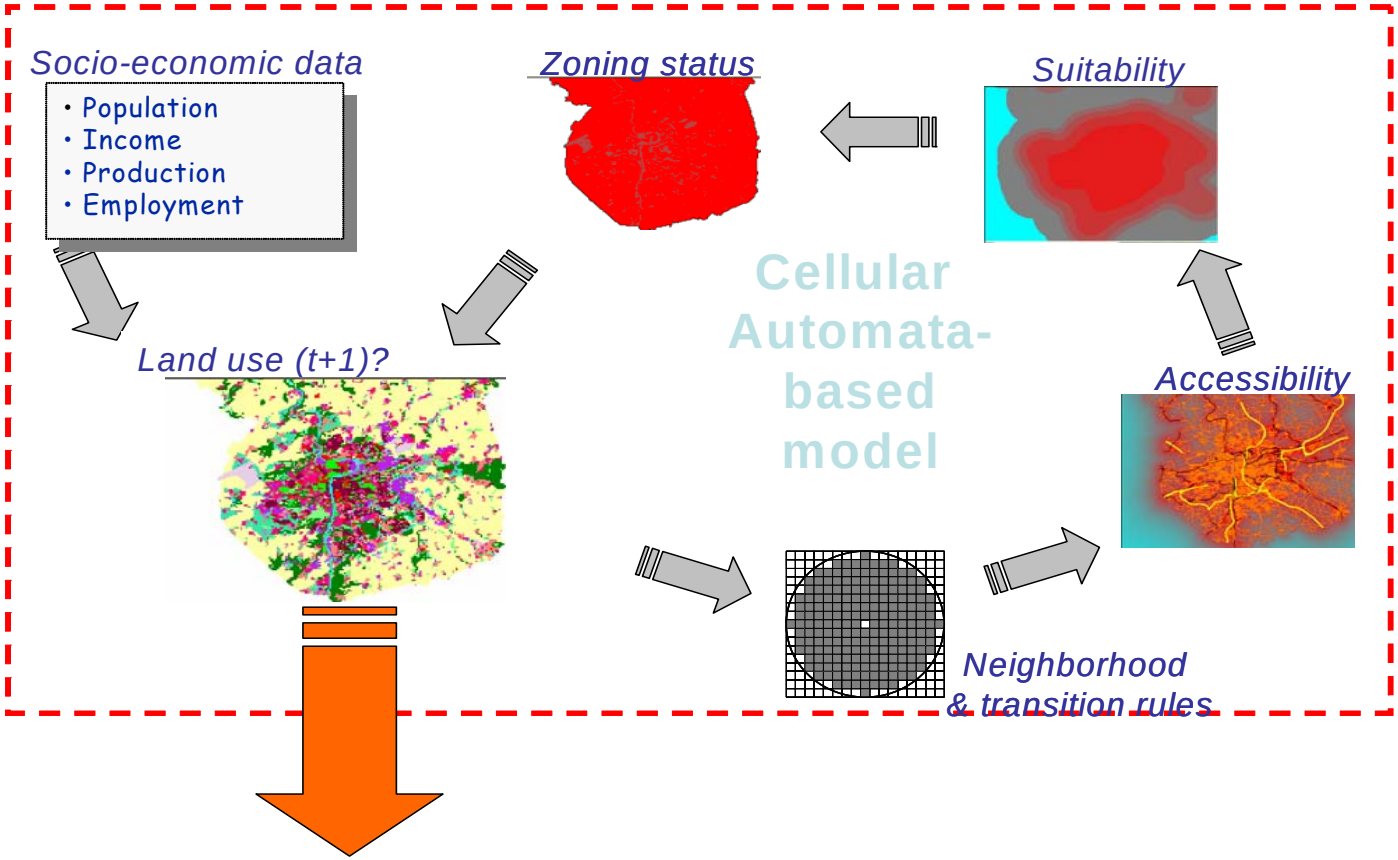
Modelling Land Use Change:
collaboratively defining the futures by scenarios

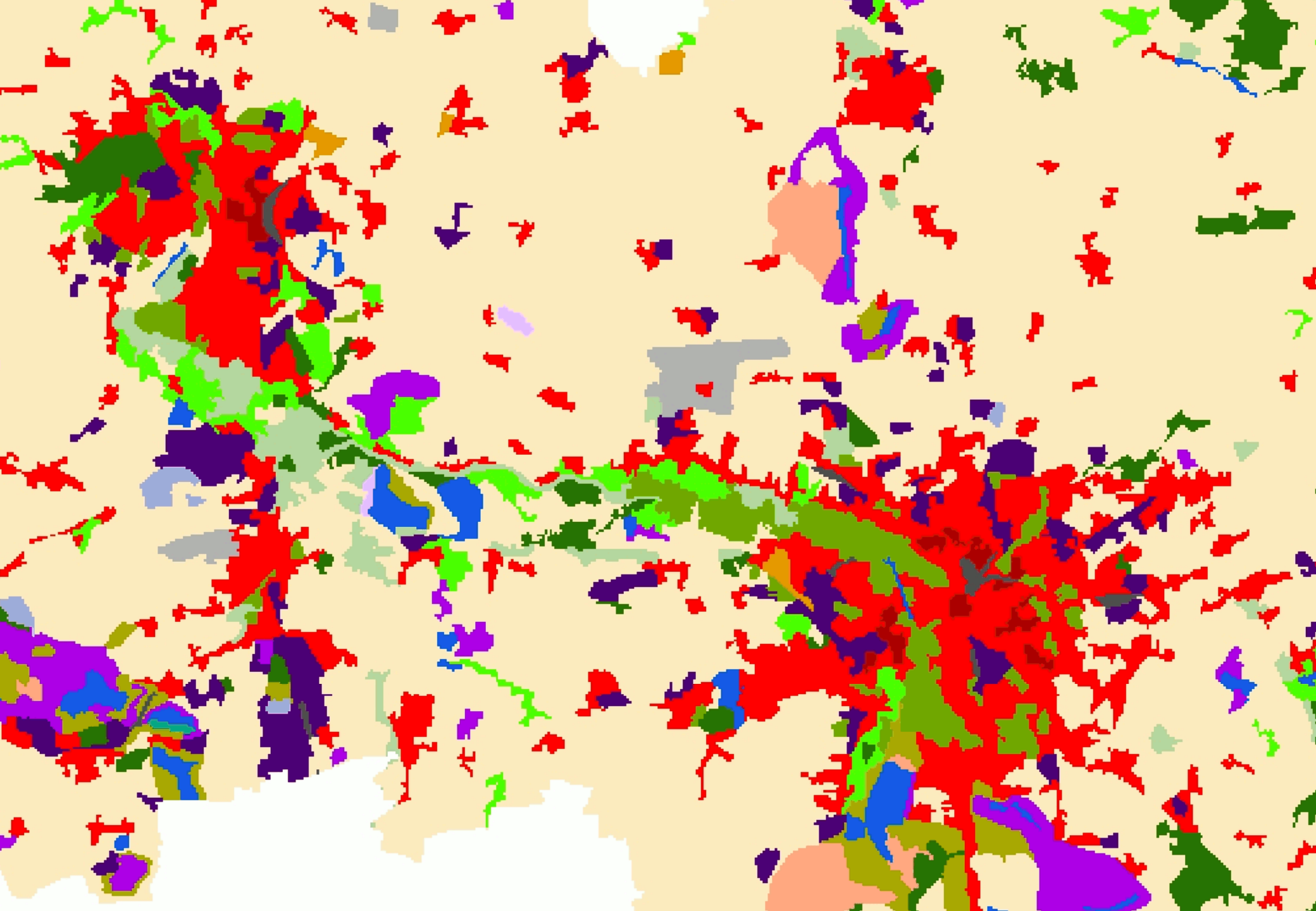
Local planning / Drivers	No Restrictions	Planning instruments implemented	Strong planning
Growth (Population, GDP)	**Hypertech*** **Uncontrolled growth****		**Managed growth**
Baseline		**Business As Usual**	
Shrinkage	**Uncontrolled shrinkage**		**Eco-Environ.** **Compact Eco**

details of the storylines are developed in cooperation with local researchers and/or stakeholders

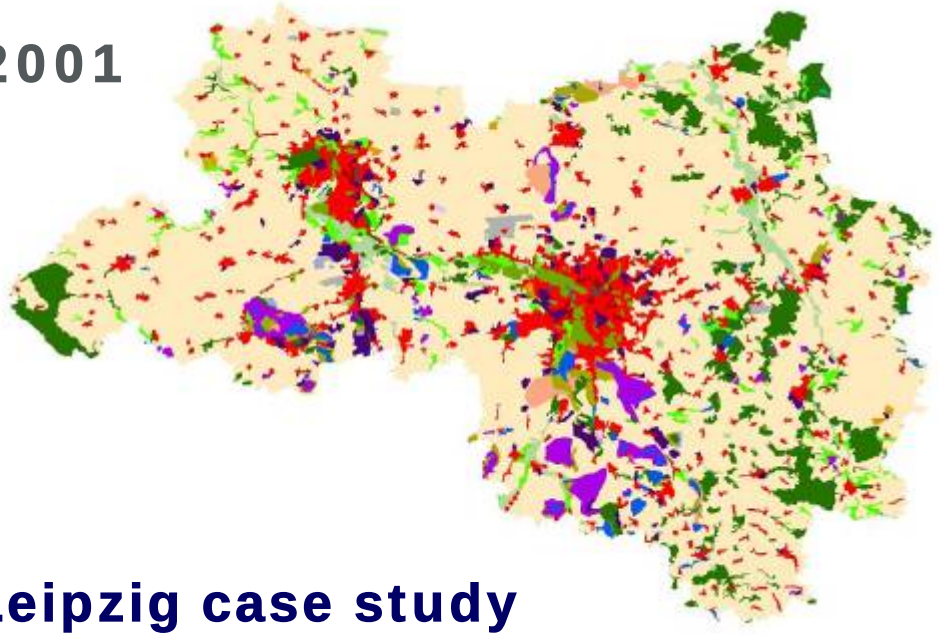
MOLAND application in the case studies

Model overview's:

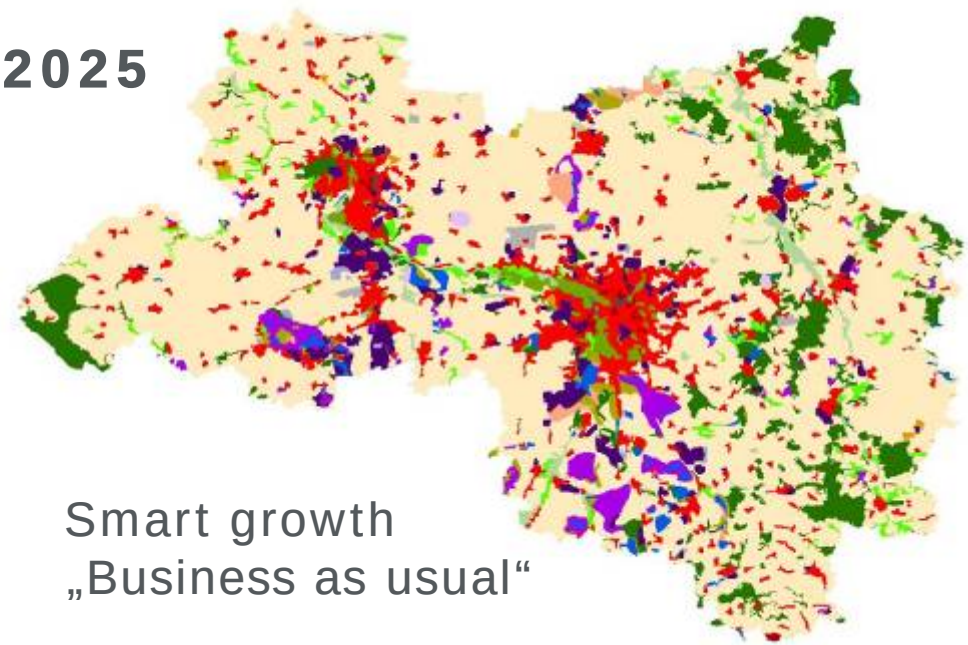




2001



2025



Smart growth
„Business as usual“

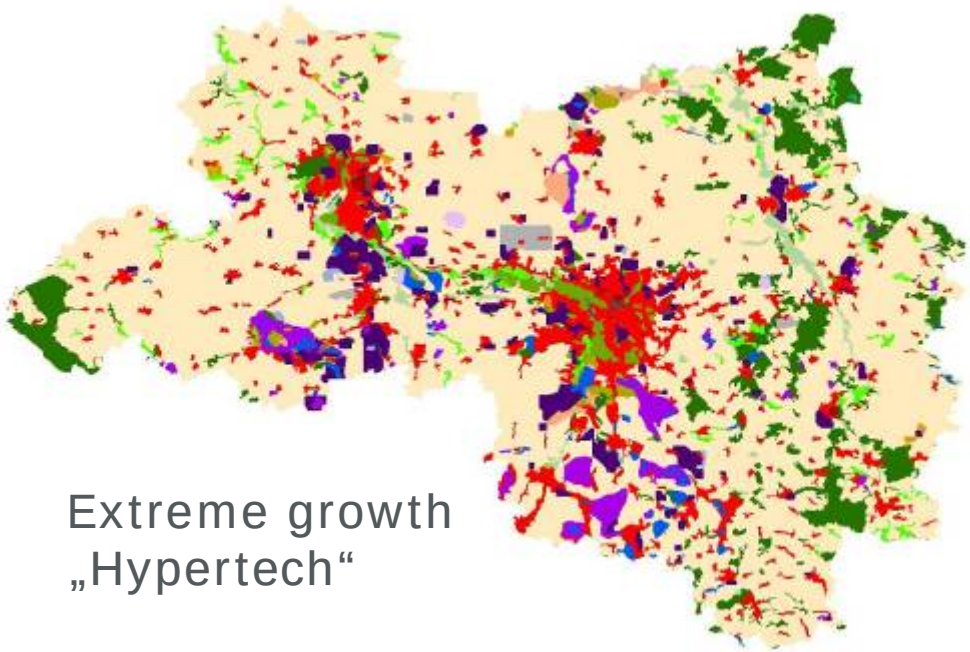
Leipzig case study

Land use types

- arable land
- permanent crop
- pastures
- heterogeneous agricultural areas
- forests
- shrub vegetation
- open spaces
- wetlands
- continuous urban fabric
- discontinuous urban fabric
- industrial and commercial
- construction sites
- port areas
- airports
- mineral extraction
- dump sites
- road and rail networks
- artificial non-agriculture
- water bodies

Layout: Dagmar Haase

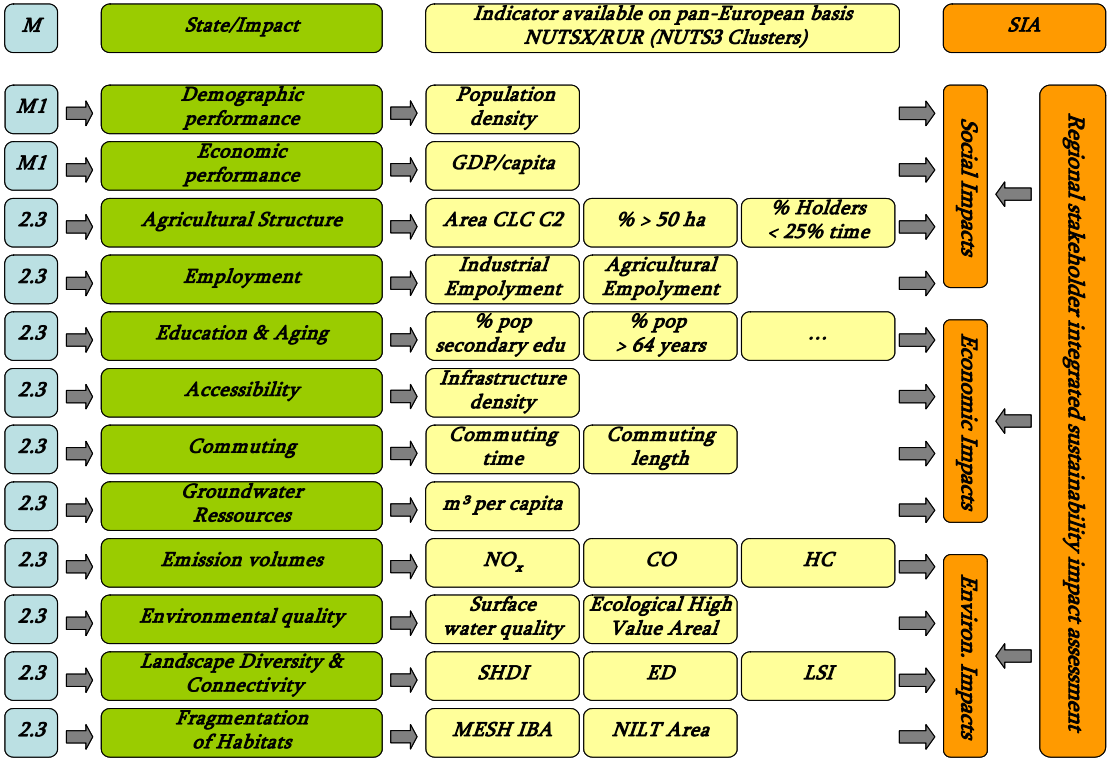
Simulation: Laura Petrov,
Dagmar Haase

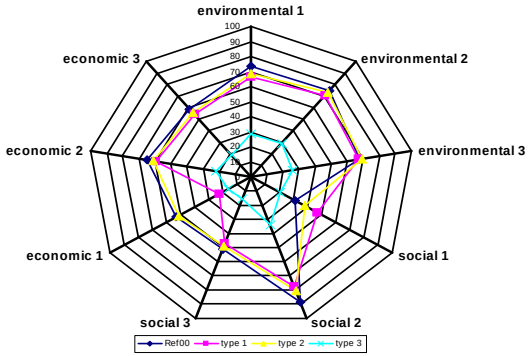


Extreme growth
„Hypertech“

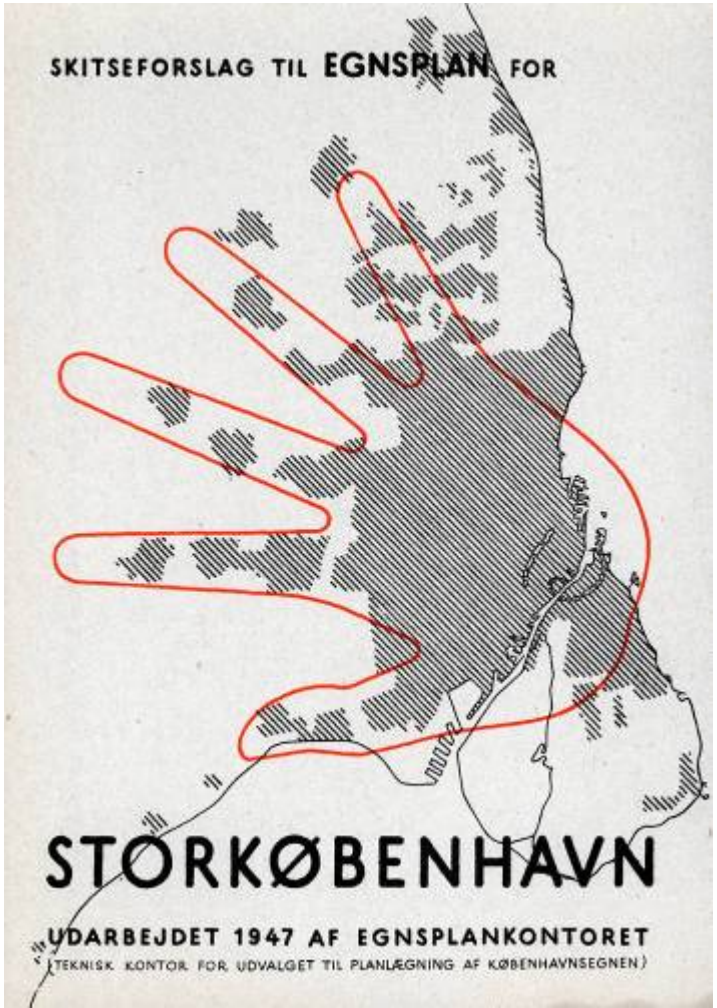
Assessment of Sustainability Impacts (or degree of objective achievement) of (peri-) urban land use changes

Response functions on different functions are intergrated into one impact assessment procedure

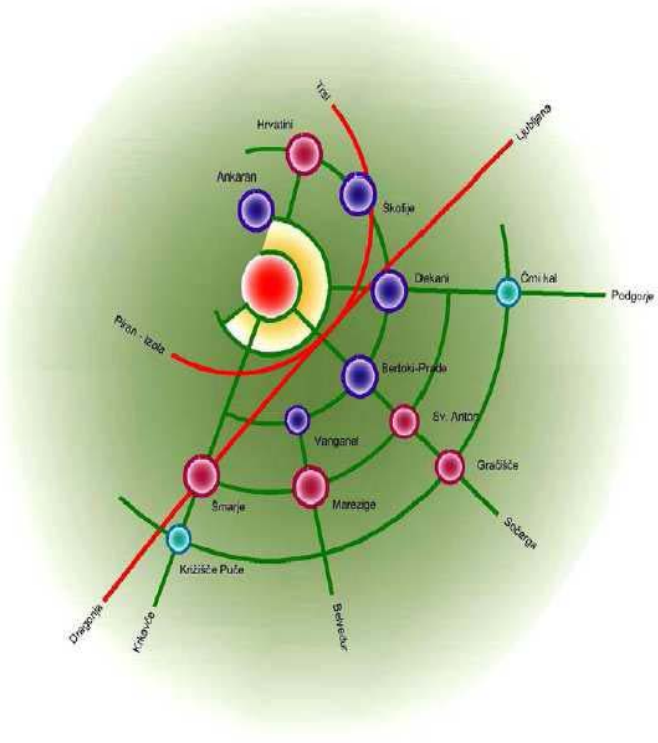


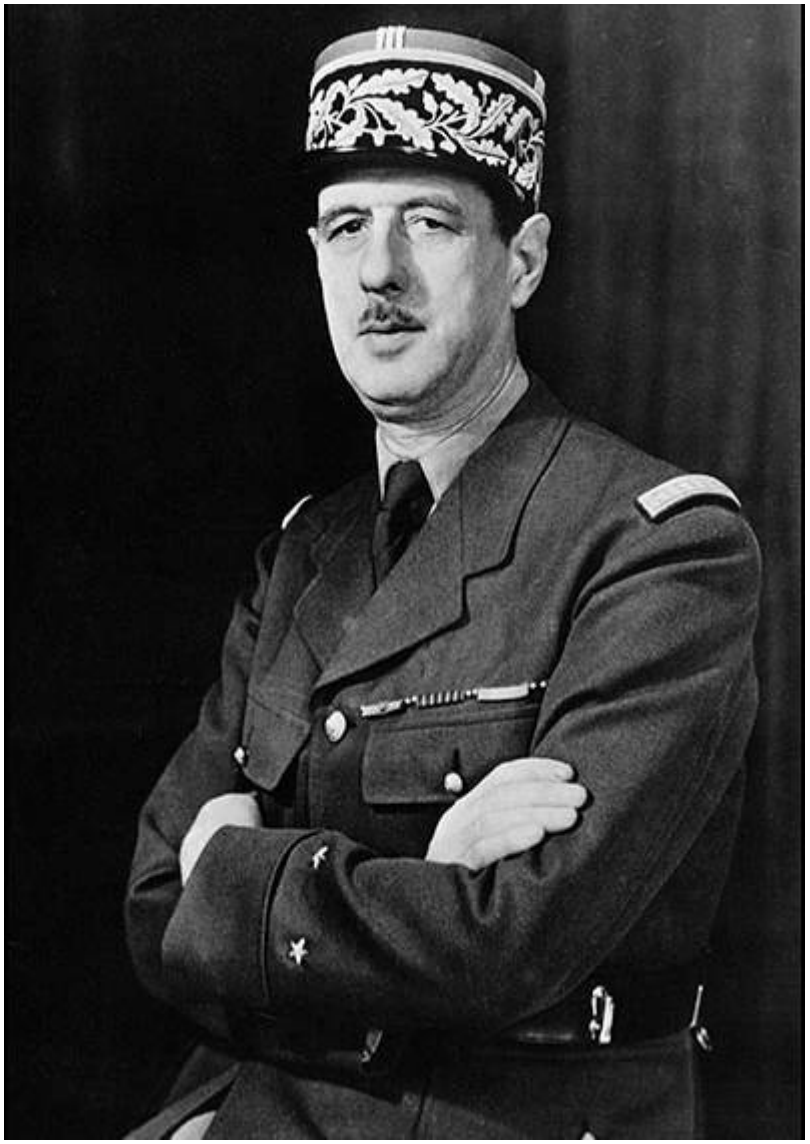


1. Better coordination between transport, land use and open space planning



Territorial cohesion and poly-centricity





2. Good governance and integrated policy appoaches

How can you govern a country which has two hundred and forty-six varieties of cheese?

Integrated territorial policy appoaches

Warsaw Metropolitan Area
– 72 municipalities

Montpellier Agglomeration
– 31 municipalities

Haaglanden – 9 municipalities

3. Urban containment - conservation

3. Urban containment - densification

Compact City

Vulnerable City

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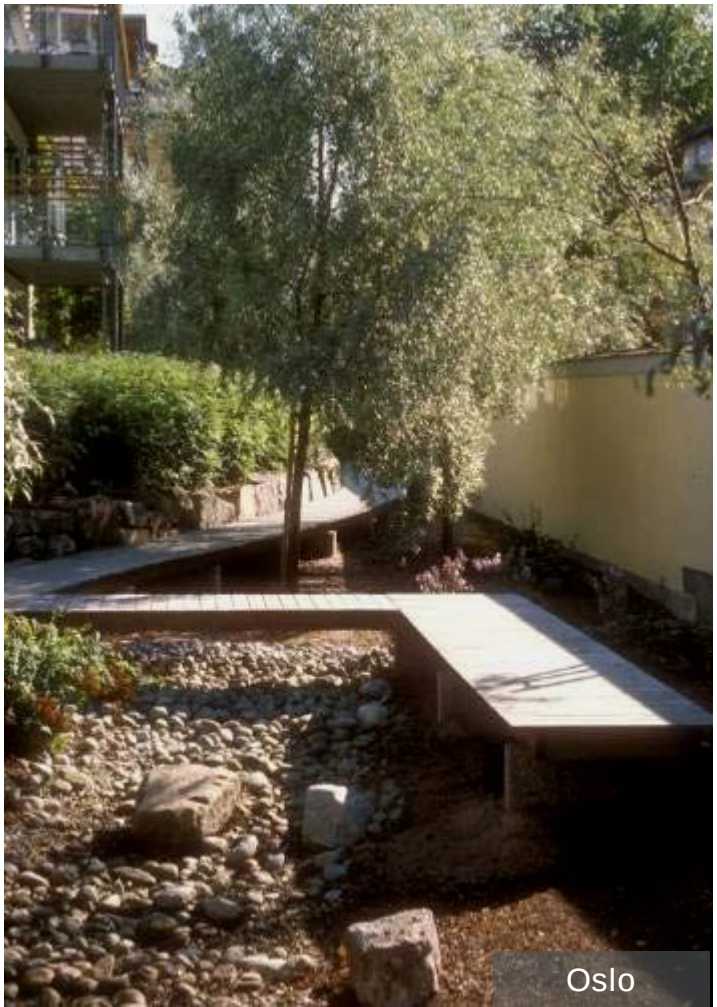
4. Green Compact City


Oslo


Stockholm


Malmo

More attractive urban core areas

Leipzig – Social city programme

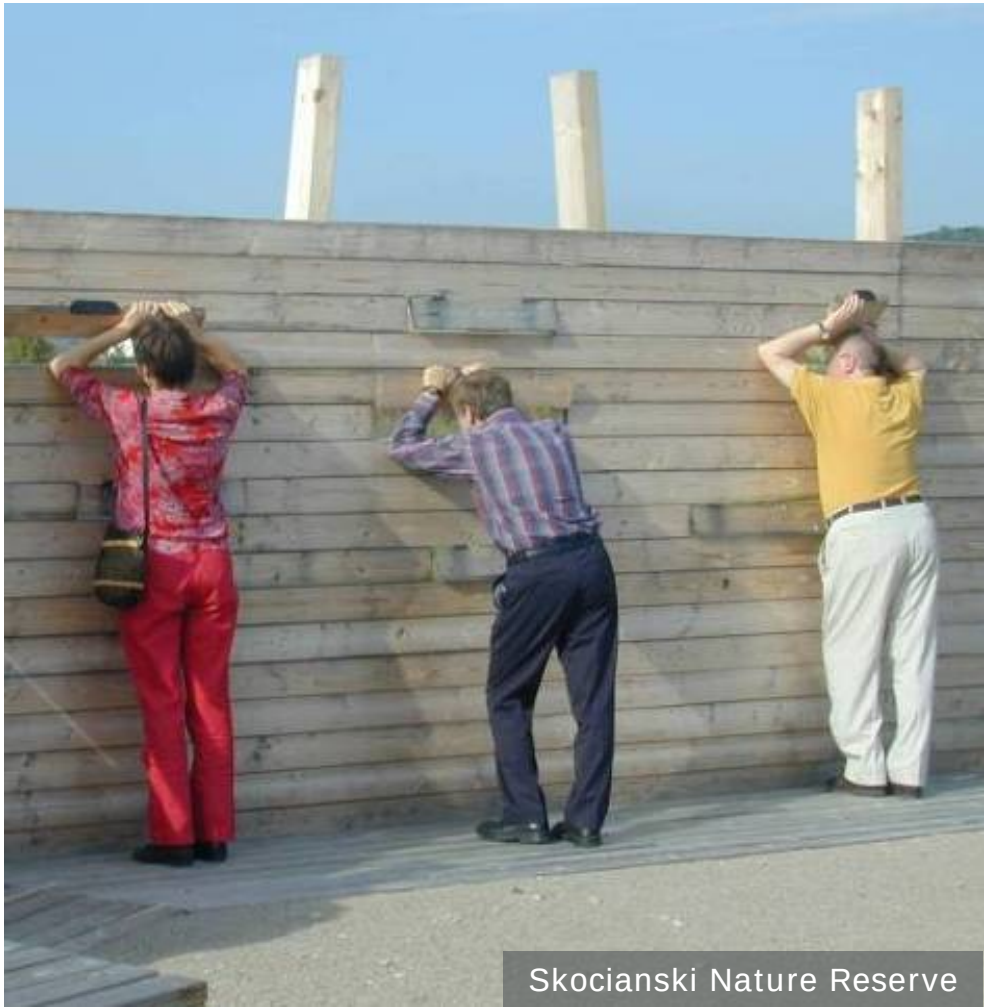
5. Preservation of the green infrastructure for biodiversity and environmentally friendly transport


Stockholm

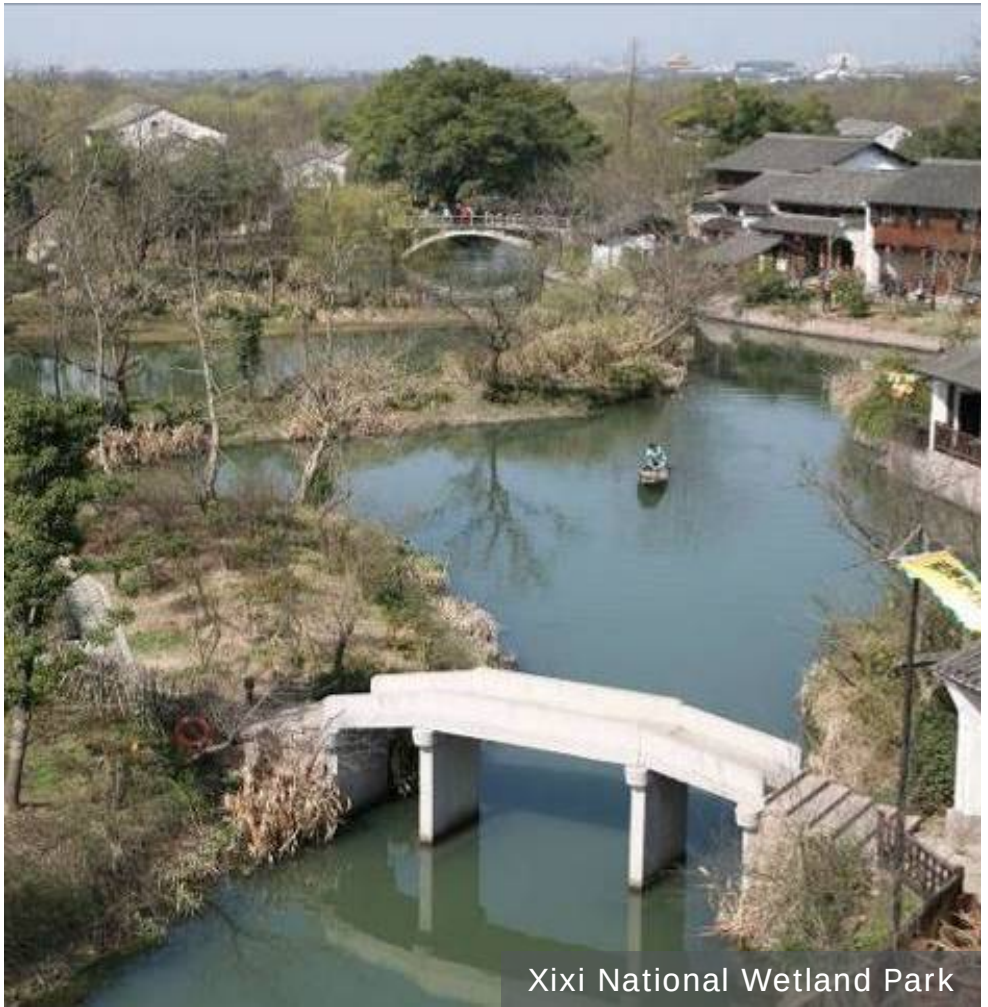

Copenhagen


Hämeenlinna

Nature conservation in the urban fringe



Skocianski Nature Reserve



Xixi National Wetland Park

6. Promotion of the Urban-Rural Interface and Short Circuits

Tampere

Guangzhou

Protection of agricultural land and local food production

Koper

Incredible edible

7. Provision of Ecosystem Services in the peri-urban Landscape

Green and Blue Services

Haaglanden

The ability/power of the public hand to resist the push of market actors towards more urban sprawl

	Type of regional/spatial planning policy		
Government deciding on land use change	a) Non-interventionist, laissez-faire systems	b) Medium level of control	c) Strong, controlled spatial policies
A. Small compared to the RUR region	1	2	3-5
B. Medium size, partly covering the RUR	2	3	4-5
C. Large, covering the RUR region	3-5	4-5	5

Source: Tosics (MRI) & Lalenis (UT) 2010

Public control of peri-urban development

	Haag-landen	Man-chester	Mont-pellier	Leip-zig	Koper	War-saw
Financial transfer system	0.67	1.00	0.67	0.67	0.00	0.33
The local taxation system	0.67	0.67	0.67	0.33	1.00	0.67
Local government financing systems	**0.67**	**0.83**	**0.67**	**0.50**	**0.50**	**0.50**
Economic development and infrastructure	1.00	0.50	0.50	1.00	0.50	1.00
Transport	0.83	0.67	0.50	0.50	0.17	0.33
Housing	1.00	0.67	0.67	0.33	0.33	0.33
Sectoral policies	**0.94**	**0.61**	**0.56**	**0.61**	**0.33**	**0.56**
Tools to steer development	**0.75**	**0.50**	**0.50**	**0.75**	**1.00**	**0.25**
Summary	**6.53**	**5.45**	**4.74**	**4.69**	**3.83**	**3.97**

Quantified answers by the regions
Source: Tosics (MRI) 2010

Conclusions:
New governance directions

- A perceived policy gap between the urban and the rural policy regimes
- Previously protected lands for agriculture and nature conservation are under hard pressure – Steadily rising land prices in the urban fringe
- Possibilities for financial compensation to farmers – Land leasing and other land management opportunities
- Participation of the general public remains a major challange
- New actors – environmental groups, neighbourhood groups, local businesses, farmers – can contribute to innovative thinking, new options and solutions
- Weaknesses of the existing political system with regard to the interlinkages between urban and rural areas
- Considerable regional governmental power is needed to steer and balance development in terms of economic, environmental and societal needs

Source: Aalbers (Alterra) & Eckerberg (SRC) 2010

Conclusions: Towards a European policy

- The challenges can only be addressed by strong public control over land use changes, which needs better coordination of economic, environmental and social interventions by the public sector
- Such coordination requires effective cross-sectorial and cross territorial thinking, which best can be realized on the territorial level of rural-urban regions
- This new approach needs policy guidance from the EU development strategy and financial support from the EU allocation system, initiating cross-sectoral and cross-teritorial planning and development on the RUR level
- Five main options:

a) EU Rural-Urban Conditionality

b) EU Integrated Rural-Urban Development Framework Directive

c) EU Community Initiative

d) Open Method of Coordination for Development Planning in Rural-Urban Regions

e) EU Reference Framework for Integrated Rural-Urban Development Planning

Source: Tosics (MRI) 2010

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Thank you for your attention!