FOOD METRES

Food Planning and Innovation for Sustainable Metropolitan Regions

Food Chain Innovation in Metropolitan Regions

From Spaces of Flow to Spaces of Place

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BIOGESTECA Conference, 14 February 2014, Milano, Italy

Overview

- Introduction: places & flows
- Metropolitan agriculture
- The FoodMetres project

Introduction: Places & Flows

"…A **place** is a locale whose form, function and meaning are selfcontained within the boundaries of physical contiguity…".

M. Castells 2000

Introduction: Places & Flows

"Landscape means an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors"

European Landscape Convention

CoE 2000

Introduction: Places & Flows

Introduction: Places & Flows

"Our society is constructed around **flows** of capital, of information, of technology, flows of organizational interactions, flows of images, sounds, and symbols. Flows are the expression of processes dominating our economic, political, and symbolic life.

M. Castells 2000

Introduction: Places & Flows

LAS – Local Agricultural Systems

MAS – Metorpolitan Agricultural Systems

GAS – Global Agricultural Systems

M. Castells 2000

Local Agricultural Systems (LAS)

Local Agricultural Systems (LAS)

- diverse commodities as well as larger proportions of region-specific goods, targeting at farmers markets, food cooperatives, direct sales as well as at ‘local food’ marketing campaigns.
- food chain components are located in spatially confined areas, sometimes single farms or agglomerations of farms.
- food chains are typically rather short with little numbers of elements or elements controlled by a few, sometimes by even only one, actor, managing the food chain.
- System innovation is targeting mainly at social and environmental issues at the farm level; key is the consumer’s experience of understanding

Global Agricultural Systems (GAS)

Global diary product trade 2006

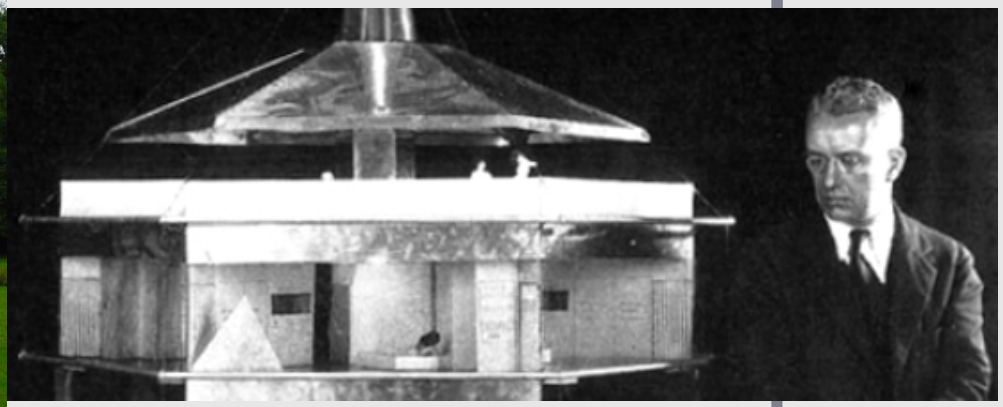
Metropolitan Agricultural Systems (MAS)

Metropolitan Agricultural Systems (MAS)

- diverse commodities as well as monocultures targeted at processed goods for large urban retailers (supermarkets) as well as for whole sale markets;
- food chain components are spread across the whole metropolitan region surrounding one or a cluster or urban centers (polycentric urban structures)
- food chain activities are characterized by a large degree of specialisation, large distances between the different operating units, and centralised transport logistics;
- system innovation is geared towards increasing both resource efficiency and the value chain in the whole food system;

Introduction: Places & Flows

Spaces of Flows are reflected in the prototypical builders Machine for Living (Le Corbusier, 1925), Dymaxion (Buckminster Fuller, 1929) and predecessor The Crystal Palace (Joseph Paxton, 1851).

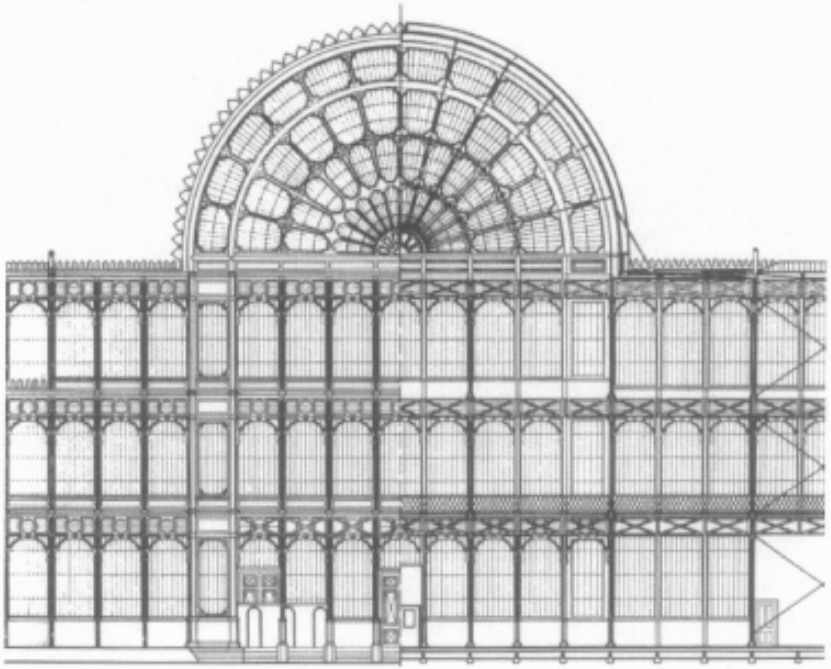


Introduction: Places & Flows

The Crystal Palace*

by Peter Sloterdijk

"Im Weltinnenraum des Kapitals"

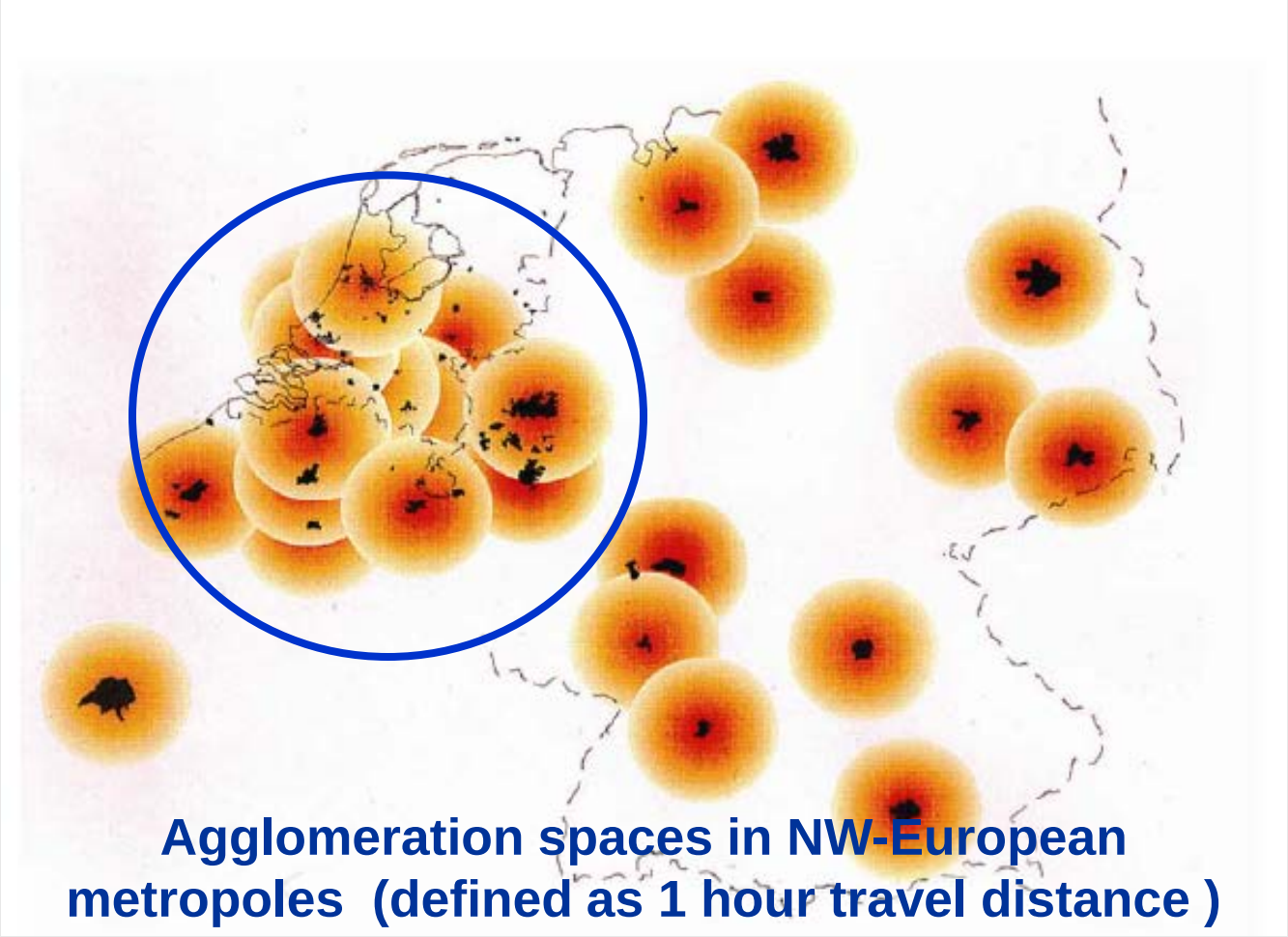


Sloterdijk 2008

Introduction: Places & Flows

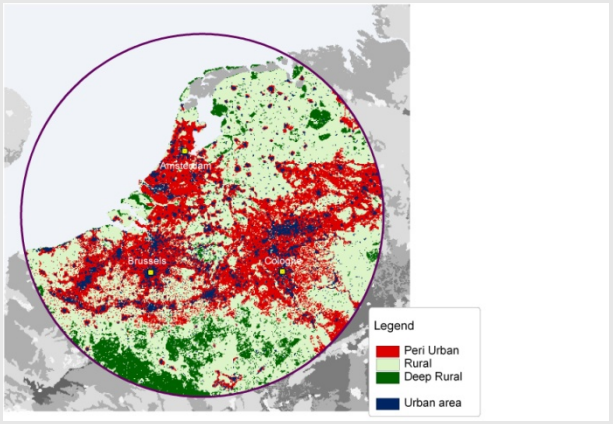
	Spaces of Flow	Spaces of Place
Communcation	Internet (digital) Global & permanent Virtual	Face-to-face (human) Locational & Real
Actors	Finances Science (RTD) Policy (WTO, CAP)	Farmers Retailors Consumers
Markets	Energy Import-export Finances	Distance Goods & services Soils & climate
People	Demography Migration International (fashion)	Tradition & skills Landscape character Regional identity

Metropolitan Agriculture

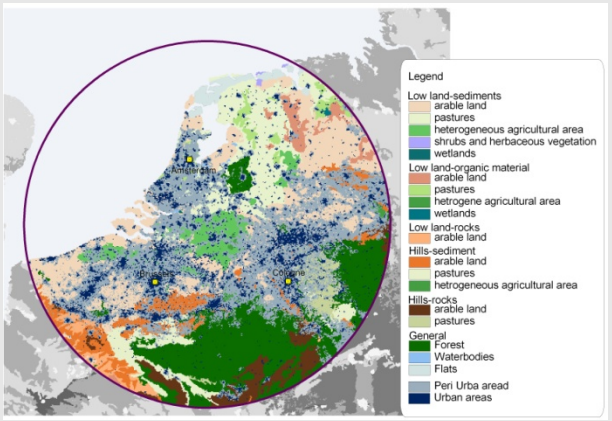


Agglomeration spaces in NW-European metropoles (defined as 1 hour travel distance)

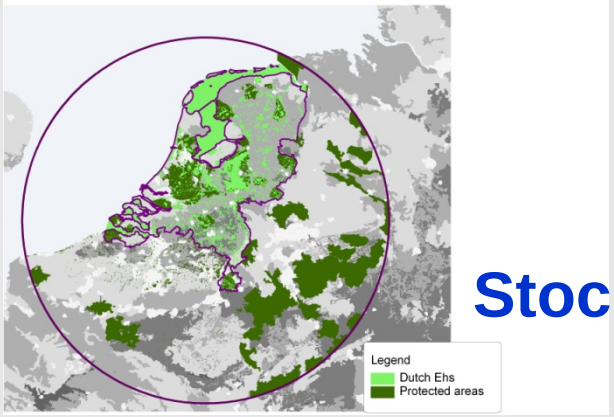
Metropolitan Agriculture: Spaces of Place



Urban-Rural Gradient

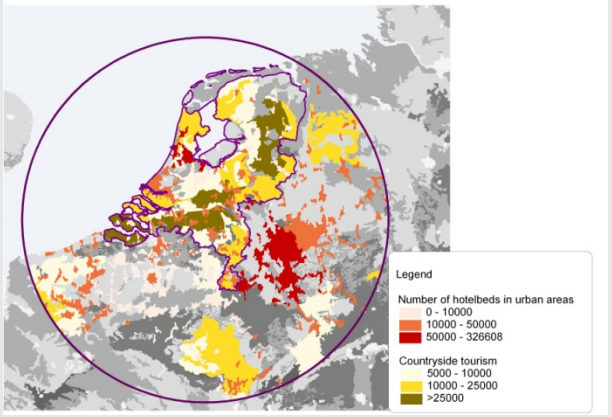


Landscape Character



Protected Areas

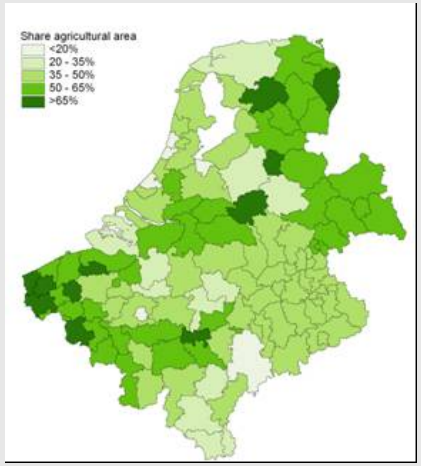
Stocks

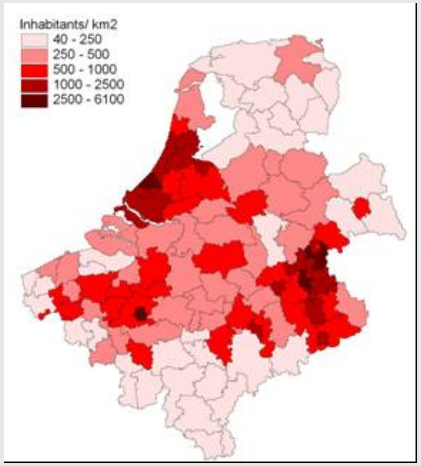


Recreational Sites

Metropolitan Agriculture: Spaces of Flow

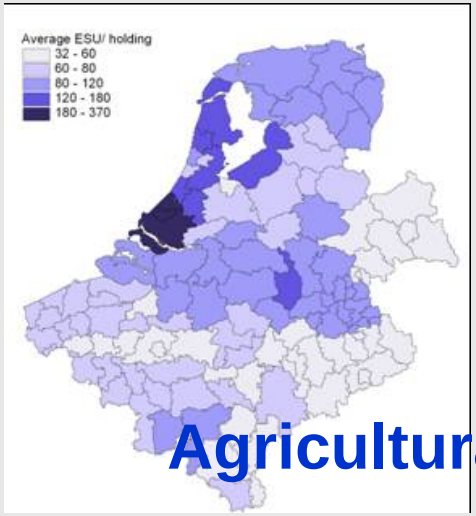
Land Use Change (share of agri-land)

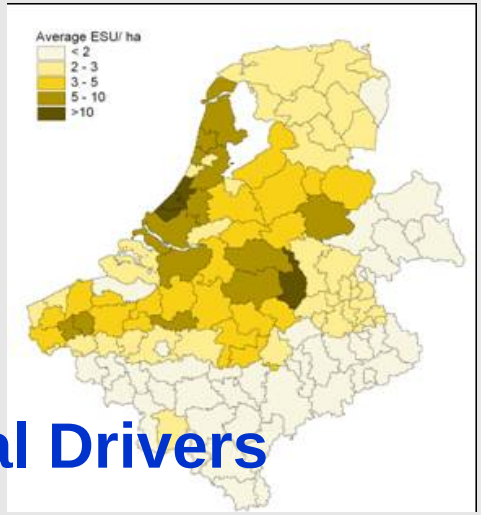




Demography (Inhab. / km2

Average ESU/ holding

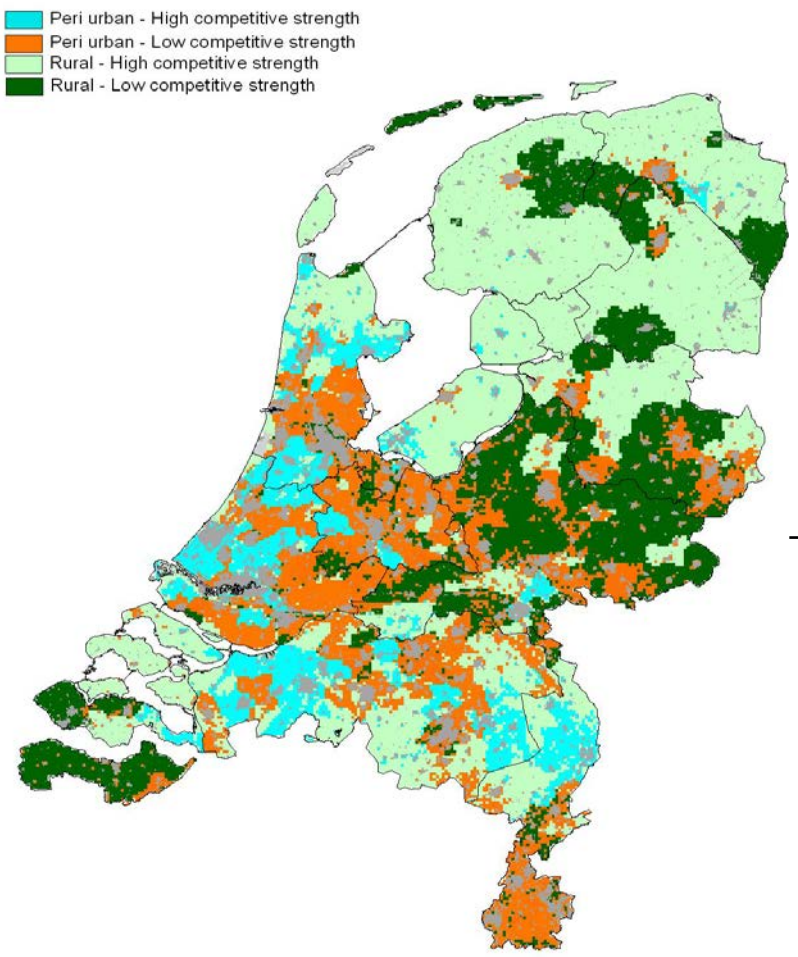




Average ESU / hectare

Agricultural Drivers

Metropolitan Agriculture: Spaces of Flow



Seperated functions

URBAN

Concentrated intensive horticulture, remaining open area (> 50%) for recreation, urban agriculture, care, etc	Extensive small scale farming, rural living, recreation, nature conserve,water retention etc.
HIGH COMPETITIVE	**LOW COMPETITIVE**
Large scale arable and dairy farming, energy and biomass production	Small scale farming. nature conserve, waterret., biomasspr.

RURAL

Interweaved functions

FOODMETRES

FOOD PLANNING AND INNOVATION FOR SUSTAINABLE METROPOLITAN REGIONS

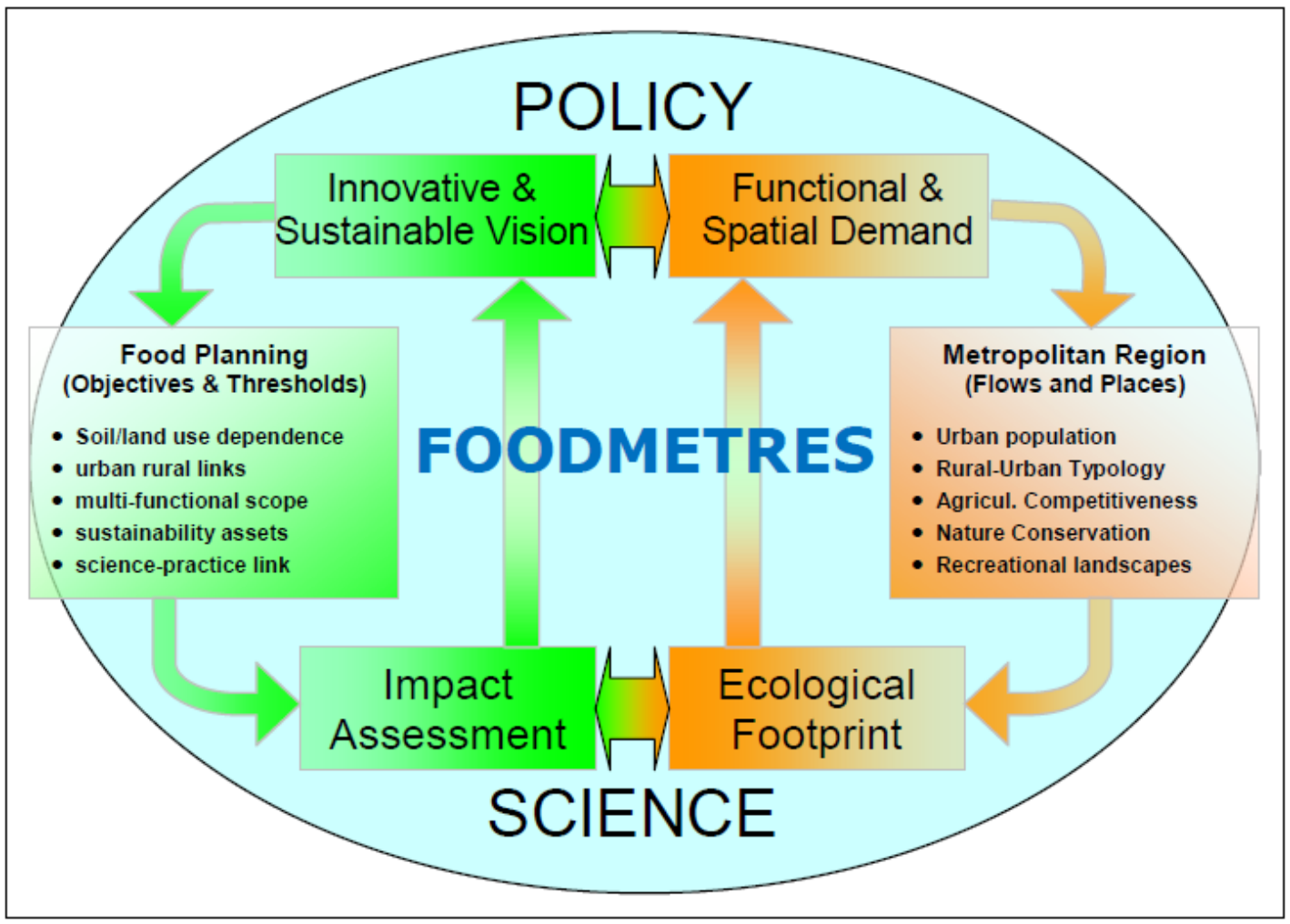
FOODMETRES 2012 - 2015

PROJECT PARTNERS	
DLO Wageningen UR (Alterra-FBR-RIKILT)	**NL**
Leibniz-Centre for Agricultural Landscape and Land Use Research (ZALF)	**DE**
Coventry University	**UK**
University of Milano	**IT**
University of Ljubljana	**SL**
University of Nairobi	**KY**
African Studies Centre	**NL**
IFR Innovative Futures Research	UK
AGRIMERCATO Association	IT
MAPSUP	NL
SUSTAIN: the alliance for better food and farming	UK
Fördergemeinschaft Ökologischer Landbau Berlin Brandenburg (FöL)	DE
Boerenverstand Consultancy	NL
Dorén + Köster	DE
GEAPRODUKT	SL
Pro CONTUS	SL
Garden Organic	UK
Malzfabrik	DE

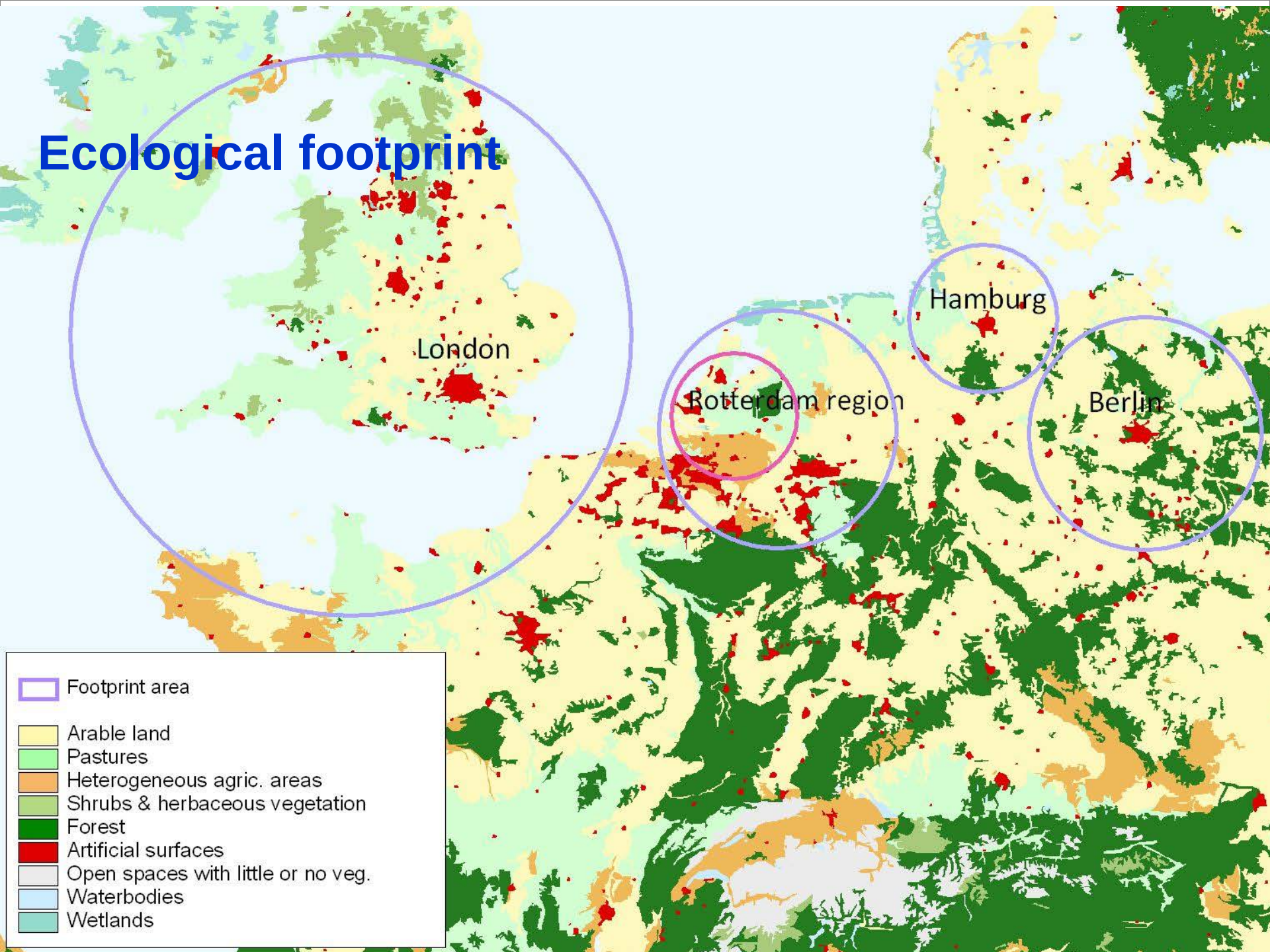
FOODMETRES: Objectives

The project
develops, tests and applies tools for
scenarios and impact assessment
focusing on environmental, social and economic
aspects of food chain innovation
with special emphasis on the
spatial dimension
of food logistics, safety and governance
in six metropolitan regions using
knowledge brokerage techniques
for food planning with stakeholders

FOODMETRES: Objectives



Ecological footprint



Identification of the LAS-Regions

Analysis at LAU2-level of both the metropolitan area identified by OECD and the "dense core" resulted from LISA (Local Indicators of Spatial Association) approach (Anselin, 1995)

The approach is as follows:

- **compute the local Moran statistics to arrive at the significance map**
- **based on this, develop the LISA cluster map which makes spatial relations more explicit**
- **Select the high-high density cluster areas as LAS-regions**

Identification of the LAS-Regions

Significant locations are color coded by type of spatial autocorrelation:

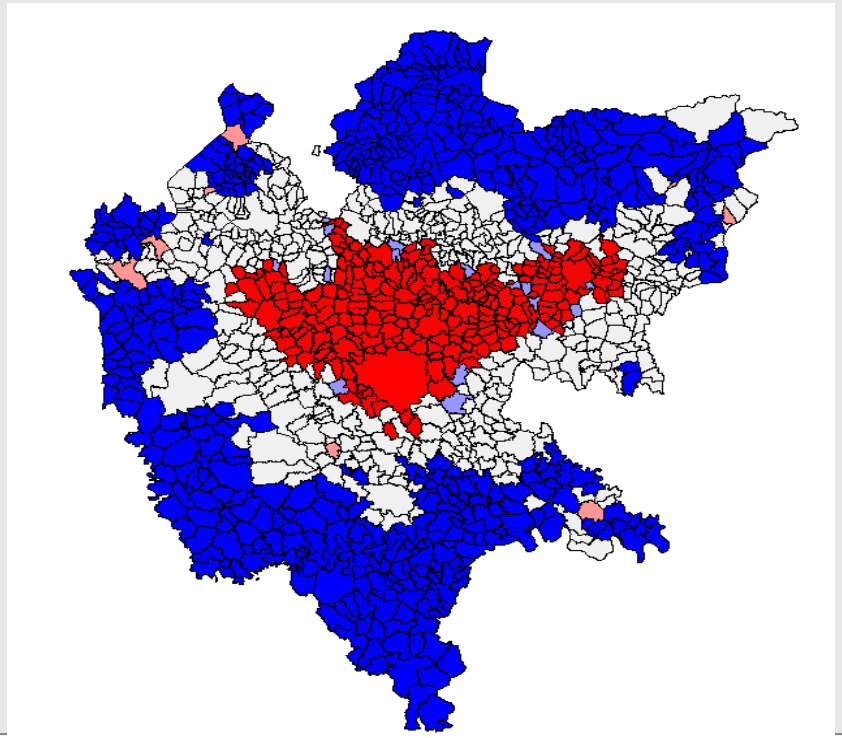
- **high-high**
- **low-low**
- **high-low**
- **low-high**

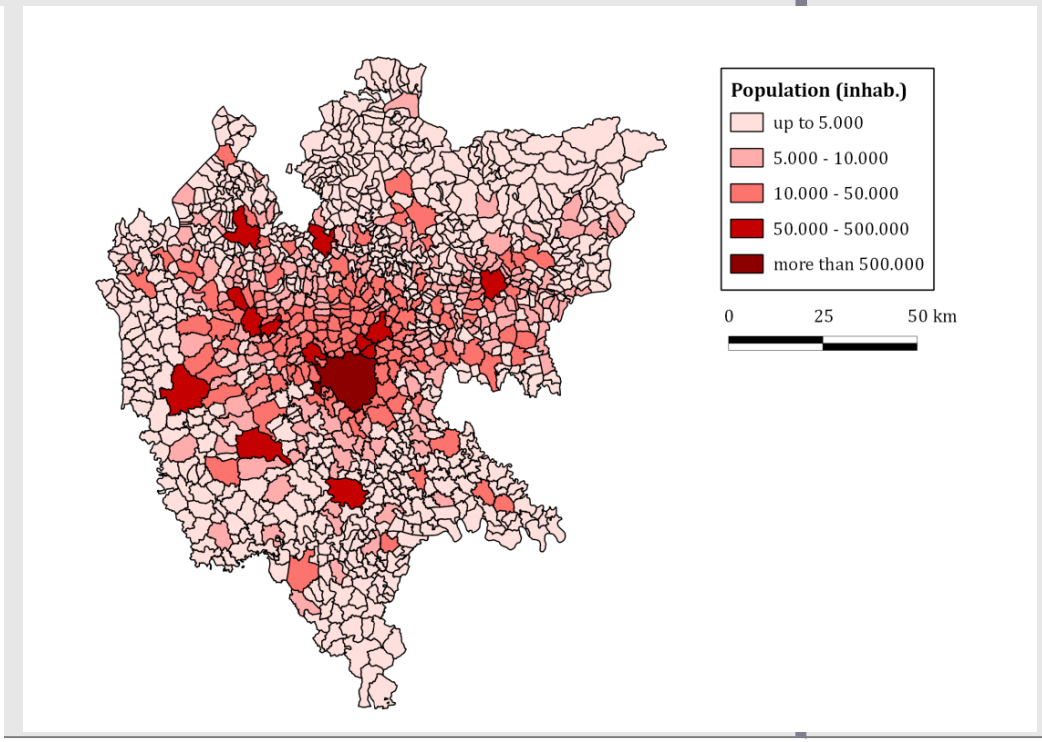
These four categories corrrespond to the four quadrants in the Moran scatter plot.

Identification of the LAS-Regions

Milan

	OECD region	LISA	LISA/OECD (%)
Municipalities (n.)	1,163	260	22
Population	7,891,991	4,535,493	57
Area (km^2)	13,111	2,095	16

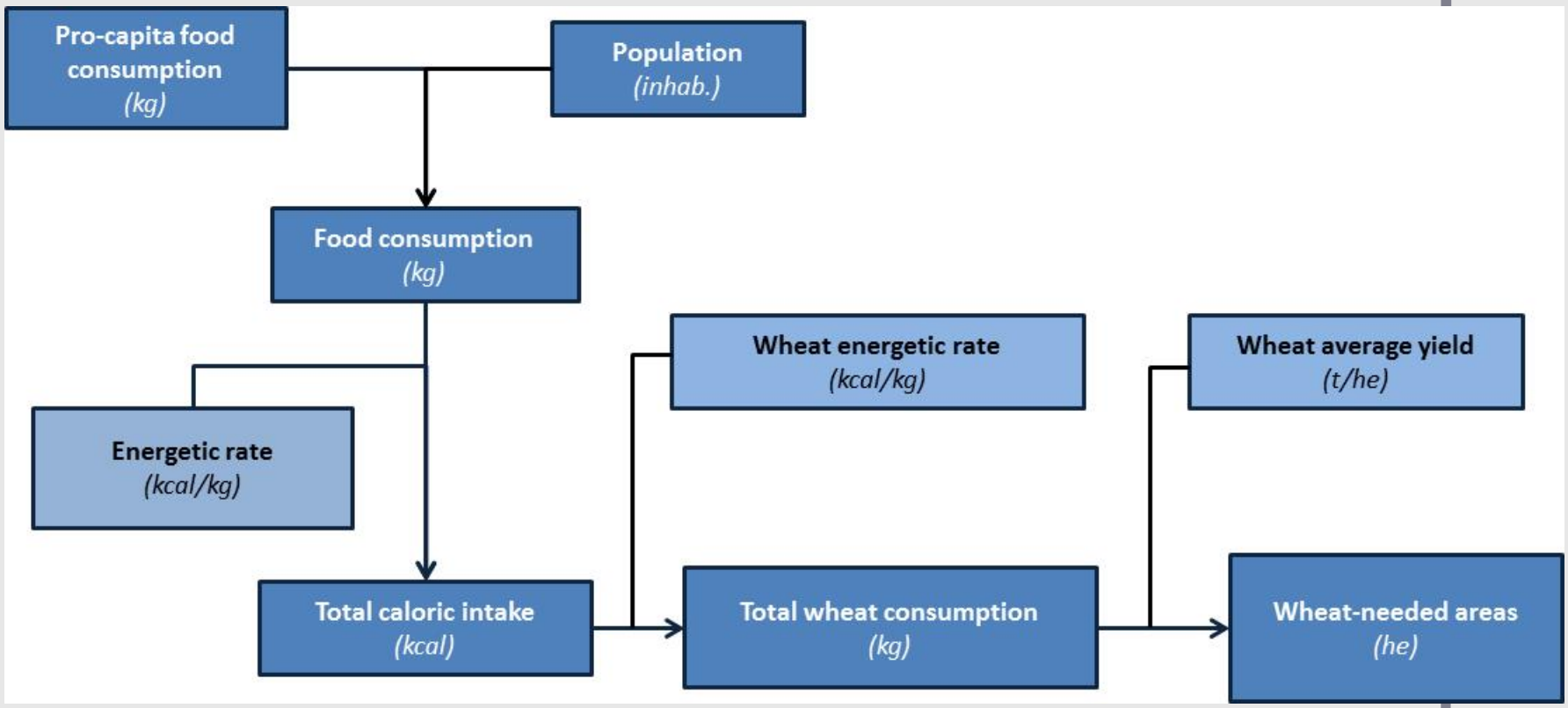




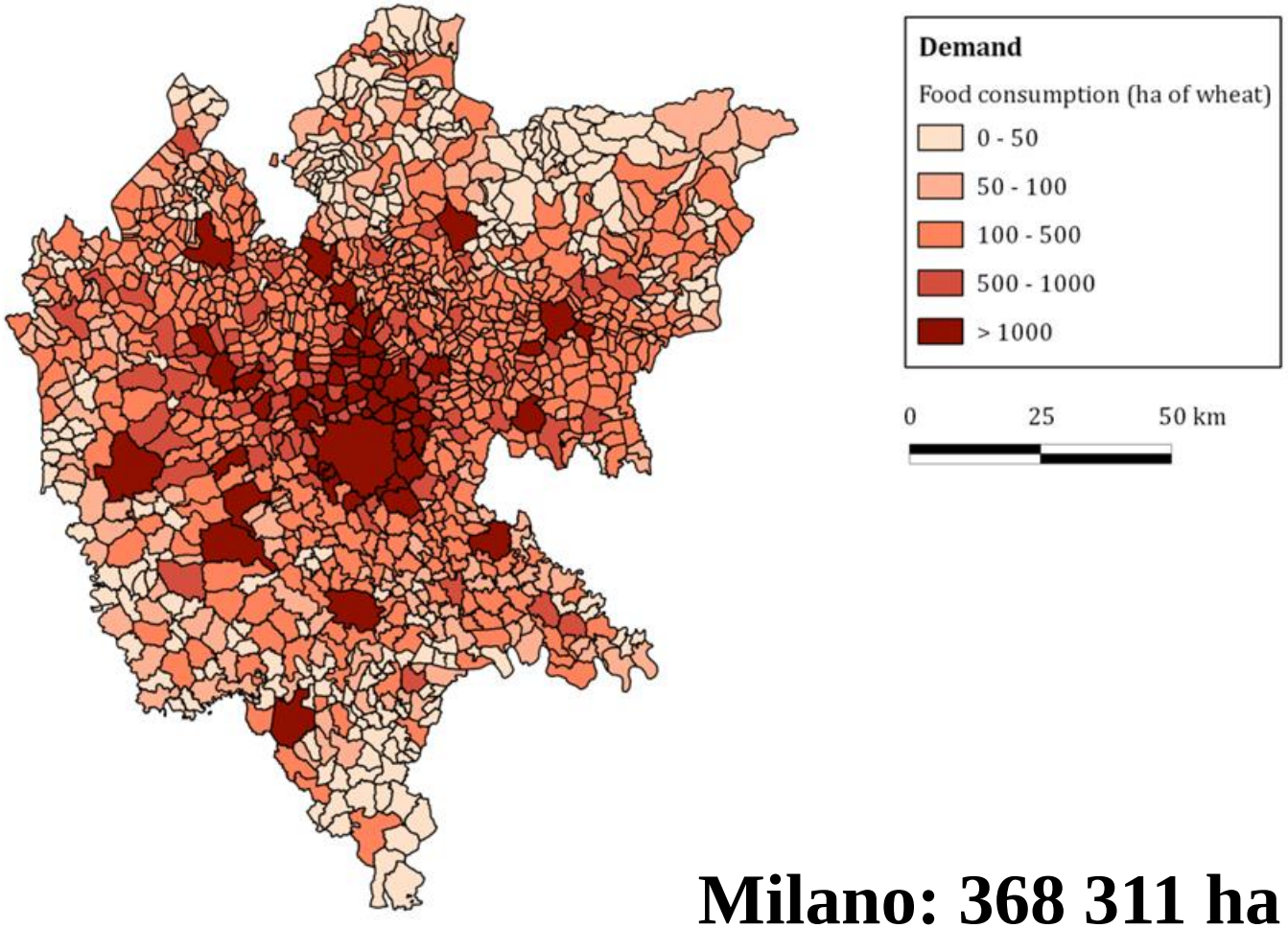
Identifying food demand

- **Source of food consumption data: European Food Safety Authority database “Chronic food consumption statistics “ (EFSA, 2011);**
- **Calculation of the total calories consumed by the population of each municipality;**
- **Using the grain as a measure of capacity of agricultural land to produce calories, for each municipality has been quantifyied the extension of agricultural land needed to produce the calories consumed by the population.**

Identifying food demand



Identifying food demand



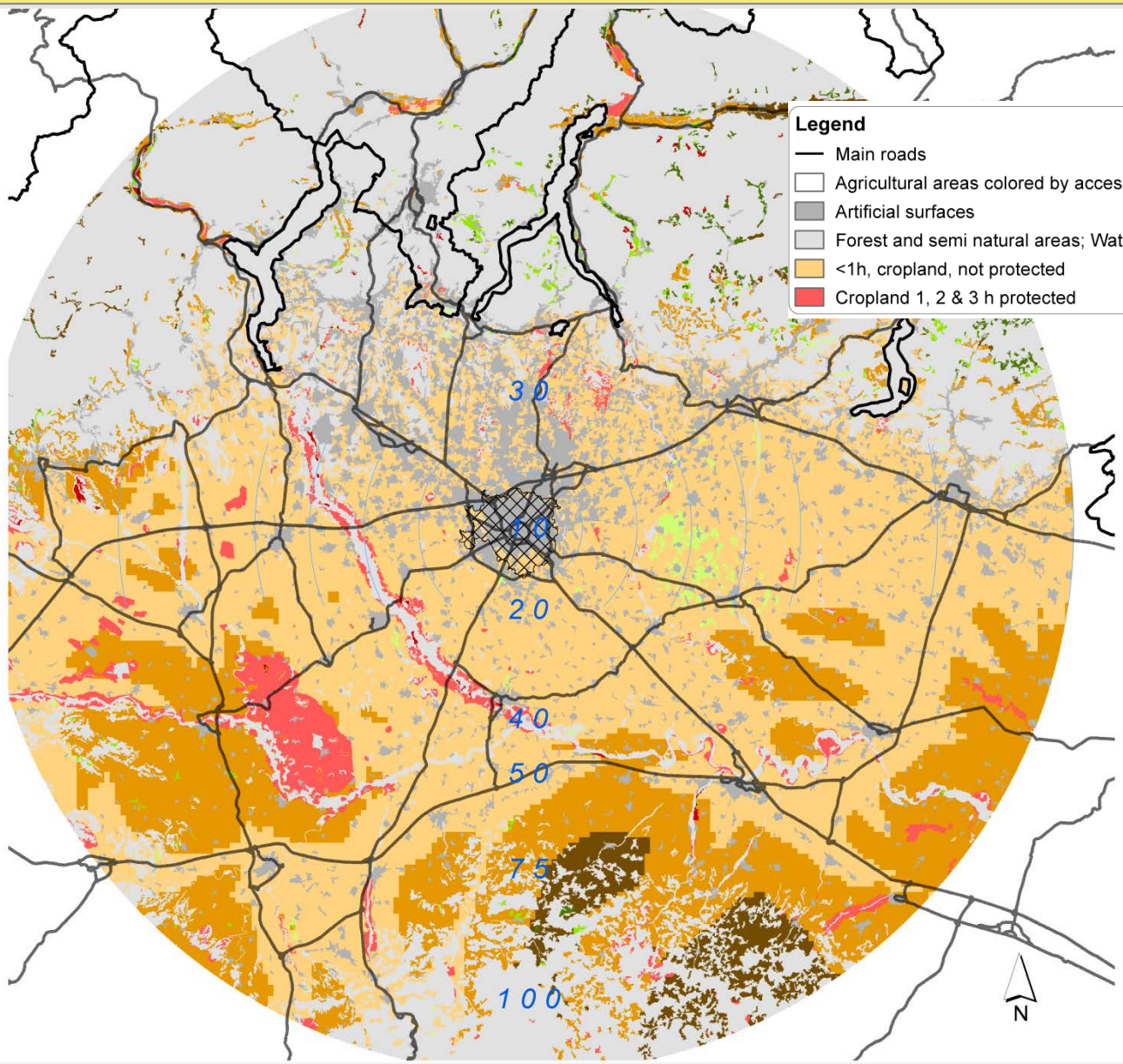
Milano: 368 311 ha wheat

Identification of the MAS-Regions

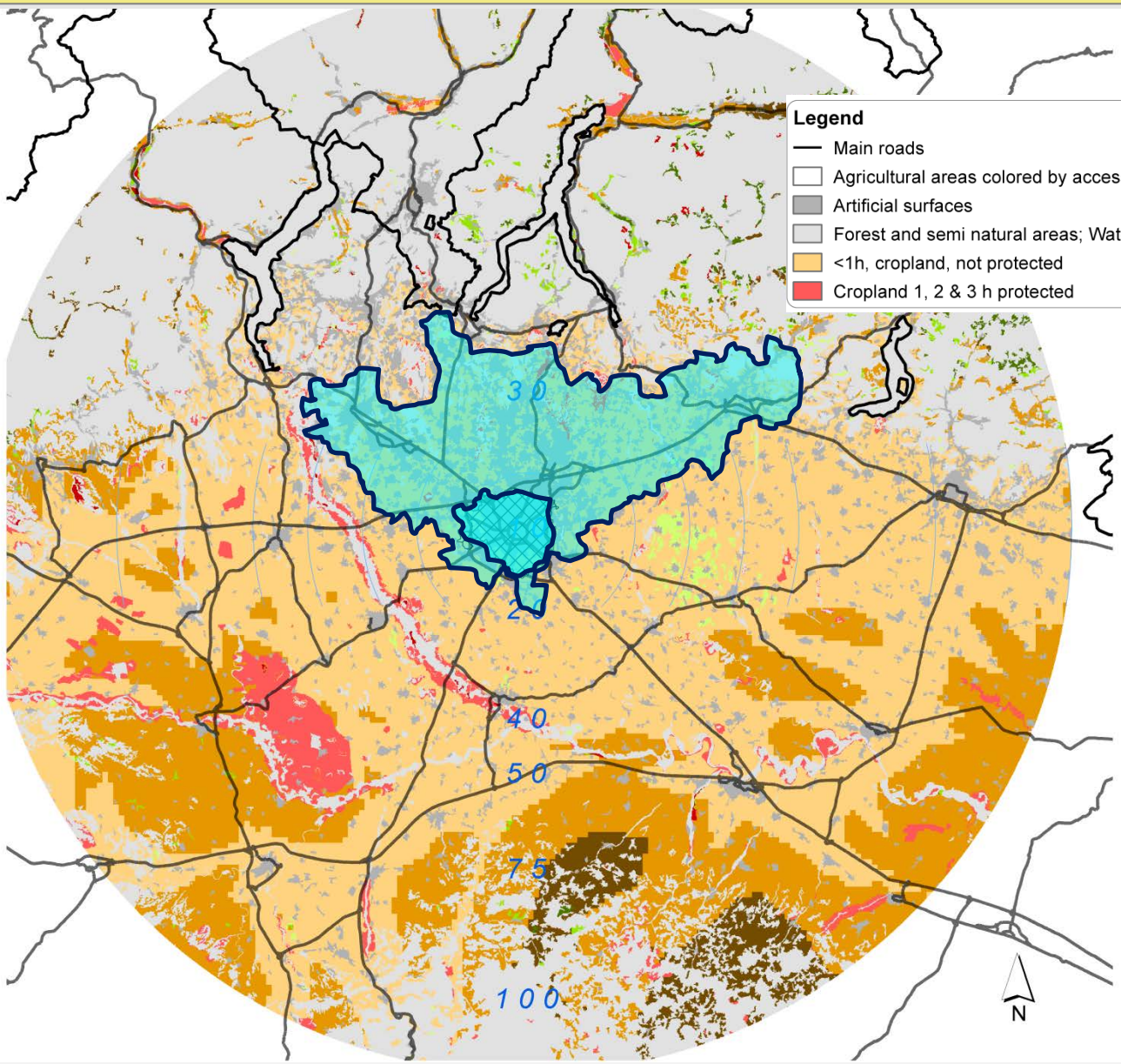
Based on supply in the context of accessibility

- for each municipality it has been calculated the amount of wheat producible on its Utilized Agricultural Area (reference: Milano yields only);
- On the basis of CORINE Land Use data & travel distance we performed an accessibility analysis;
- Accessibility has been calculated on the basis of travel distance in time in hourly intervals
- The results show a metropolitan space that is considered as relevant from the viewpoint of supply and accessibility

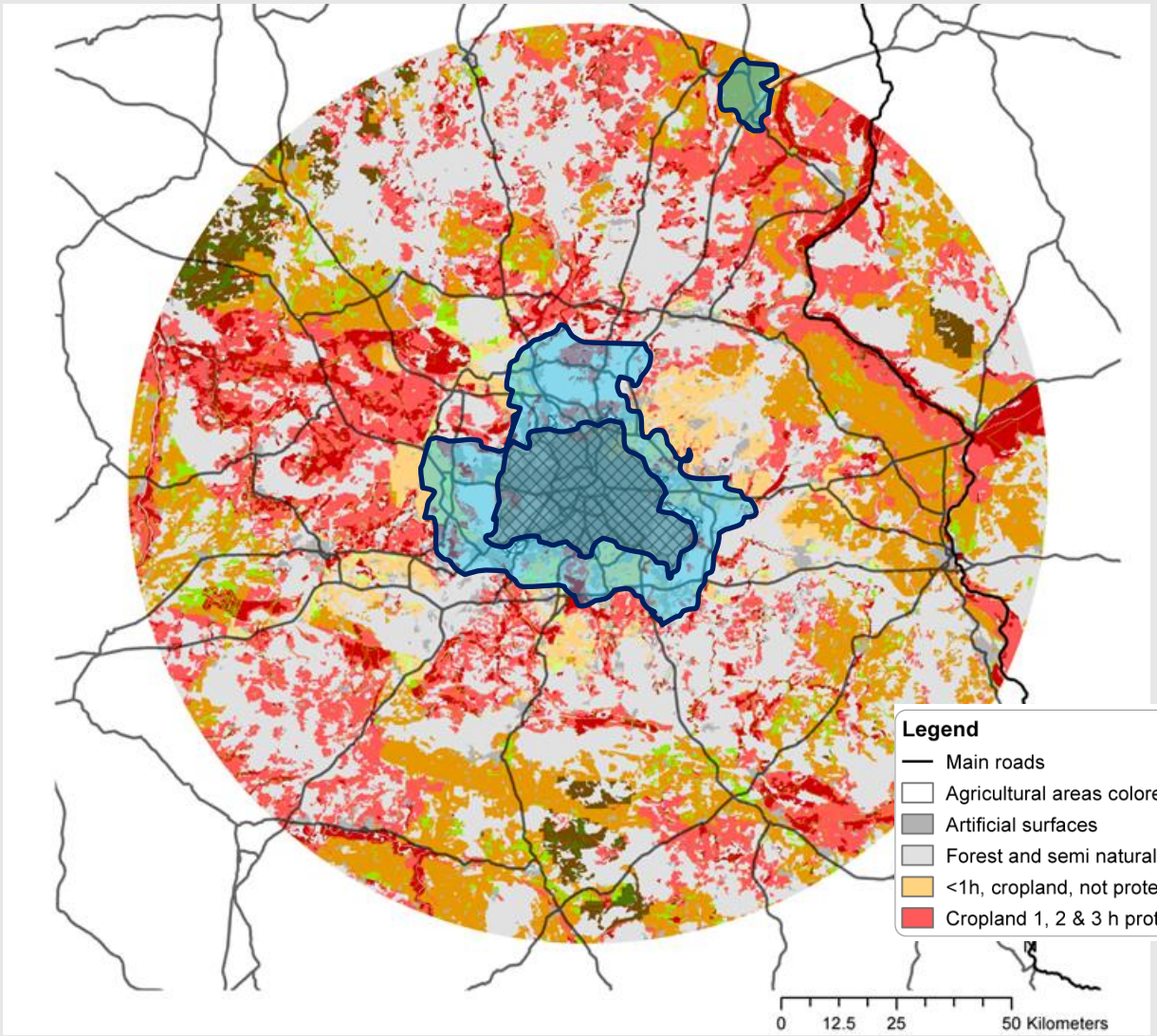
Food Supply and Accessibility: Milano

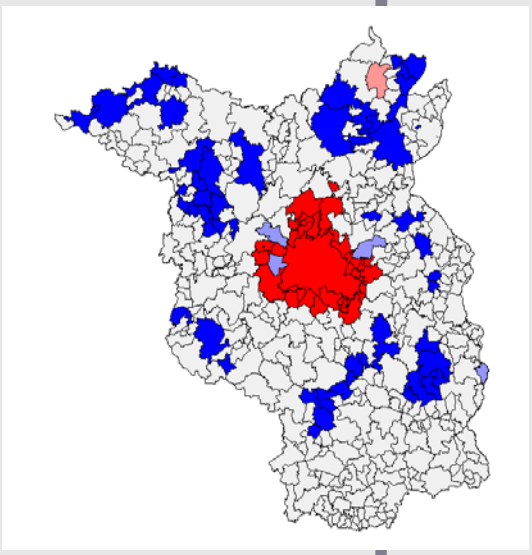


Food Supply and Accessibility: Milano

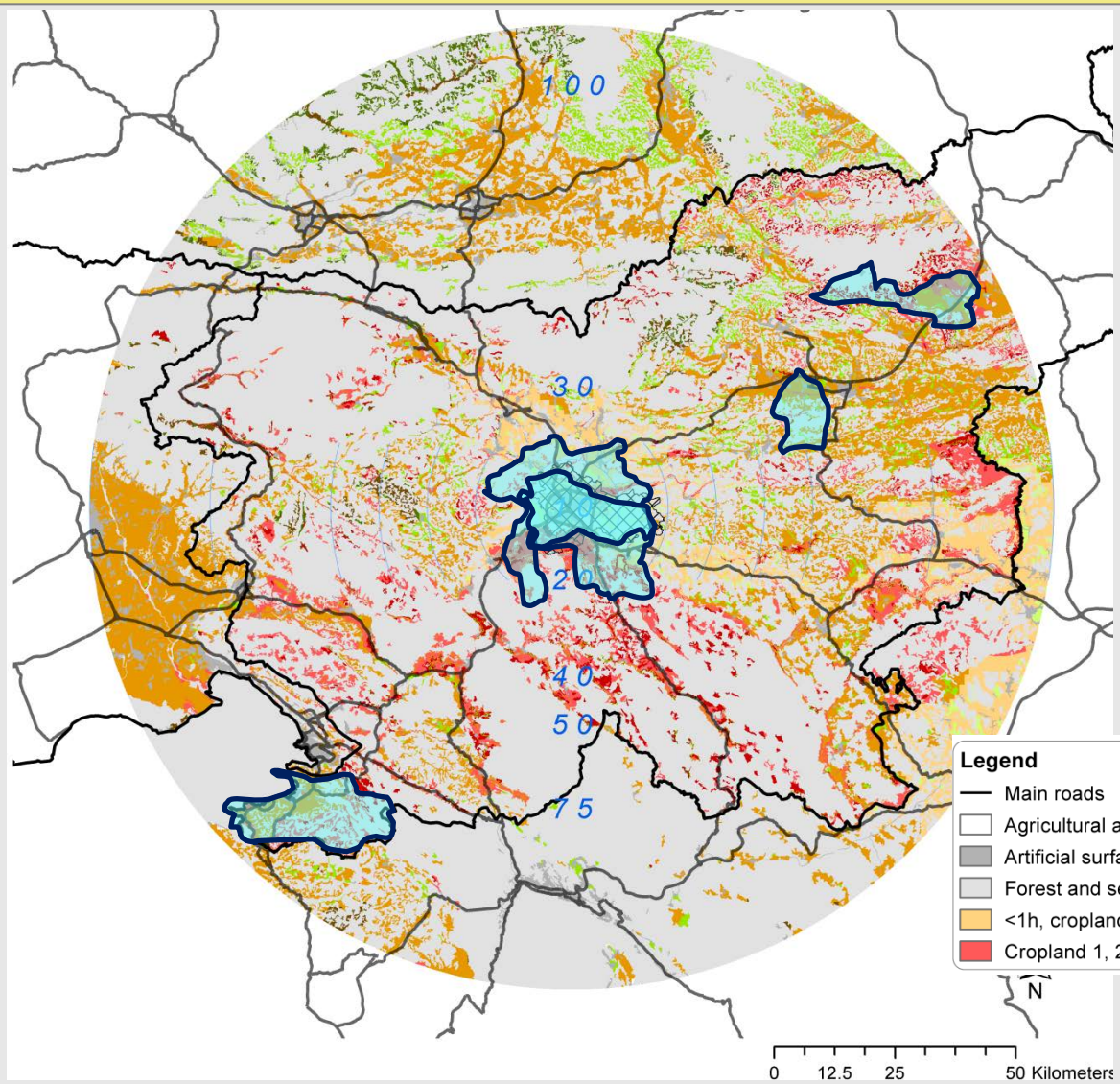


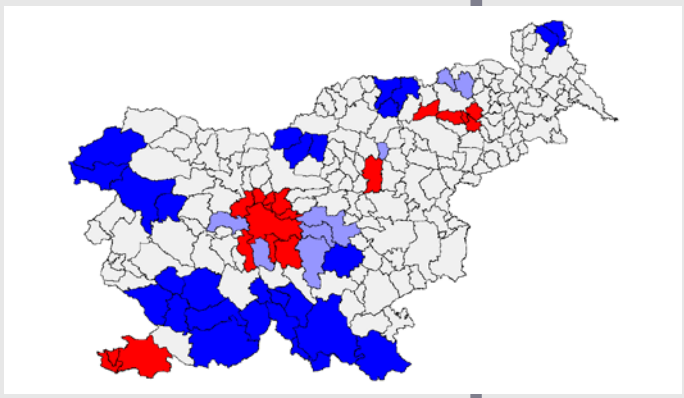
Food Supply and Accessibility: Berlin





Food Supply and Accessibility: Ljubljana

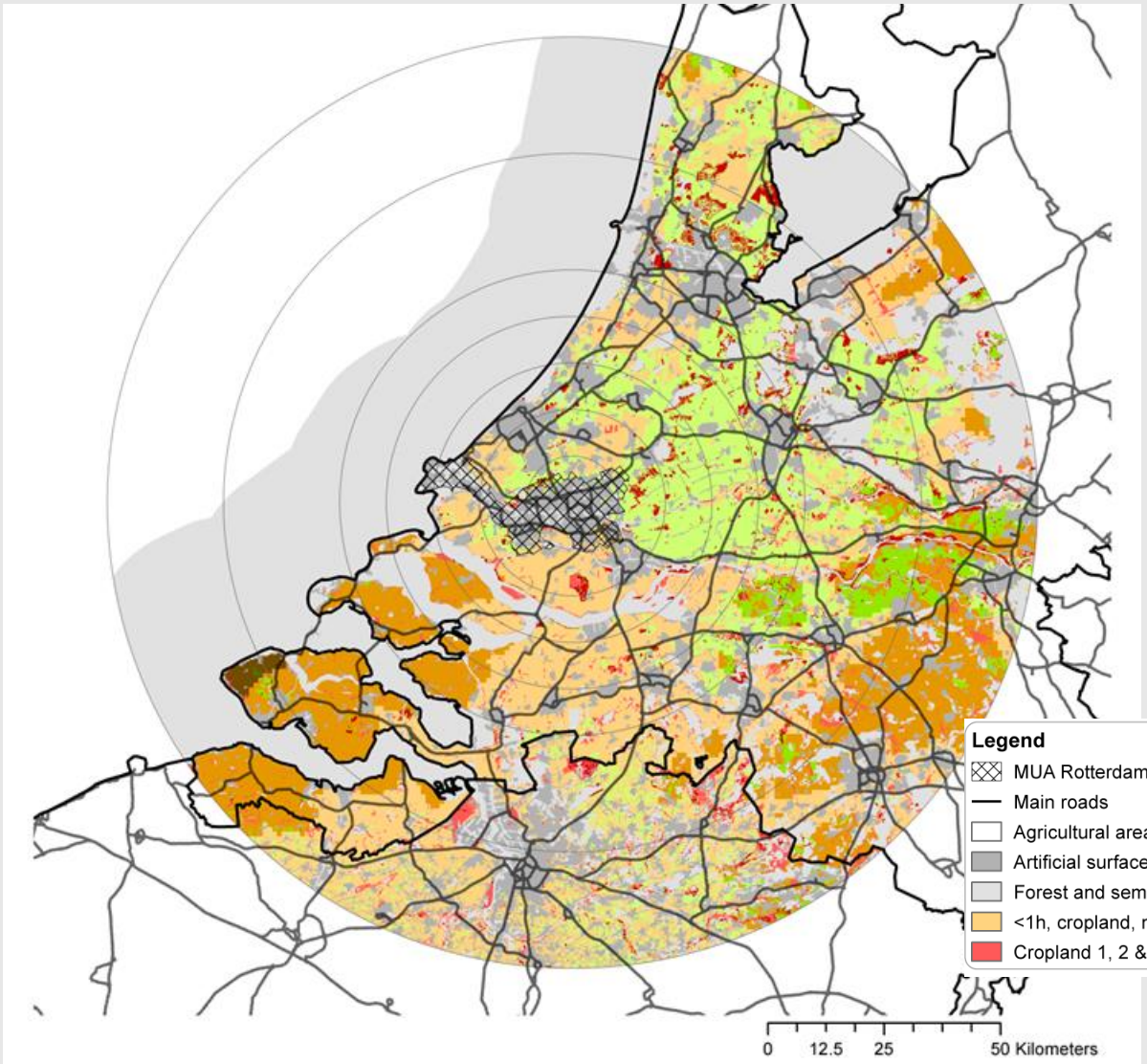




Legend

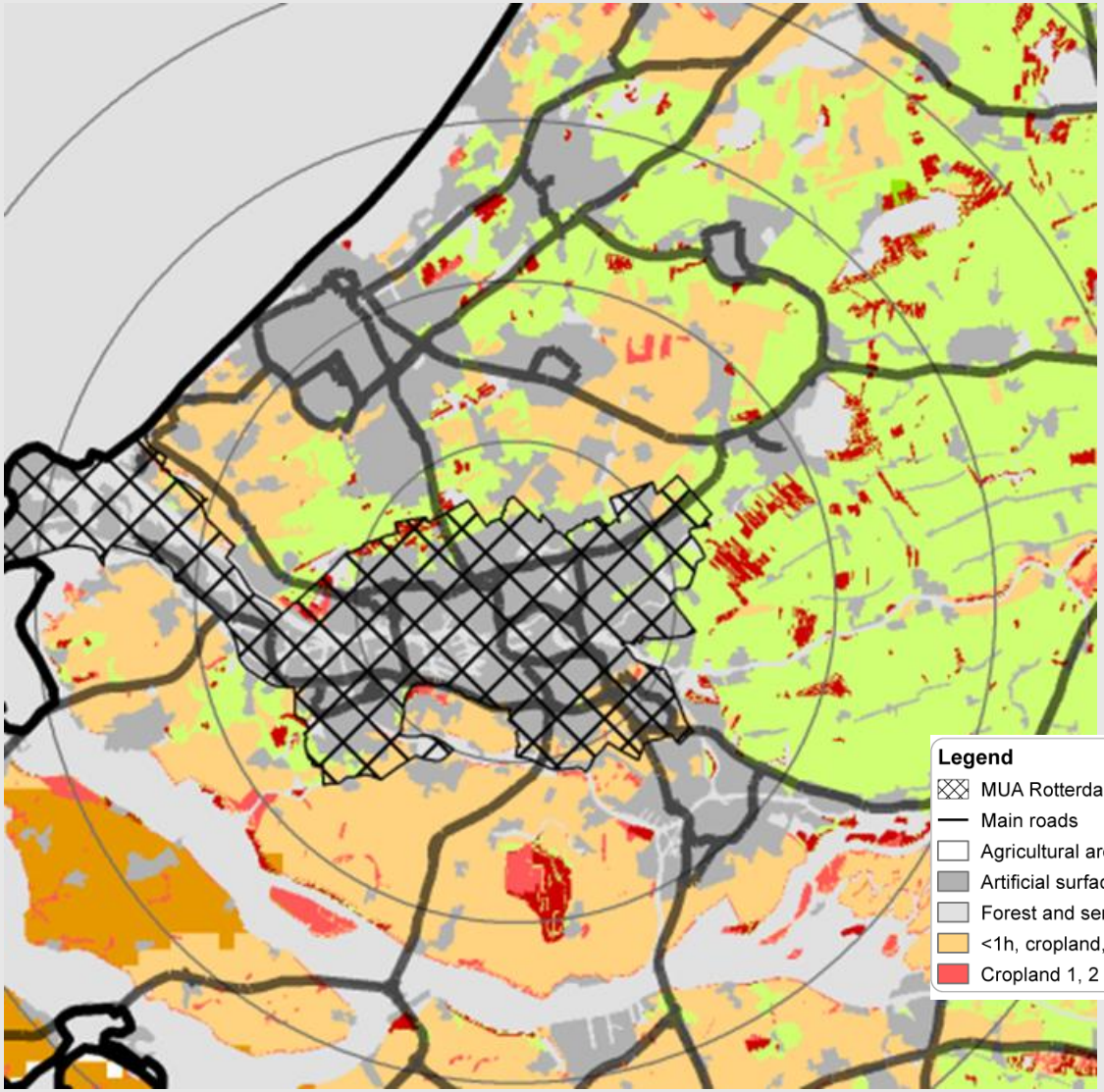
- Main roads
- Agricultural areas colored by accessibility
- Artificial surfaces
- Forest and semi natural areas; Water bodies; Wetlands
- <1h, cropland, not protected
- Cropland 1, 2 & 3 h protected
- <1h, pasture, not protected
- Pasture 1, 2 & 3 h protected
- 1-2h, cropland, not protected
- 1-2h, pasture, not protected
- >2h, cropland, not protected
- >2h, pasture, not protected

Food Supply and Accessibility: Rotterdam



traveltime within buffer of 100km	Arable not protected	Pasture not protected
1hour	484243	315746
2hours	242395	48017
3hours	5350	287
total	731988	364050
1hour	132%	86%
2hours	66%	13%
3hours	1%	0%
total	199%	99%

Food Supply and Accessibility: Rotterdam



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FOODMETRES: Stakeholder-interaction

FOODMETRES: Food Chain Innovation

Rotterdam:
- dairy
- wheat
- vegetables
- beef
- eggs

Ljubljana:
- salad
- cabbage

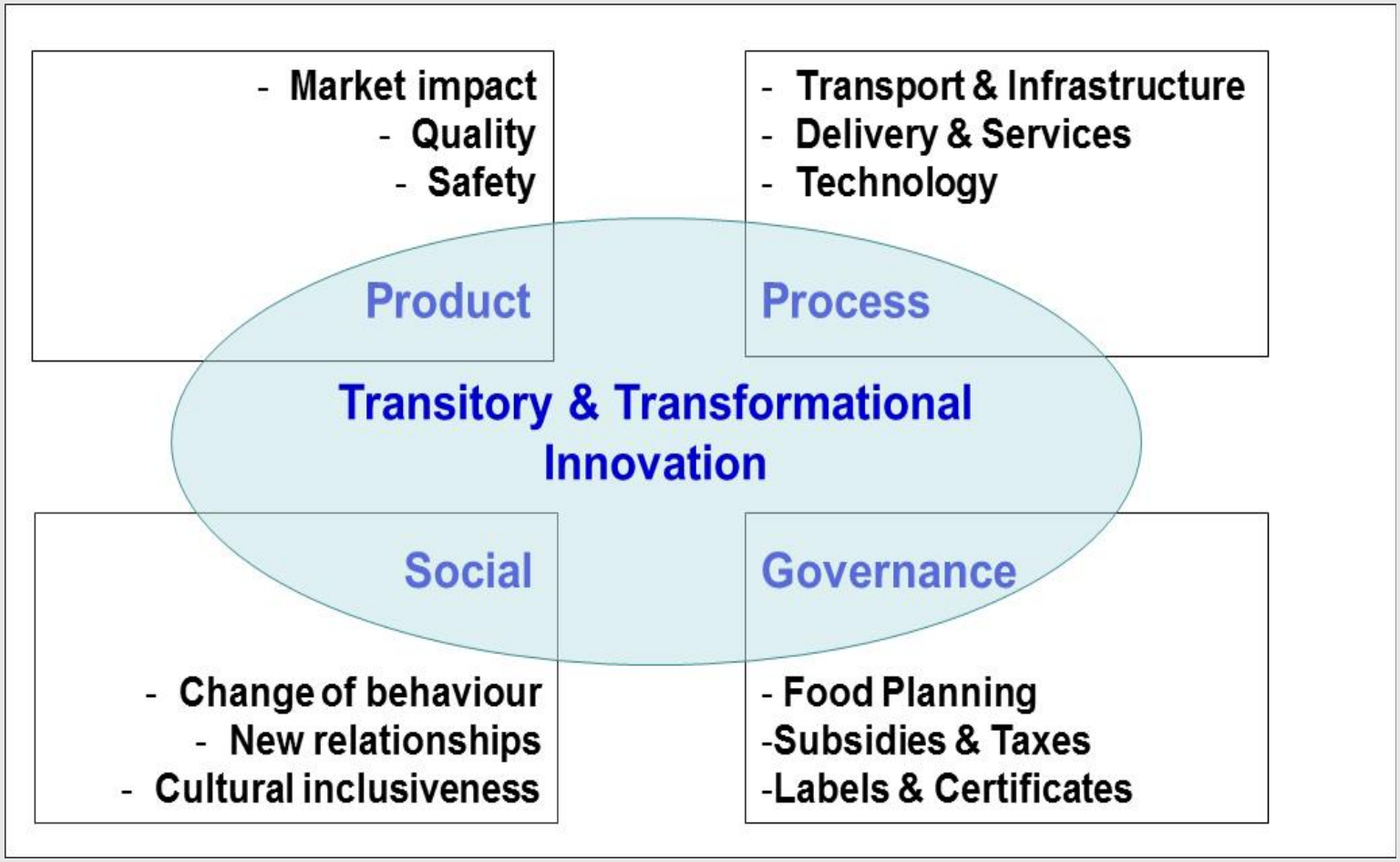
Milano:
- rice
- vegetables
- dairy
- fruit

London:
- herbs, vegetables, fruits (domestic)
- herbs, vegetables, mushrooms, fruits (community)

Nairobi:
- tomatoes
- spinach
- cale
- bananas
- onions
- potatoes
- eggs

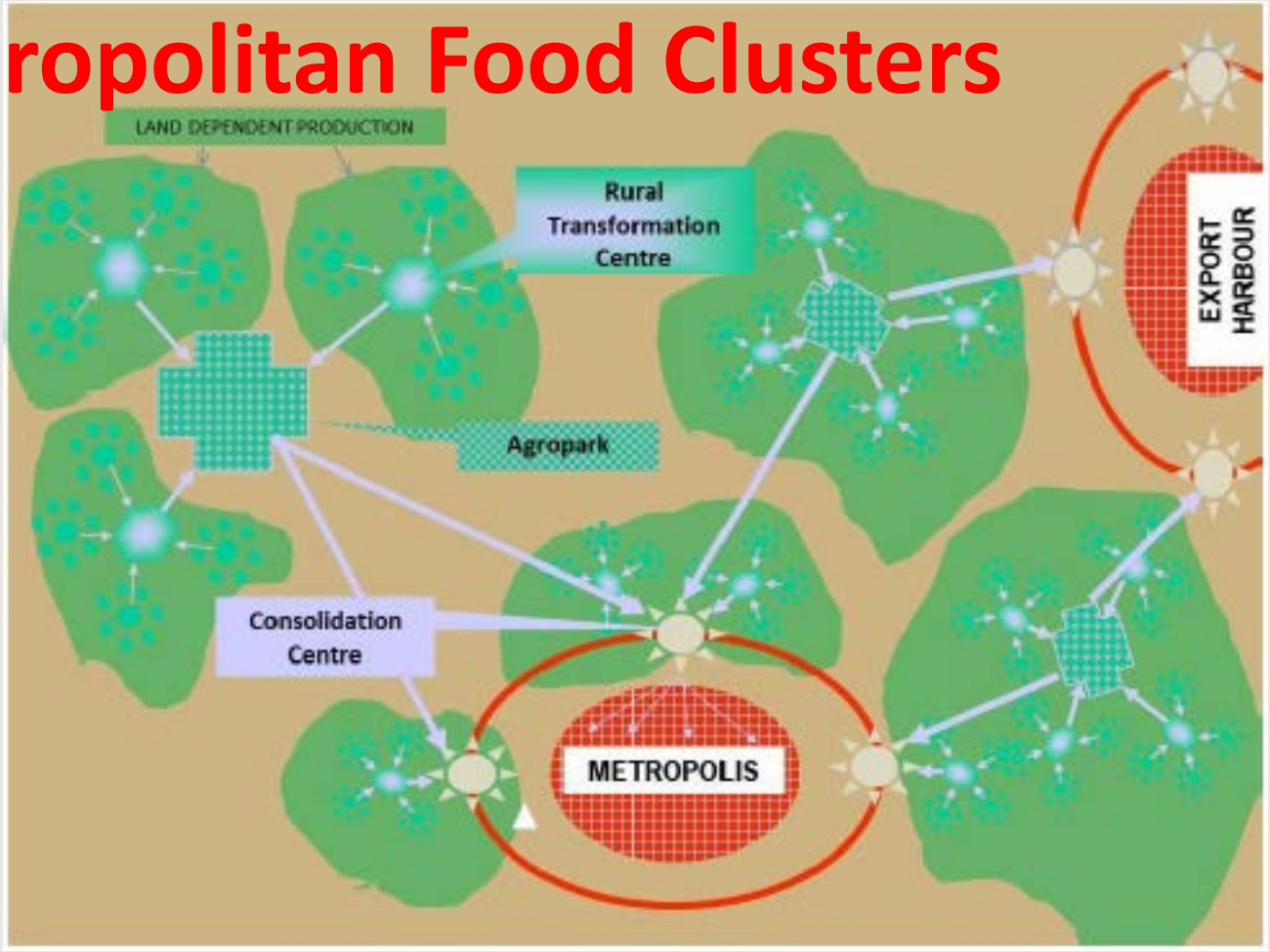
Berlin:
- vegetable
- milk
- meat

FOODMETRES: Food Chain Innovation



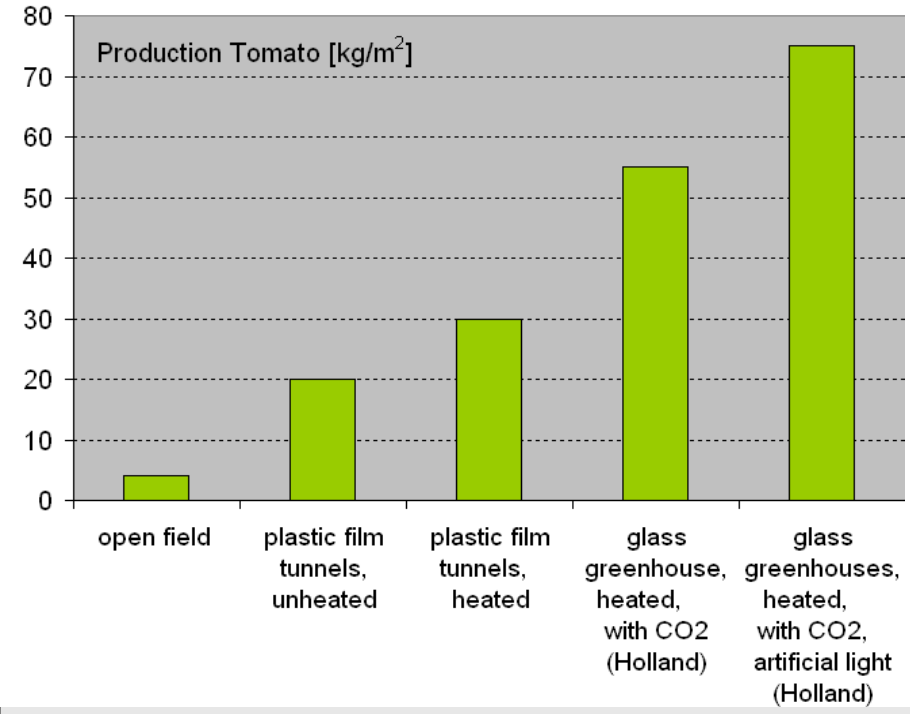
Innovation Targets

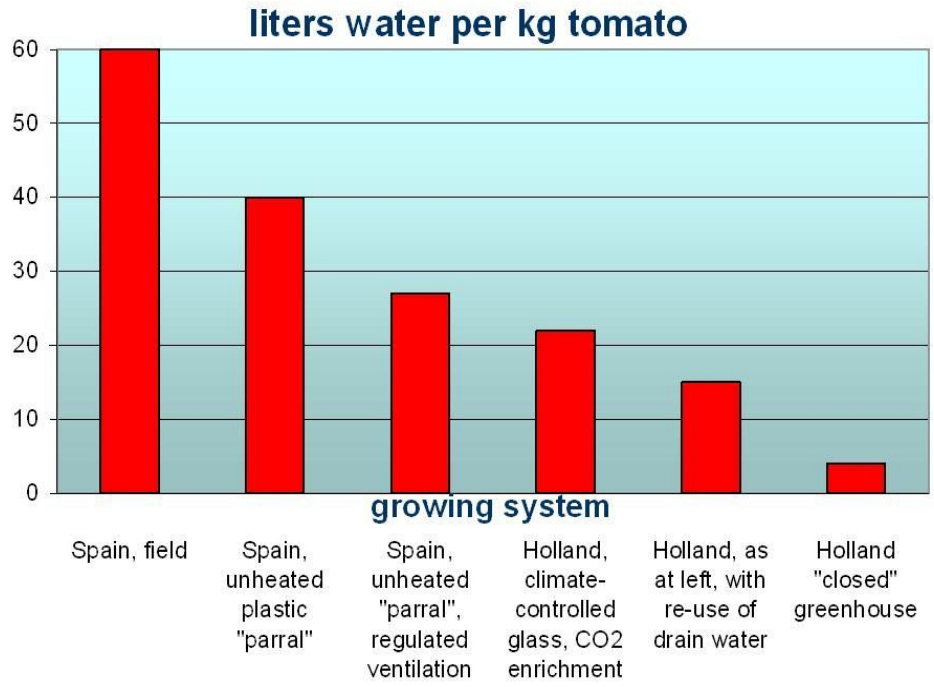
Agroparks - Metropolitan Food Clusters



Innovation Target 1

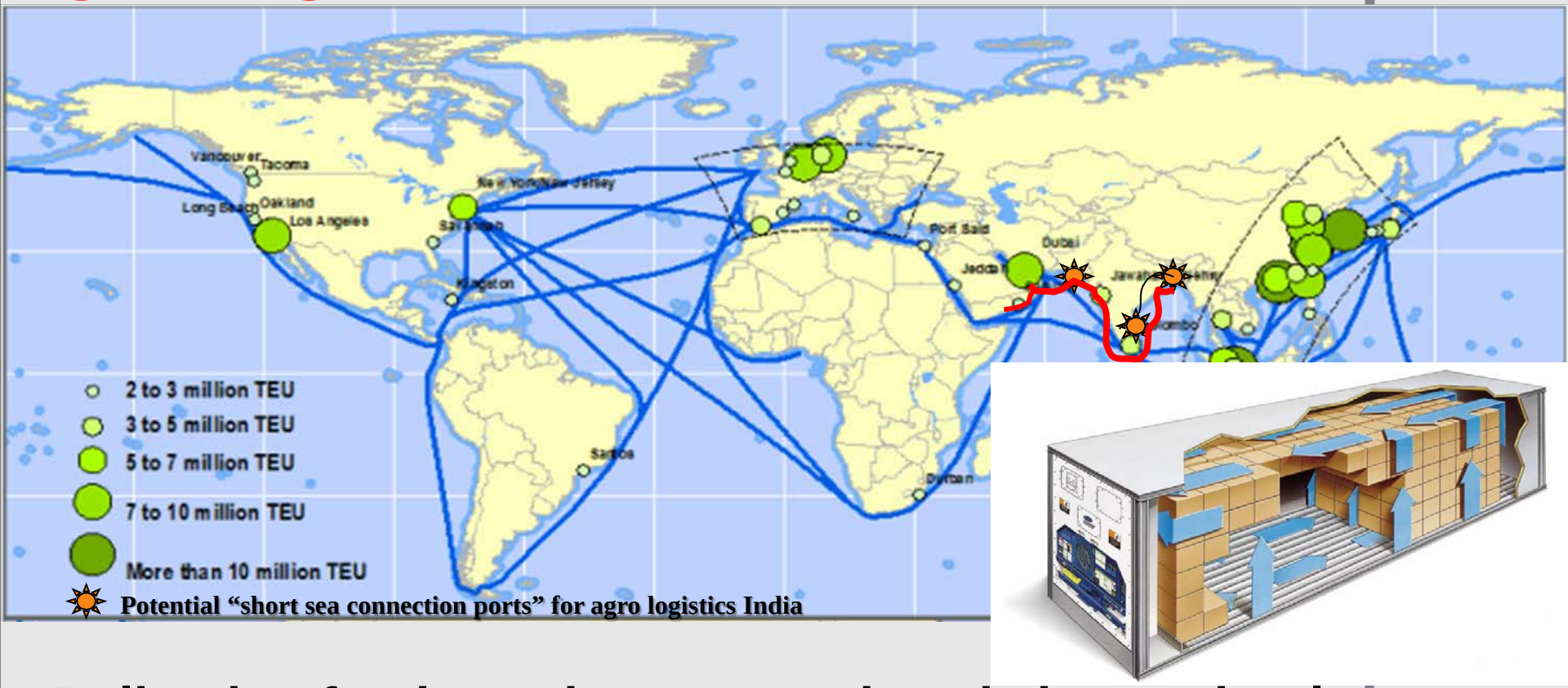
Resource Efficiency





Innovation Target 2

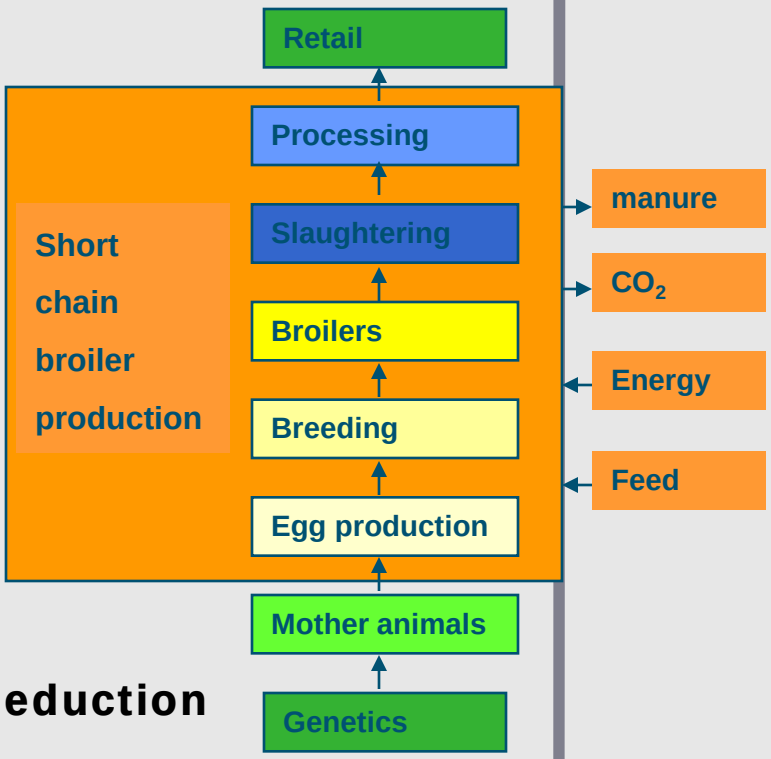
Agro-Logistics



Delivering fresh products to markets is key technology: Short sea shipping along the coast will become an important sustainable transport modality

Innovation Target 3

Vertical Integration



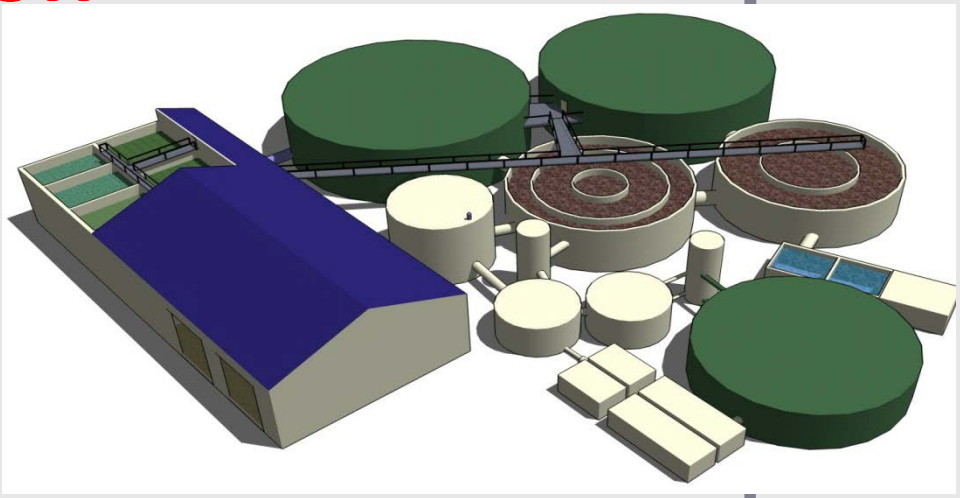
- Integration reduces transport and veterinary risks
- Better meat quality because of stress reduction
- Reduction of contamination and prevention of loss of taste
- Large scale and industrial mode of production enables radical environmental technology: Smell - Ammonia emission -Fine dust reduction

Innovation Target 4

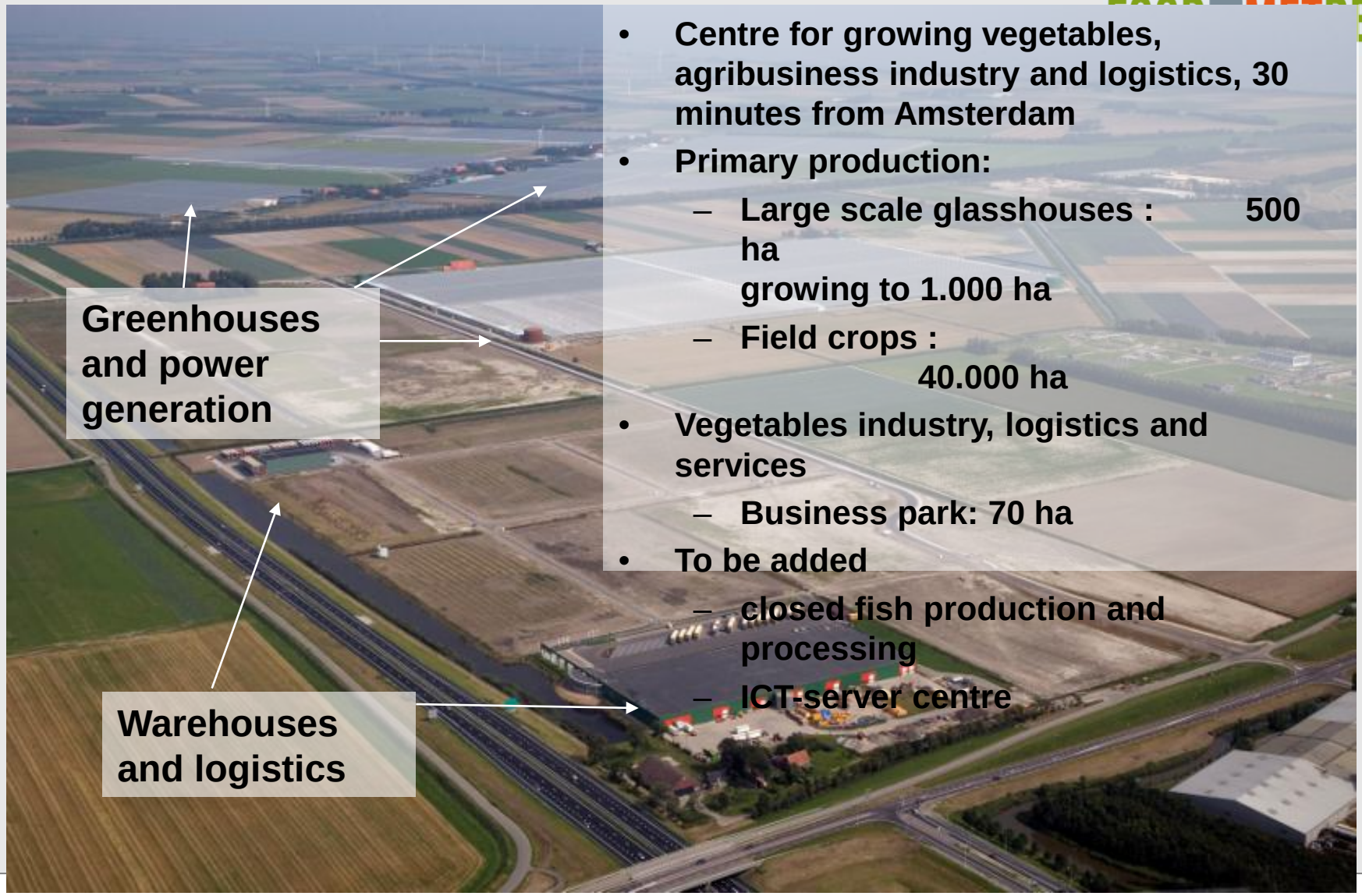
Horicontal Integration

- Thermophyllic co-digestation at 55°C, very efficient.
  - Processing 120.000 ton organic waste/yr, producing 4.5 MW power.
  - Co-digester is core of industrial ecology in agropark

- Microalgae refineries
  - Grown on waste water
  - Production of many interesting products
    - Proteins for food/feed
    - Oils for biodiesel
    - Omega 3 fatty acids



Example Greenfield Agropark Venlo



- Centre for growing vegetables, agribusiness industry and logistics, 30 minutes from Amsterdam
- Primary production:
  - Large scale glasshouses : 500 ha
    growing to 1.000 ha
  - Field crops : 40.000 ha
- Vegetables industry, logistics and services
  - Business park: 70 ha
- To be added
  - closed fish production and processing
  - ICT-server centre

Spaces of Places and Flows in Harmony?

Thank you