

Inclusive metropolitan transitions

Challenges and opportunities for food and green

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Content of presentation

- Urgency, challenges and trends
- Metropolitan transition support system
 - Decision support
 - Process support
- Highlights of a casestudy
- Further information

What's happening, what's coming?



Metropolitan challenges world wide

To meet sustainable development goals, e.g.:

- Sustainable cities and communities
- Responsible consumption and production
- Climate action



Metropolitan food; trends (1/2)

- Robust metropolitan food systems become increasingly important - encompassing complex networks of actors, processes and relationships of food processing, marketing and consumption (e.g. new modes of transportation, ICT and Big Data)
- Metropolitan landscapes consisting of (multiple) urban centres (cities and towns) surrounded by rural areas intensify in urban land-use
- Flows of people, goods and ecosystem services build up (greater mobility and connectivity) between urban centres and rural areas

Metropolitan food; trends (2/2)

- Food security is increasingly dependent on well functioning metropolitan food systems which managed effectively and efficiently
- Food policies are gaining global importance and cities become important drivers of food transitions (e.g. nutrition and availability)

Towards inclusive pathways for metropolitan areas

- The economic dynamics of metropolitan areas potentially brings many benefits, but can exacerbate inequalities:
 - Serious variances in income and consumption at the urban level
 - One third of urban dwellers in developing world live in slum-like conditions
- Inclusive pathways depend on:
 - Capacities of: migration and employment status (i.e. for informal workers), youth and age, physical ability, ethnicity and religion, and gender
 - Political commitment to facilitate inclusion (e.g. participatory policy making)

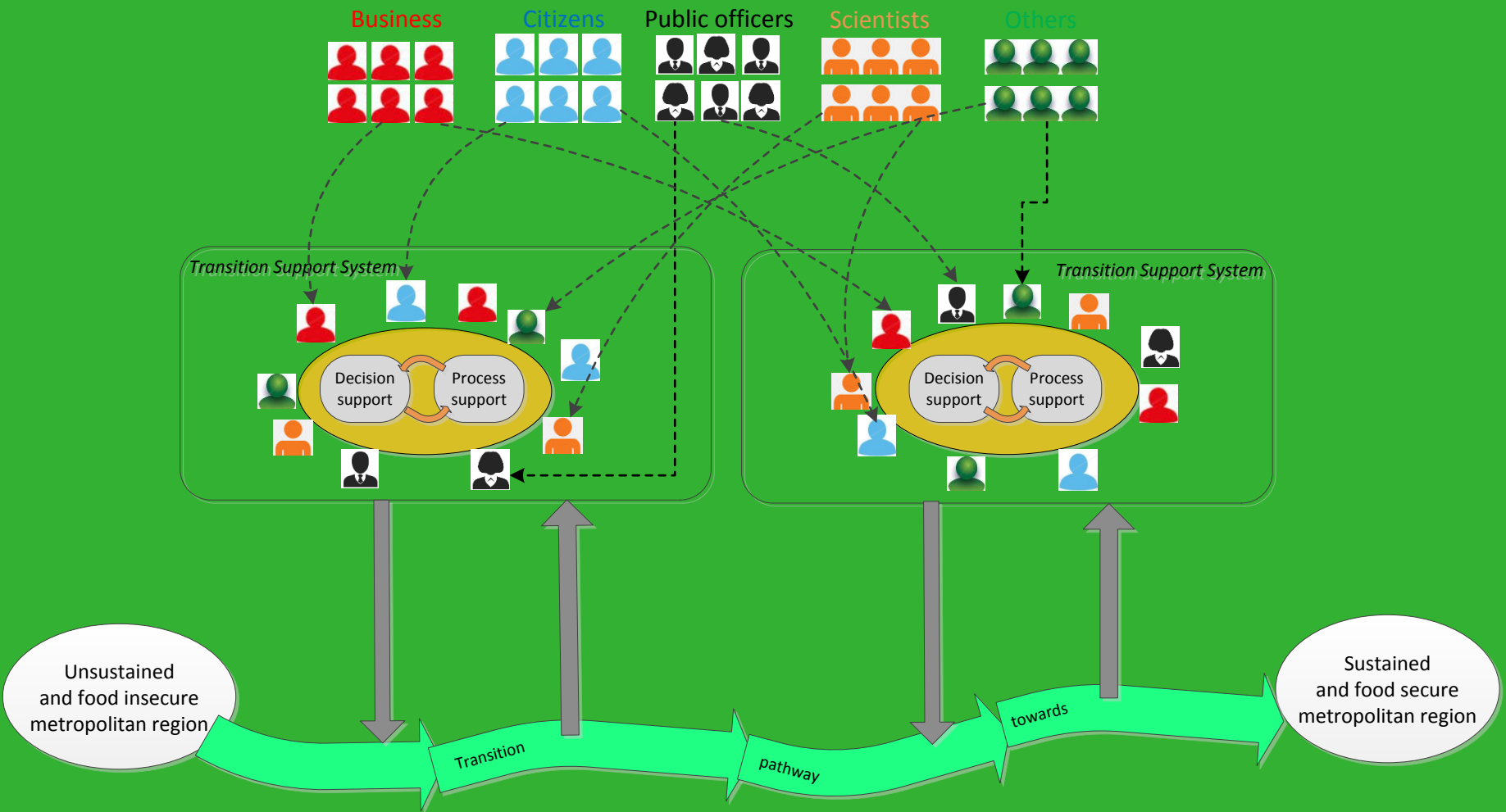
Therefore a transition strategy is needed

- **To explore** transition pathways towards food and green secure metropolitan areas, so that key stakeholders can enhance their policies and transition strategies.
 - **To downscale** long term global and regional trends and scenarios to food security and liveability at metropolitan level.
 - **To take account of** the preconditions, processes and incentives in metropolitan transitions that motivate companies, governments, citizens/consumers to strive towards a green and food secure future.
- **Resulting in a dedicated sustainable transition process**, involving interactive approaches of (integrated) models and collaboration among stakeholders.

Under influence of climate change, summers will generally be hotter ☀️.



Metropolitan transition pathways



Supporting metropolitan transition by:

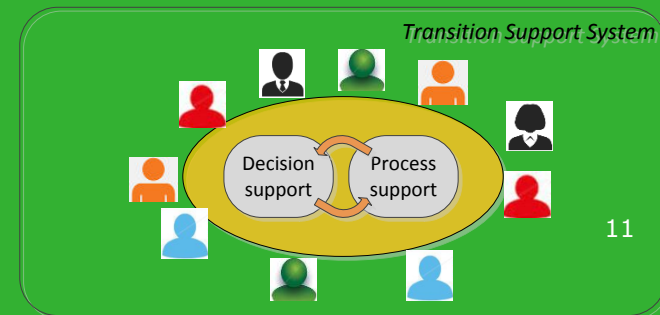
Metropolitan Transition Support System for an interactive approach

1. Decision support:
a) Scenario analysis
b) Scaling tools



2. Process support:
Stakeholder
participation tools

Monitoring and impact assessment



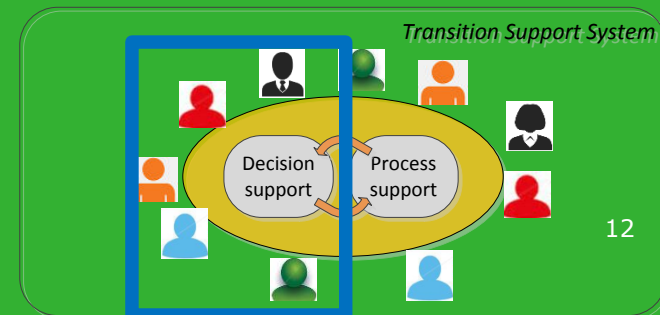
1. Decision support; scenario analysis

- Guided by stakeholder participation tools
- At global, country and metropolitan multi-level

Identify critical factors with stakeholders

Generate alternative futures

Identify issues arising for scaling tools



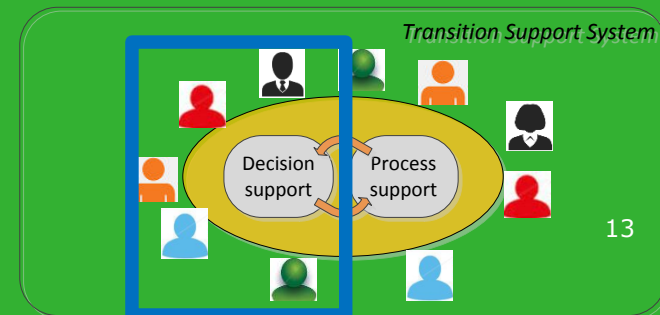
1. Decision support; scaling tools

Module 1:

From global to national level: General equilibrium model
MAGNET

Module 2:

- From national to metropolitan areas: Metropolitan detector
- To upscale specific metropolitan scenarios (bottom-up validation)
- To include metropolitan questions on food and green (bottom-up)



Scaling tools module 1: MAGNET

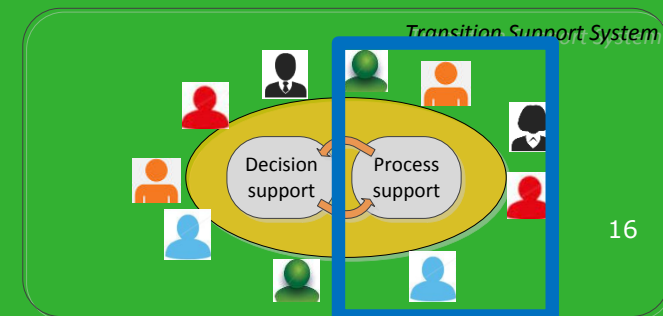
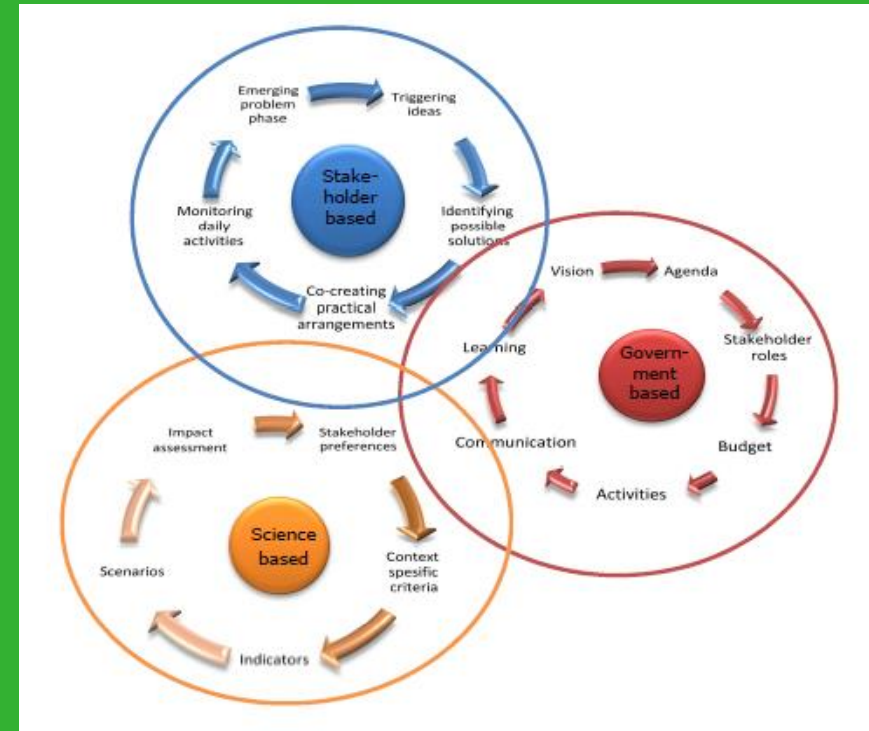
- **Type of model:** Macro economic world wide model
- **Objective:** Simulate long-term economy-wide trends in food production, food demand, prices and, trade balance
- **Scope:** World wide model, simulation up to 2050, possible indicators: GDP, welfare, employment, value added, trade balance
- **Challenge:** Downscale the MAGNET results on a national/global level to metropolitan level with Global Detector to show how national trends can impact on a regional scale
- Assumptions in Baseline:
 - Socio-economic reference pathway 2 for (SSP2) macro economic development; business as usual (IPCC)
 - Fossil price development IEA 2015

Scaling tools module 2: Global Metropolitan Detector

- A grid based expert system is used to combine indicators arithmetically to give insight in metropolitan regions
 - Grids of 5'x5' (about 10x10 kilometres), global coverage
 - Each grid is classified according to their socio-economic, demography, land cover, and physical conditions → results are GIS visualized
- A spatial explicit metropolitan translation of global scenarios (MAGNET) with help of allocation functions:
 - Dependent on grid characteristics such as population density, GDP and land cover
 - Face validity (expert knowledge)

2. Process support: stakeholder participation tools

- To reach legitimacy, accountability, representation, responsibility and transparency in metropolitan transitions
- Balancing of stakeholder participation, science support and government involvement is needed
- Support by insights from (social) innovation
- (Economic) incentives



Monitoring and impact assessment

- To apply traditional approaches (e.g. life cycle assessment such as food footprint and carbon footprint)
- Benefitting from innovative data mining approaches (big data) such as:
 - real-time now casting and prediction of events
 - nudging and recommendation models for citizens behaviour on food
 - participatory crowd sensing
- The choice of method depends on the specific problem at hand (depending on objectives of stakeholders and data availability).

Concluding remarks (1/2)

- Ultimately we want to contribute to realizing a **dedicated sustainable transition process**, involving interactive approaches of (integrated) models and collaboration among stakeholders.
- Herefore we developed a conceptual Metropolitan Transition Support System consisting of decision support and process support

Concluding remarks (2/2)

- The next example will highlight that:
 - Our scaling tools allow downscaling a global scenario to metropolitan areas with help of additional parameters to allocate current and future land demand, e.g. crops versus livestock, wheat production and vegetables (“proof of pudding”).
 - Upscaling specific metropolitan scenarios is a next step (validation)

Highlights from case study metropolitan land use changes in Western Europe

Case study characteristics

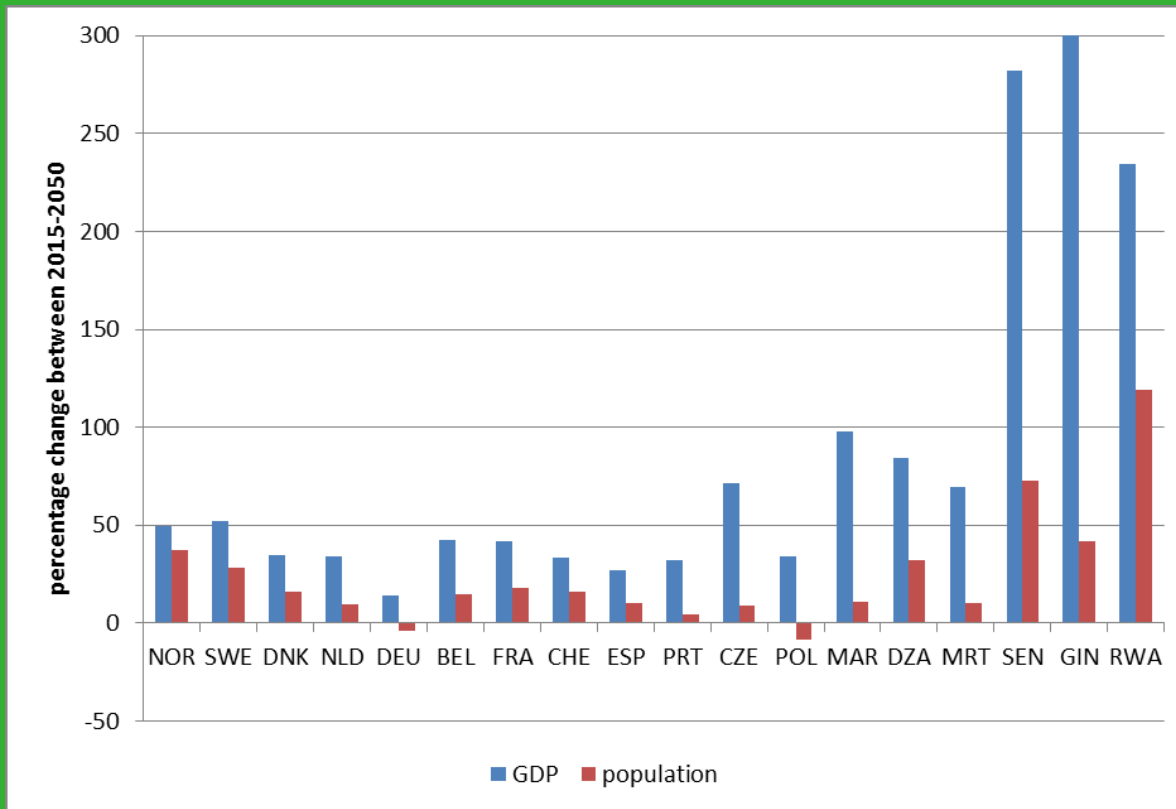
- Objective: To give insight in key elements of the metropolitan transition support system for food transitions for a specified reference scenario
- Approach: From scenario development to consequences for metropolitan transitions with use of the metropolitan transition support system
- Delimitation:
 - Region: North-western Europe to the south of Europe
 - Operationalisation of stakeholder participation tools is not included (hence: only downscaling!)
- Output: Highlighting key elements

Downscaling a global scenario

- Starting point for reference scenario: Shared Socioeconomic Pathways 2 (SSP2; FAOSTAT, 2013)
- Focus on arable farming, horticulture and life stock
- Input indicators SSP2: Population growth, production, consumption, regional and national import/export, GDP and demand for land
- Output indicators to be downscaled:
 - Rural/urban income
 - Food security
 - Demand for different food categories (primary and luxury)
 - Food prices

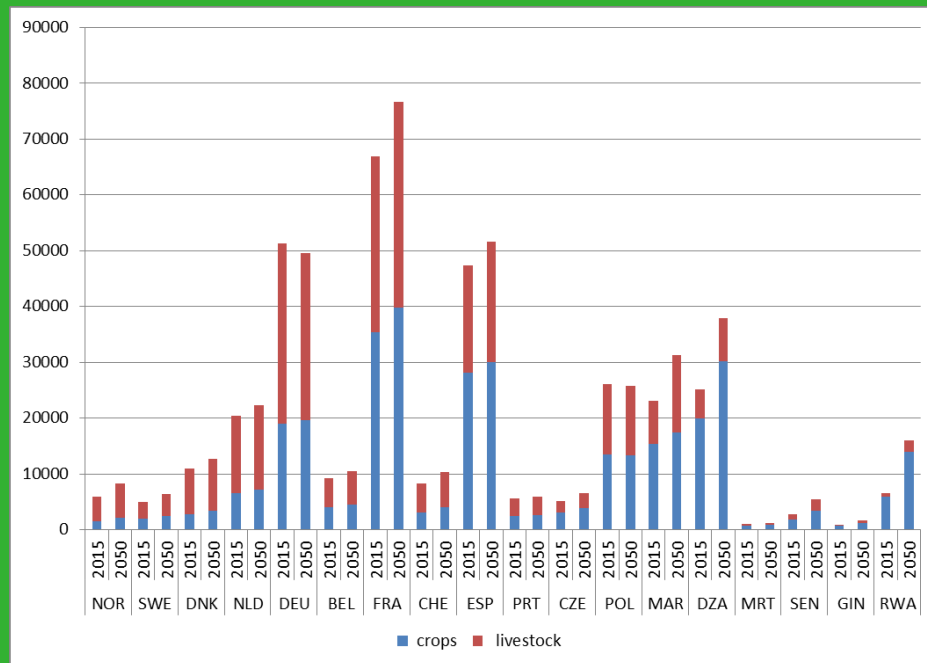
Input for MAGNET: Scenario GDP & population growth

Highest growth GDP and population in African countries (2050):



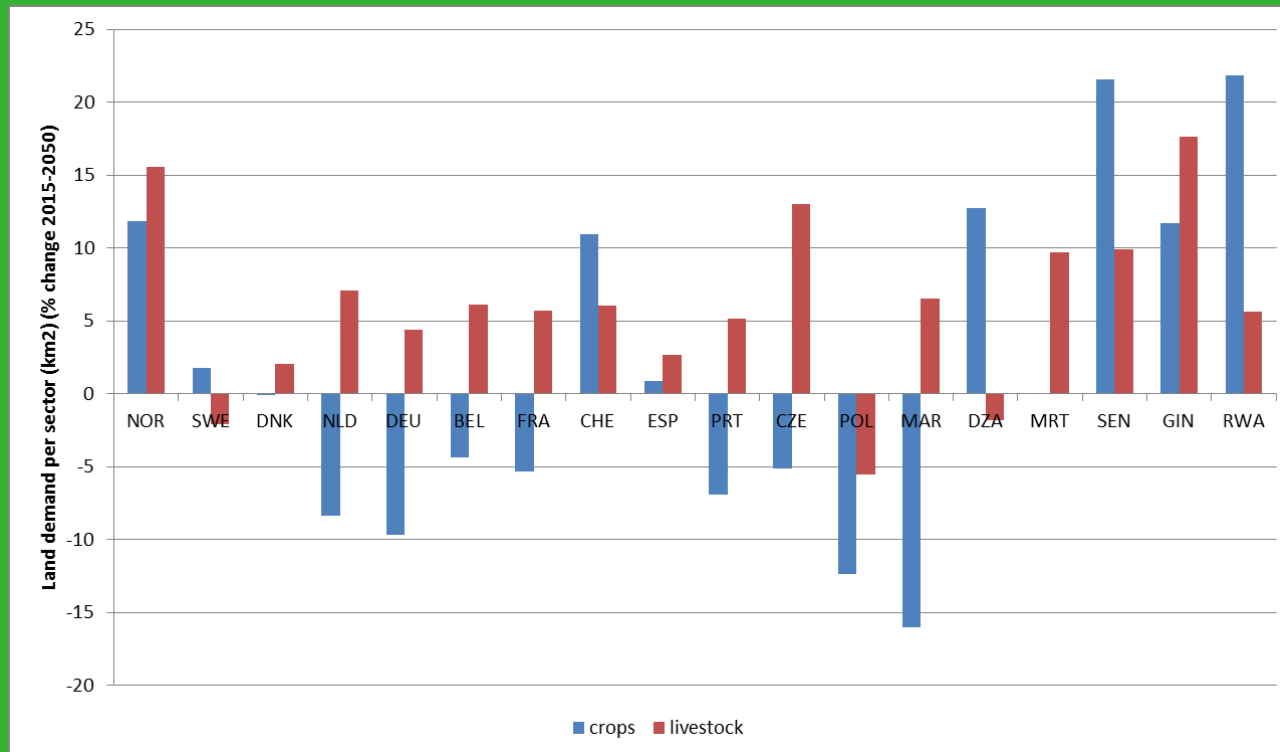
Output from MAGNET: Production crops and livestock increases: increasing population and welfare (million dollar)

Total food production increasing substantially between 2015-2030:



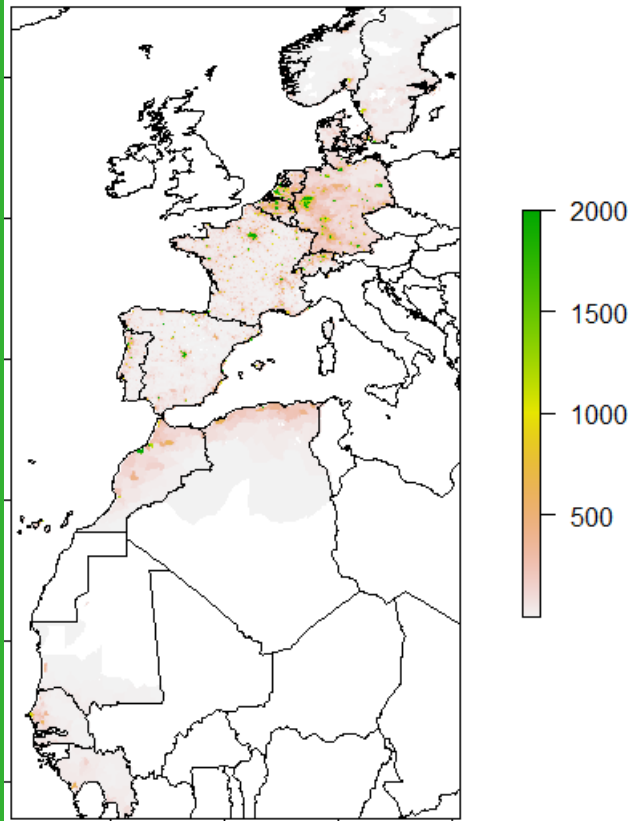
Output from MAGNET: regional differences in land use changes agriculture

More land is needed for food production 2050, often livestock (arable, livestock or both):

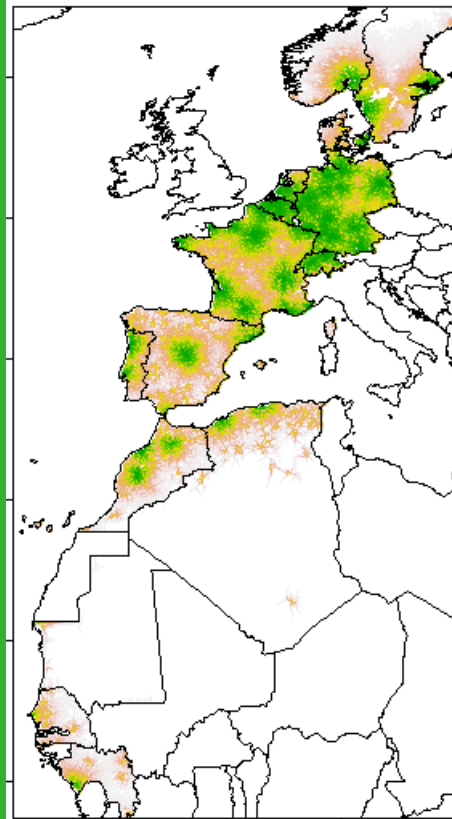


Additional input for downscaling: population, market access and degree of urban area

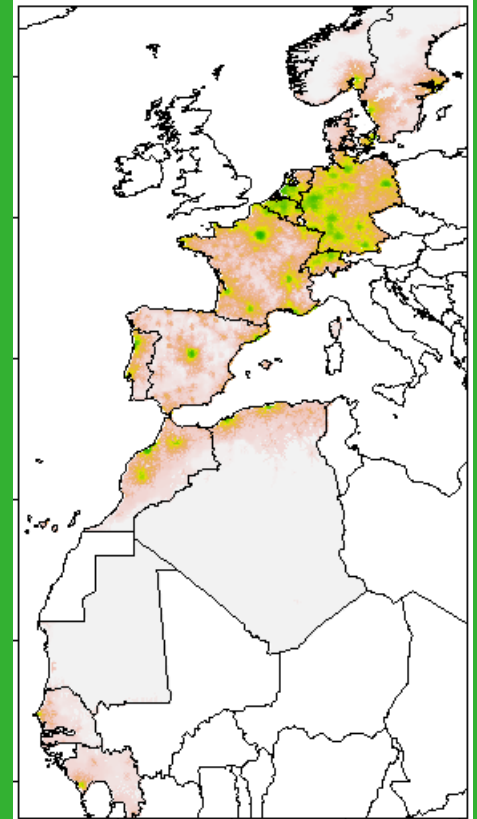
Population density



Access to markets



Urban/rural



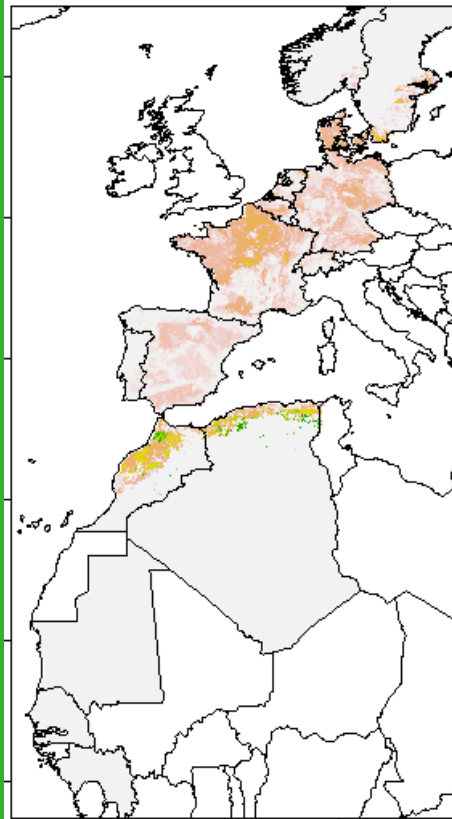
What are the consequences of these scenarios for metropolitan areas?

Applying scaling tool Global Metropolitan Detector for area north-western Europe to south Europe

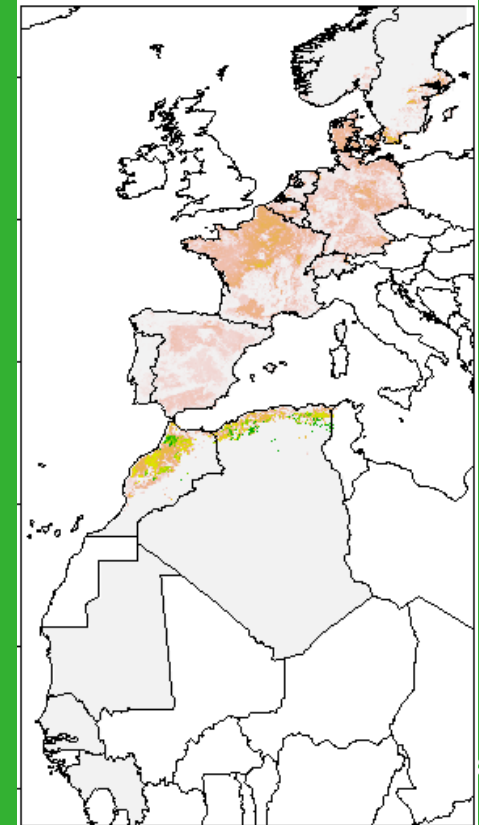
Result of downscaling pathways wheat production and area (proof of principle)

- Example: change in location wheat production
- Consequences for metropolitan areas or rural areas?

Area wheat production 2015

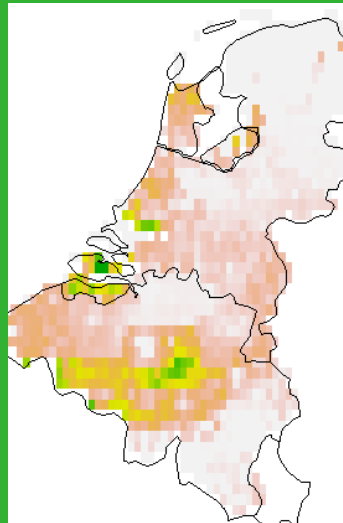
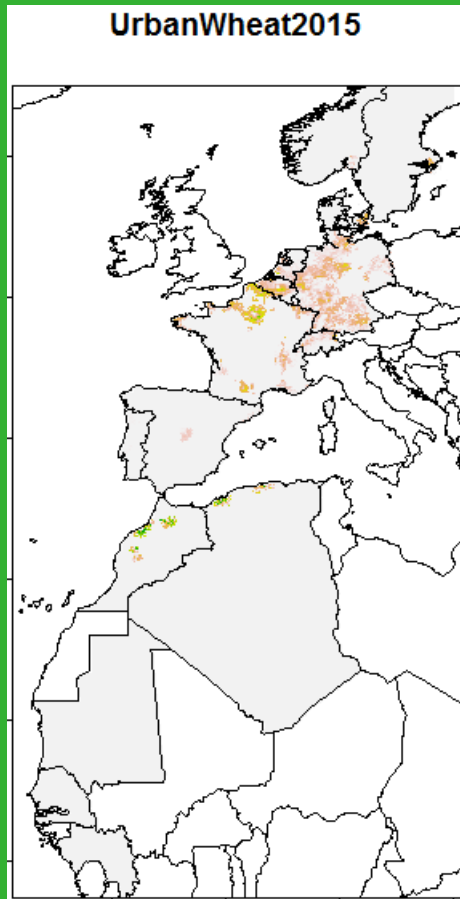


Area wheat production 2030

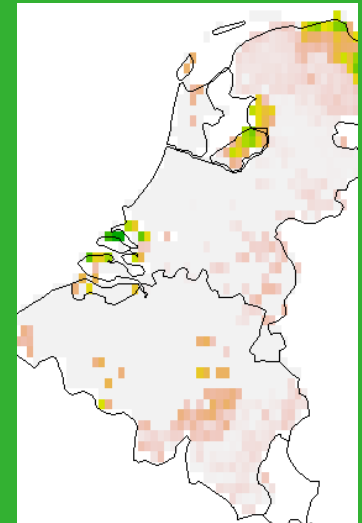
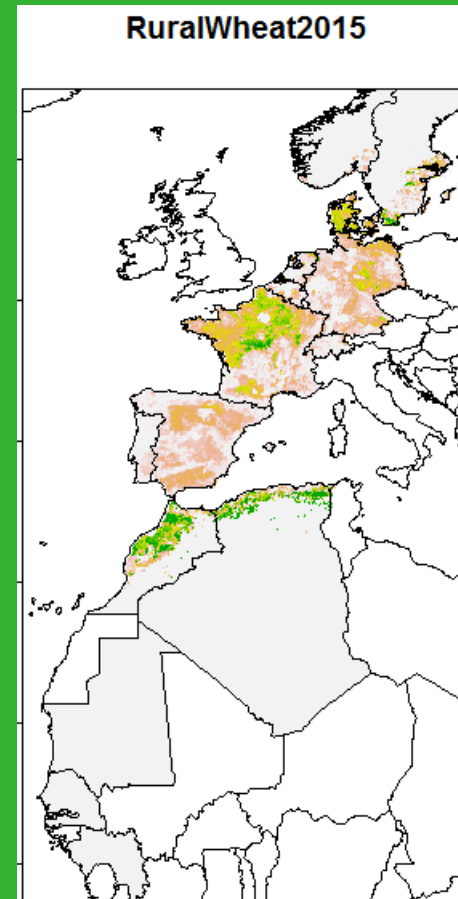


Location of wheat production: urban/rural?

Wheat in urban areas



Wheat in rural areas



Next step

We highlighted key elements of the Metropolitan Transition Support System for food transitions for a specified reference scenario. Our focus was on showing the basic elements from scenario analysis and scaling tools (=decision support).

In practice transition support consists of decision and process. Linking both will lead to better decision making.

The next step is a demonstration case for metropolitan area

Further
information:



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Additional contributions from:

- Rolf Michels on Infographic metropolitan solutions
- Wil Hennen on Global Metropolitan Detector
- Heleen Bartelings on Magnet