

# Aims for today

- **Inform** you of what we're doing in the project and inform us, providing a scientific steer on our work
- **Identify** synergies between our plans and your research – where can we connect what we are doing now
- **Build** understanding and networks for future work together pursuing other opportunities

Who's in the room?



# Overview of the Rurban Revolution project



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# The basics

~£800k over next two years (April 2019 to March 2021)

Funded by 'Resilience of the UK Food System in a Global Context' Third Call, Global Food Security Programme (BBSRC, ESRC, NERC & Scottish Government)

[www.lancaster.ac.uk/lec/rurbanrevolution](http://www.lancaster.ac.uk/lec/rurbanrevolution)



# What do we mean by “rurban”?

rurban = rur(al)+(ur)ban

Bringing the rural into the urban: increasing green ‘natural’ spaces and agricultural food production in the built environment



# What do we mean by “rurban”?



Who: Community-led, corporate, public

How: Low tech & high tech

Where: Private gardens, public spaces, disused spaces, redevelopment

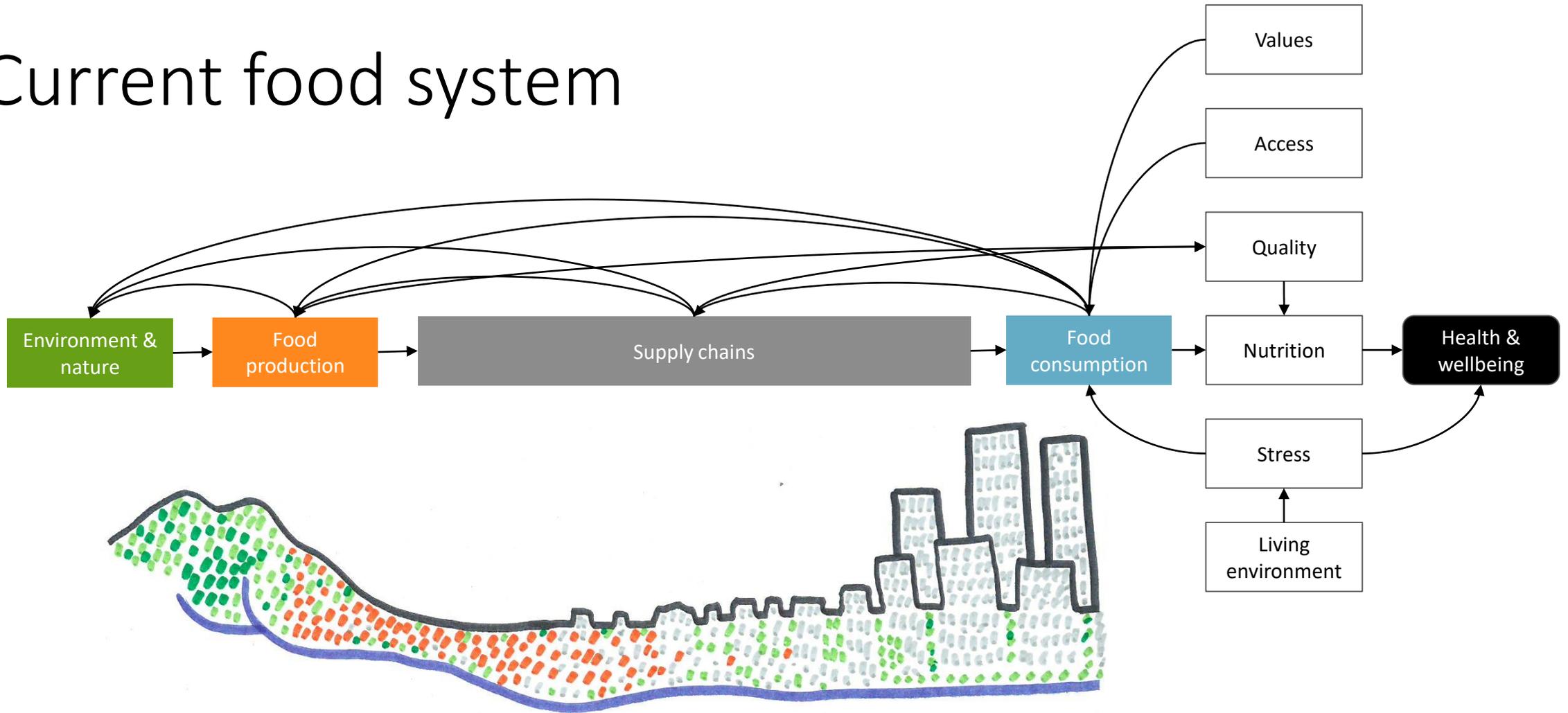
What: Focus on fresh fruit and vegetables

# Why are we interested in the idea of upscaling greening and growing in urban contexts?

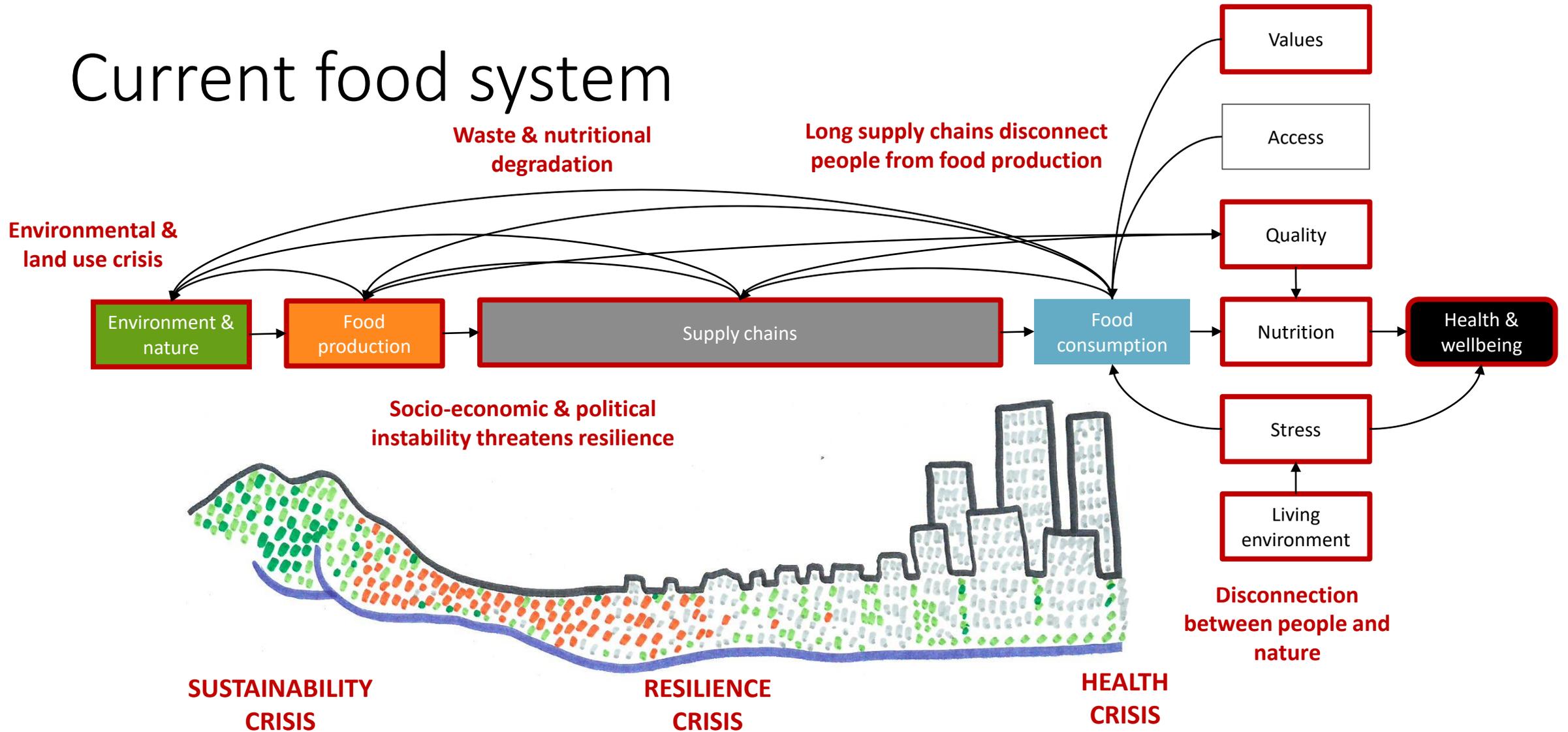
Is this a holistic leverage point for food system transformation towards a healthier, more sustainable, more resilient food system?



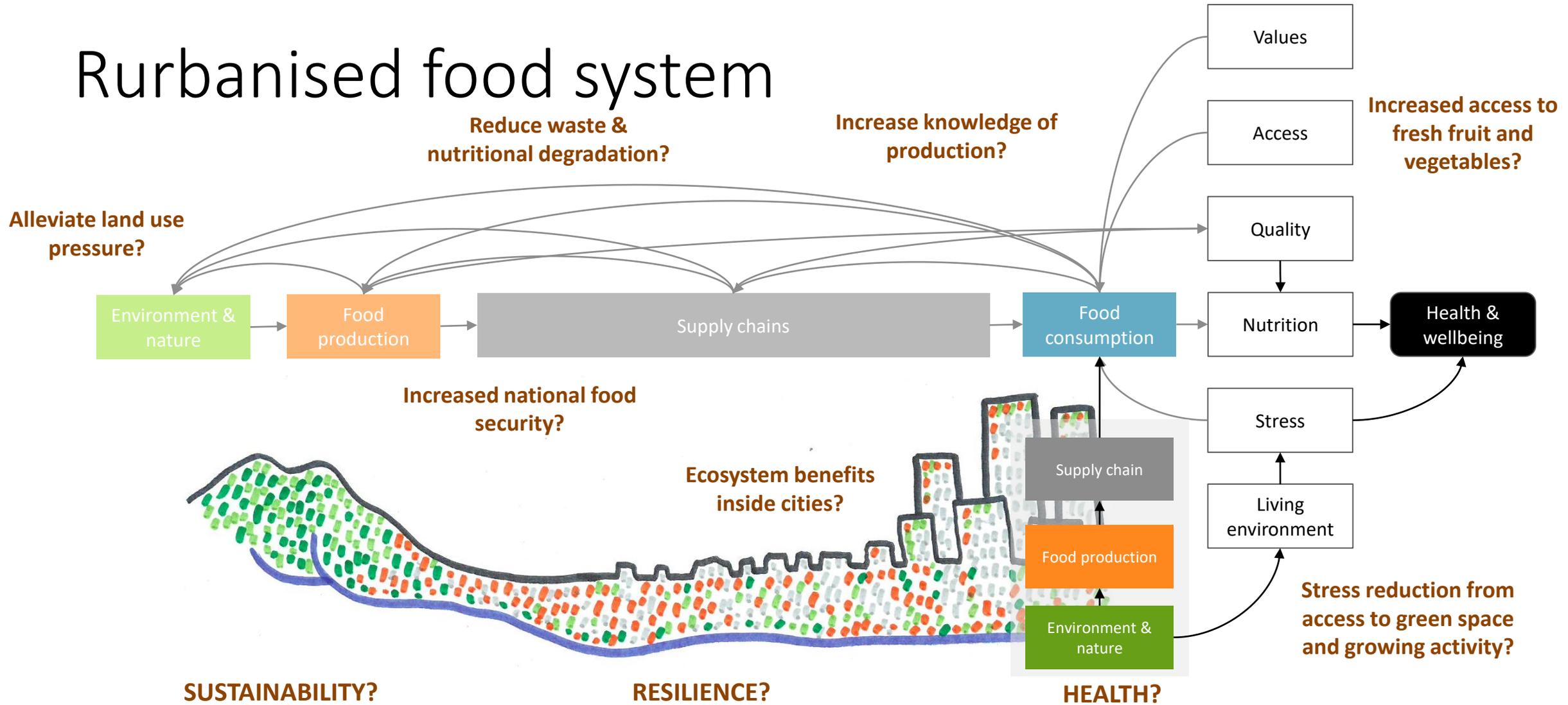
# Current food system



# Current food system



# Rurbanised food system



# Urban growing and greening is nothing new...

Community growing



Green infrastructure



Urban food for resilience



Vertical farming



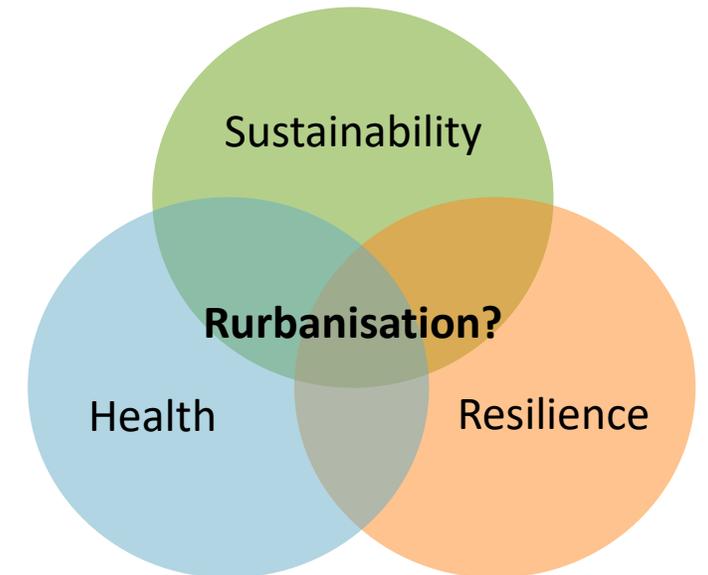
... but lots of potential for joining up research communities and knowledge to provide more holistic understanding

# Aim

Build an **interdisciplinary evidence base and network** through **collaborative research...**

...that helps us understand and perhaps realise the potential that 'rurbanisation' may have for **transforming our food system...**

...in terms of **health, sustainability and resilience.**



# Key questions

1. How would rurbanisation influence:
  - a. Healthy and sustainable diets by improving availability, access and consumption of fruit and vegetables?
  - b. Food production in terms of quantity, quality and safety and the resilience of the UK food system?
  - c. Ecosystem service delivery inside and outside cities?
  
2. How do we overcome the barriers to rurbanisation and maximise benefits?

\* Answered by an interdisciplinary team



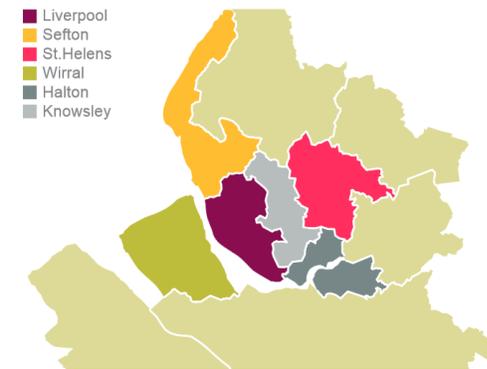
\* Only a two year project – much of what's planned are scoping studies and broad-scale analysis. There will be much left to do: opportunities for spin-off and future collaboration



# Approach

## Work streams

- What would rurbanisation mean for **health and dietary change**?
- What would rurbanisation mean for **food system resilience & ecosystems**?
- What would rurbanisation mean for **food quality and safety**?
- **Barriers and opportunities** for rurbanisation and developing a roadmap



# Scoping Region Selection: Which cities with urban food activity should we select for our scoping work?

a. Major UK urban towns and cities in the Sustainable Food Cities network

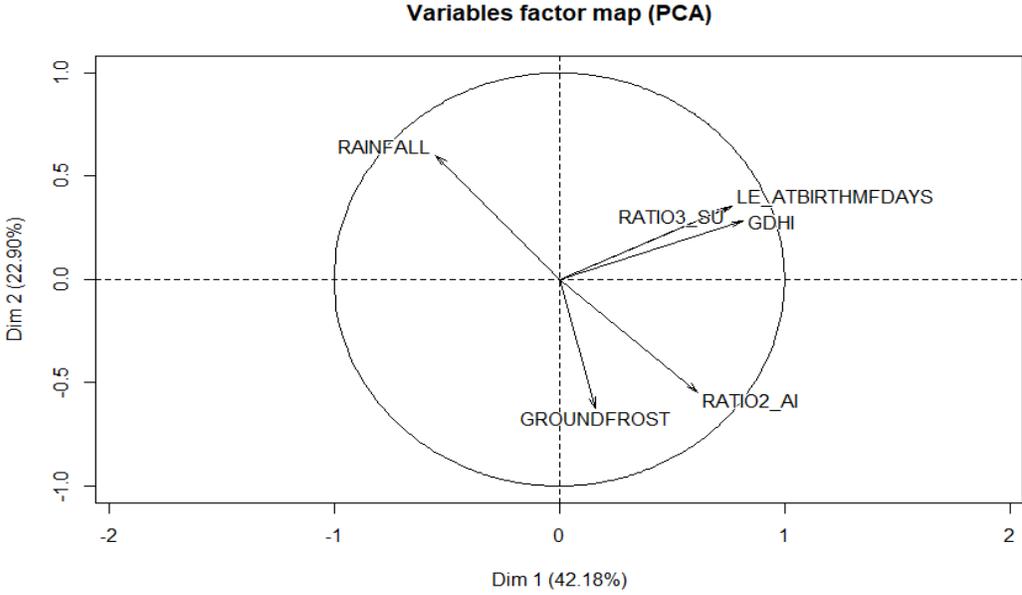


b. Collection & collation of indicators

- Socio-economic
  - 20 year Mean (Gross Disposable Household Income per head by Local Authority (GDHI) from 1997 to 2016
- Environmental
  - Mean number of ground frost days over the last 20 years (GROUND FROST), extracted at major settlement level
- Health and wellbeing
  - Combined male and female life expectancy at birth (LE\_ATBIRTHMFDAYS) by local authority from 1991-2012

# Scoping Region Selection: Analysis conducted to establish how cities aggregate?

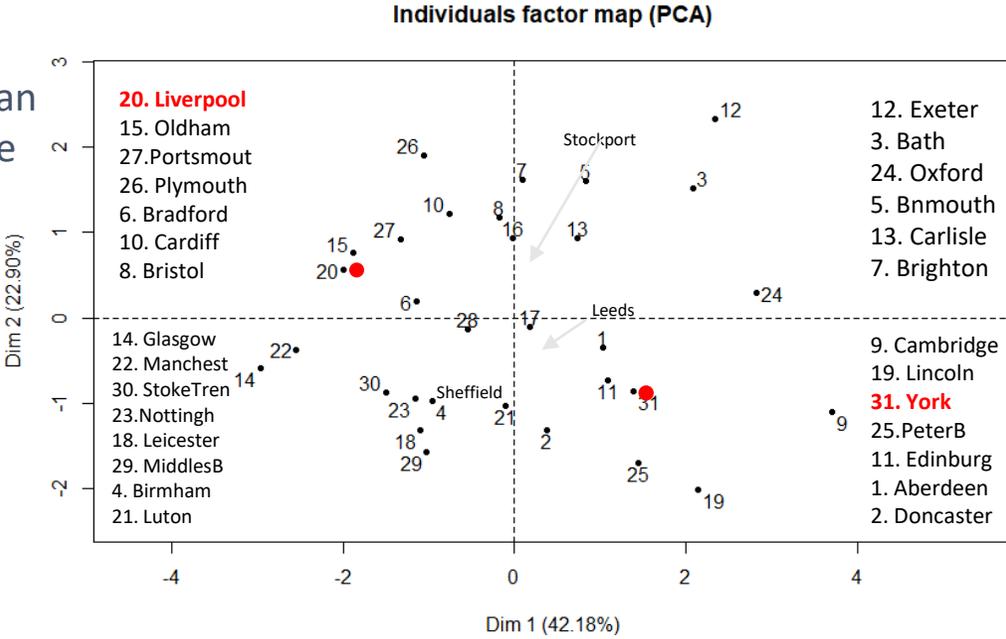
c. Principal Component analysis (PCA)



Dim 1 (Dimension=GDHI)      Ratio 3\_Suburban:Urban  
 Dim 2 (Dimension=Groundfrost)      Ratio 2\_Arable:Improved Grassland

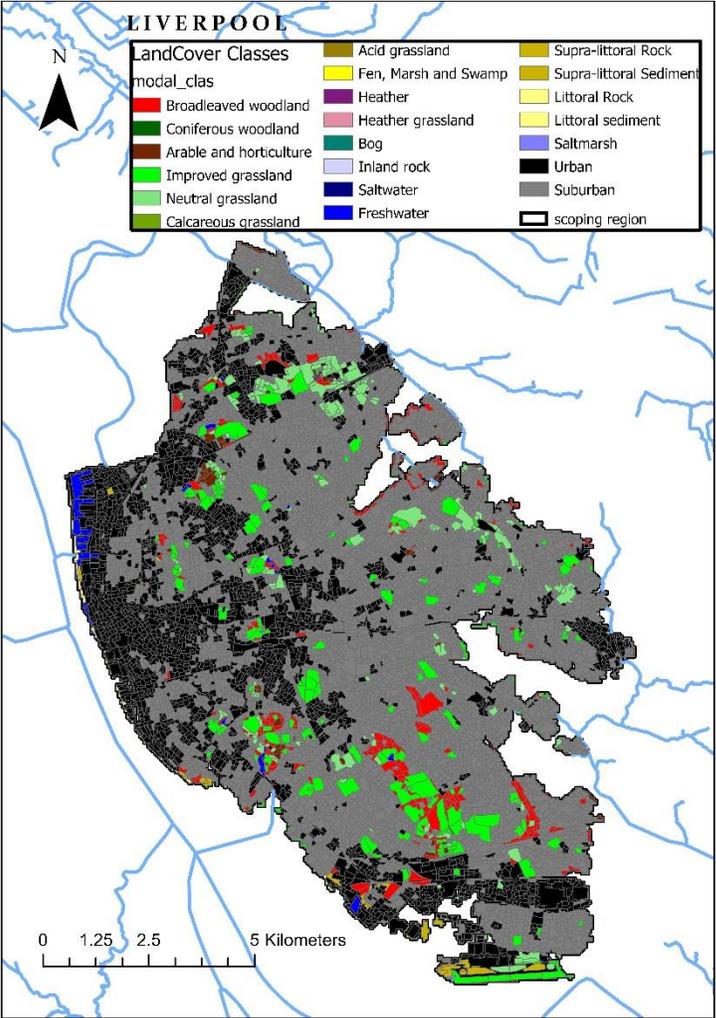
d. Generated output of how major UK towns and cities aggregate

Wetter  
 More Urban  
 Less arable  
 Milder



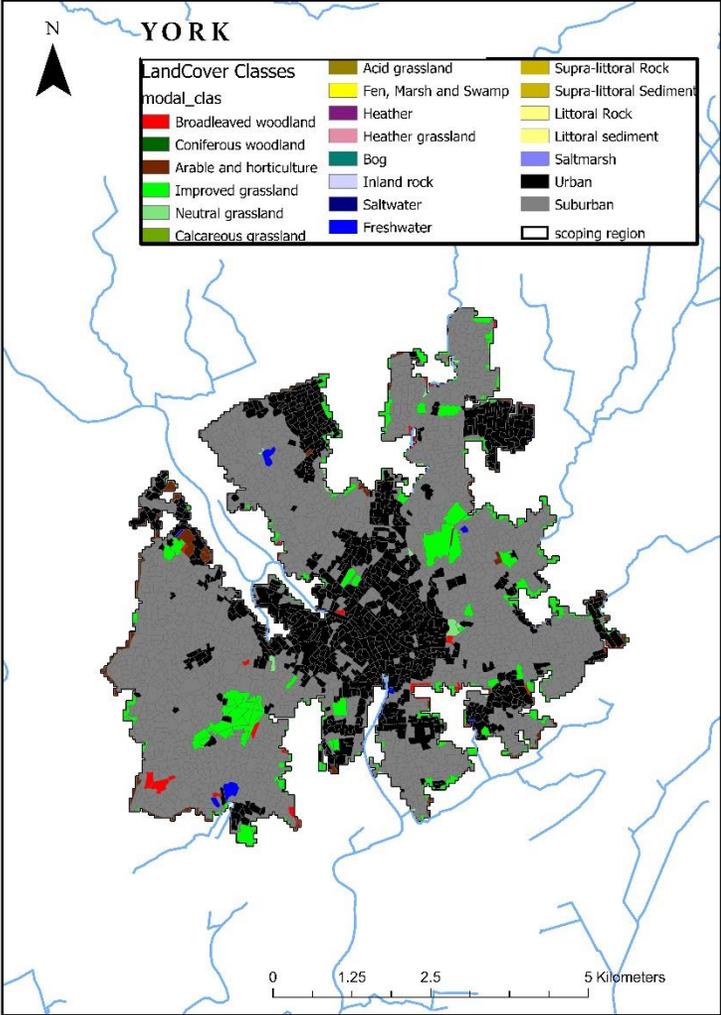
Suburban  
 Wealthier  
 Healthier  
 More Arable  
 Frostier

# Profile of selected scoping cities: Liverpool & York



e. Made a selection from opposing quadrats where we had an existing network

	Liverpool	York
Size	Large (460,000 people)	Small (19,000 people)
Rainfall	862mm	603mm
Groundfrost days	70 (coastal)	104 (in-land)
Gross Domestic Household Income	£11k	£14.5k
Life expectancy	76 years	80 years
Suburban Vs Urban	Relatively less suburban (1.7x)	More suburban (2.7x)
Urban Vs Agricultural	More urban (7.8x)	More agricultural (0.26x)



# What would rurbanisation mean for food system resilience & ecosystems?

Dr. Lael Walsh and Dr. Jess Davies, Lancaster University  
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# Task Aim: Assess the fresh fruit and vegetable production potential of rurbanisation and its value for food system resilience

- **Where:** Identify urban and peri-urban areas and surfaces that could be made available for urban farming
- **What:** Decide what types of fresh fruit and vegetables could be grown in these areas
- **How much:** Estimate how much could be grown per m<sup>2</sup>
- **So what?:** How does this compare to what we import?

# Where could we grow what in the UK? Set typologies of urban growing & FF&V categories



- Datasets:**
1. OS Master Map GreenSpace Area
  2. OS Building Height Attribute
  3. OS Landcover Map 2015
  4. Land Cover CCI UCL-Geomatics 2017

## How much per m<sup>2</sup>

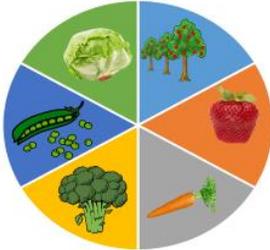
**DEFRA horticulture data for the UK (20-year average (1996-2015))**

FF&V Class	Symbol	Mean Total Production (T/ha)	Proportion of Total Horticulture Land Area
Orchard Fruit		17	0.12
Soft Fruit		11	0.06
Roots & Onions		45	0.18
Brassicas		17	0.19
Legumes		4	0.34
Others		21	0.11

# In progress: Estimating how much space in each typology is devoted to each FF&V category

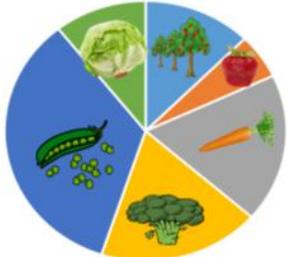
SOIL BASED GROWING

Equality



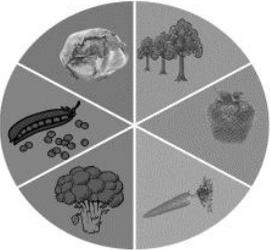
**Simplest:** Assume equal proportion of every feasible category

% of domestic production area



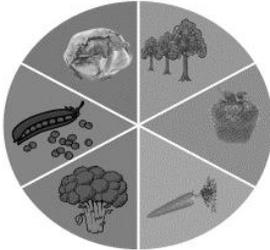
**Feasible:** Based on current domestic land area devoted to each category

Follow the Money



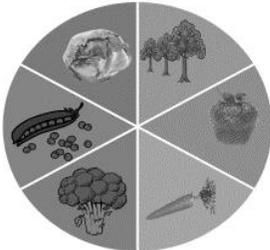
**Complex:** Base on the wholesale price of crop  
£/kg using a flagship crop in each category

Consider the imports



**Complex:** Base on import data  
£/kg using a flagship crop in each category

Eat well diet: what should people be eating?



**Complex:** Base on the relative value to diet (e.g. Lancet eat well)  
e.g. Veg>Fruit

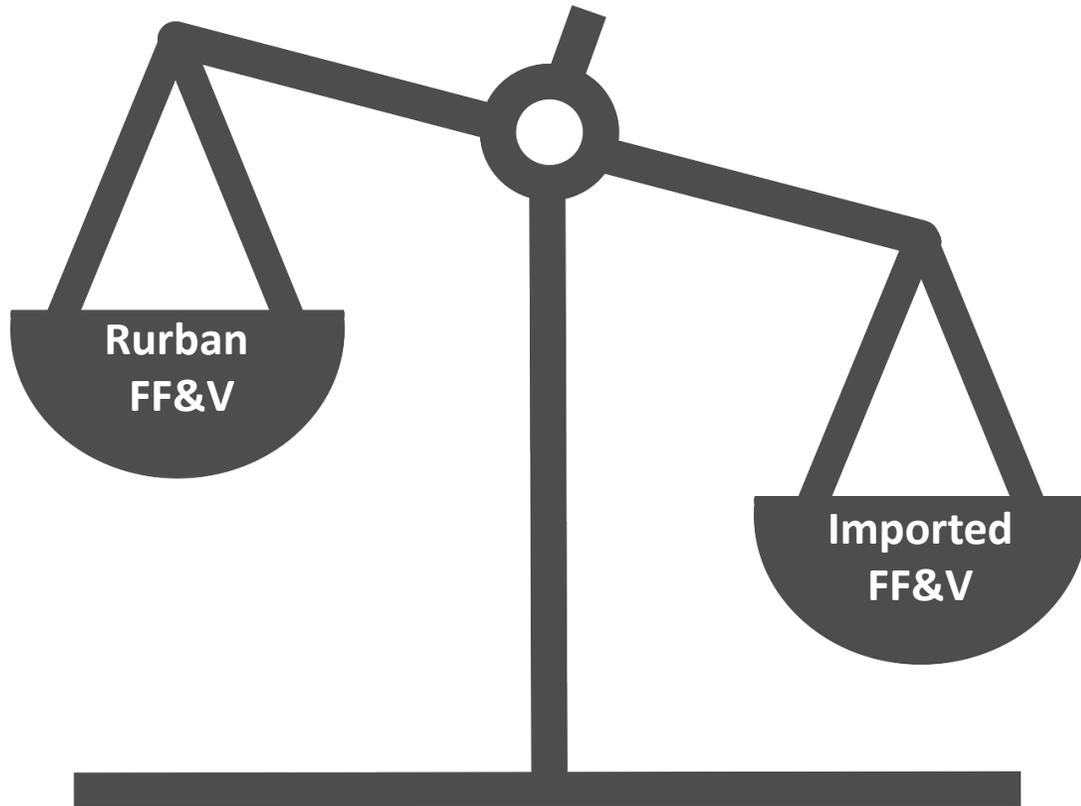


*Increasing level of complexity*

# So What? Comparing Rurbanised FF&V production to imports to assess food system resilience contribution

Once we have an estimate of how much can be grown and where

- Compare Tonnes/yr in FF&V categories
- Consider what spaces would be sacrificed for urban food production



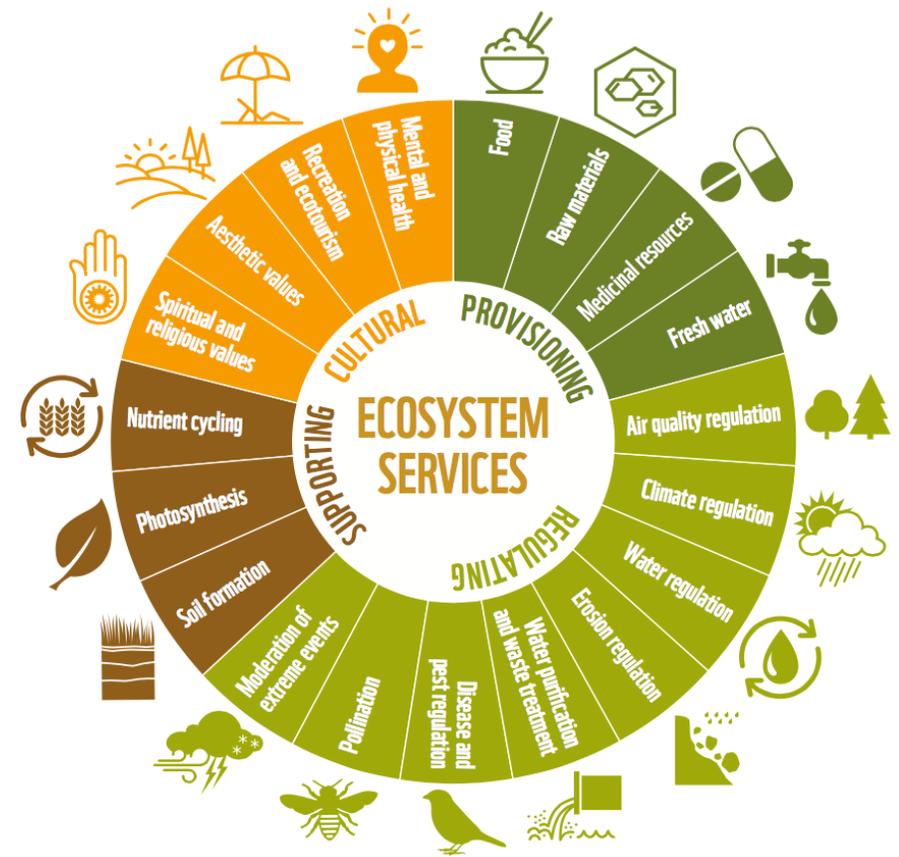
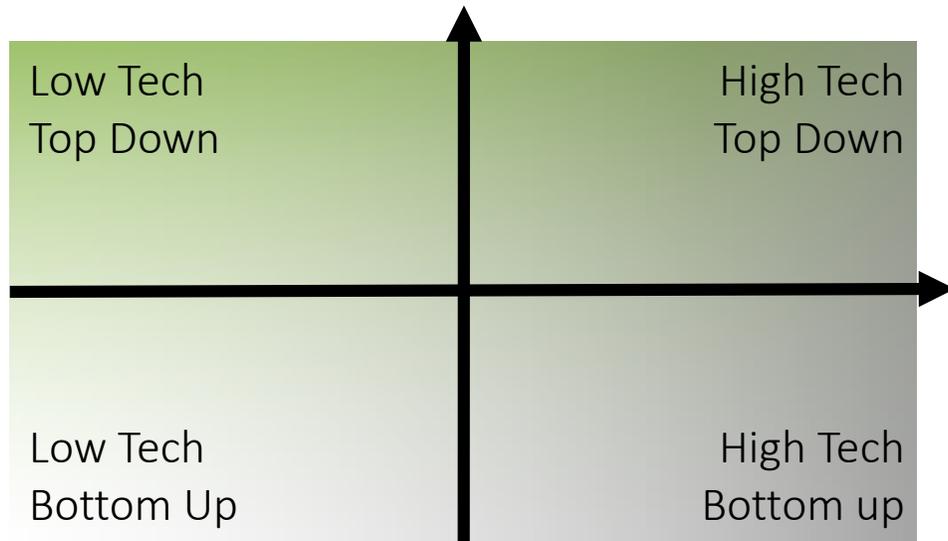
**There are clear limitations...**

- Seasonality
- Production  $\neq$  Consumption
- Assumptions around yields
- Data limitations on spaces

...but, this will provides us with a first-order upper-limit estimate on how much FF&V could be grown in urban systems and it's potential importance for food system resilience.

# Next Task: How might rurbanisation affect urban ecosystem service delivery?

- Use existing tools for ecosystem service analysis (e.g. InVEST)
- Fill gaps where needed by synthesising current urban ecosystem service knowledge base
- Applying in our scoping regions under rurbanisation scenarios



# What would rurbanisation mean for health and dietary change?

Dr Charlotte Hardman and Dr Beth Mead, University of Liverpool  
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# Context



- Public and personal health implications of the obesity rate – 2/3 UK adults overweight or obese.
- 8.4 million people are food insecure → Unhealthy eating habits and malnutrition.
- Mental health crisis.
- Positive relation between spending time in natural environments and mental health/well-being.
- Urban growing as means of reconnecting people with nature and food growing?



# Key Questions

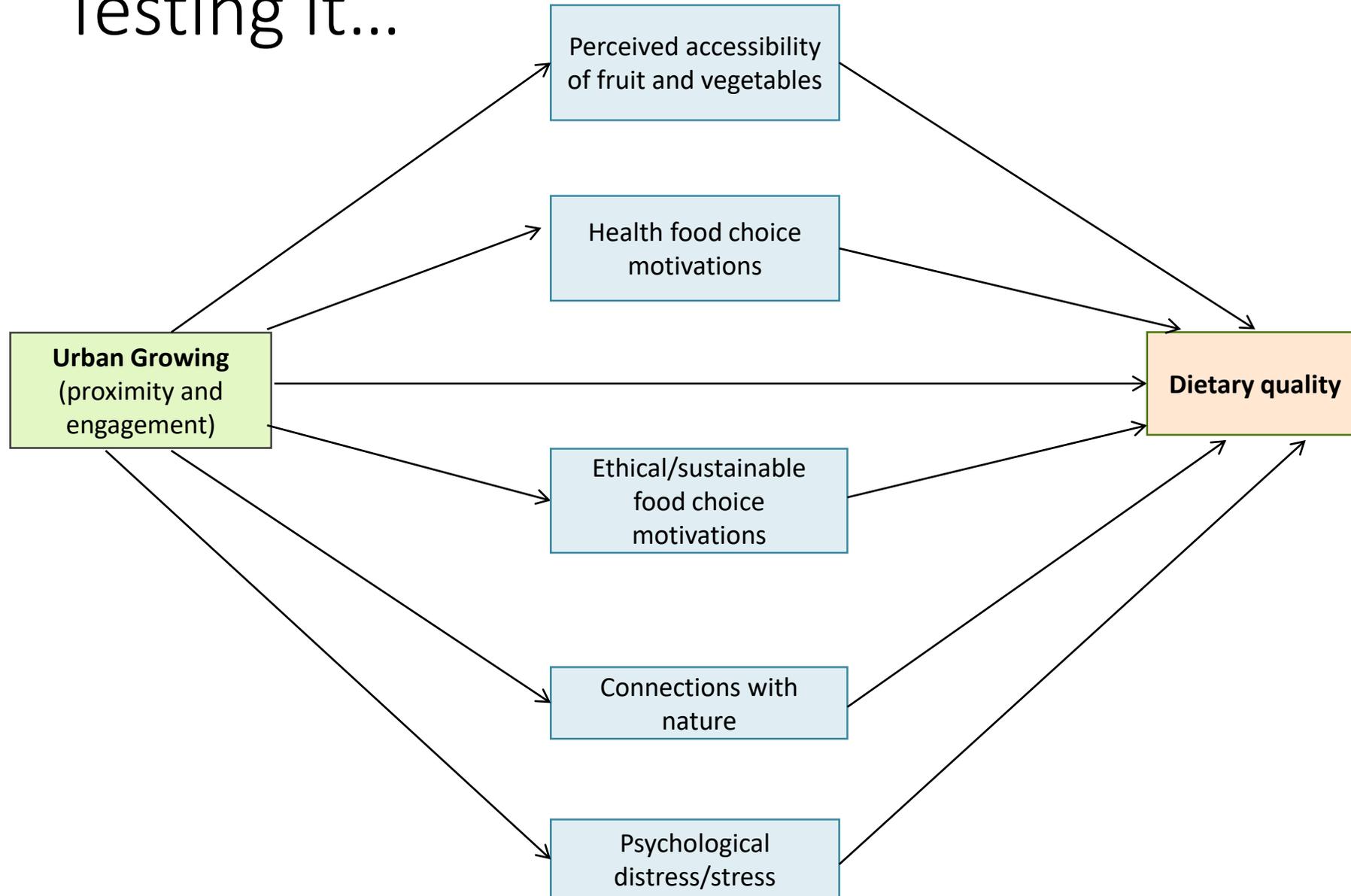
If we were to radically upscale urban growing and greening in cities would that be associated with better wellbeing and healthier dietary choices?

Specific Research Questions:

1. Is proximity to and engagement with urban growing associated with healthy and sustainable dietary choices and what accounts for this relationship?
2. Does exposure to urban agriculture have a causal influence on healthier food choices and what factors mediate this effect (e.g. mood)?



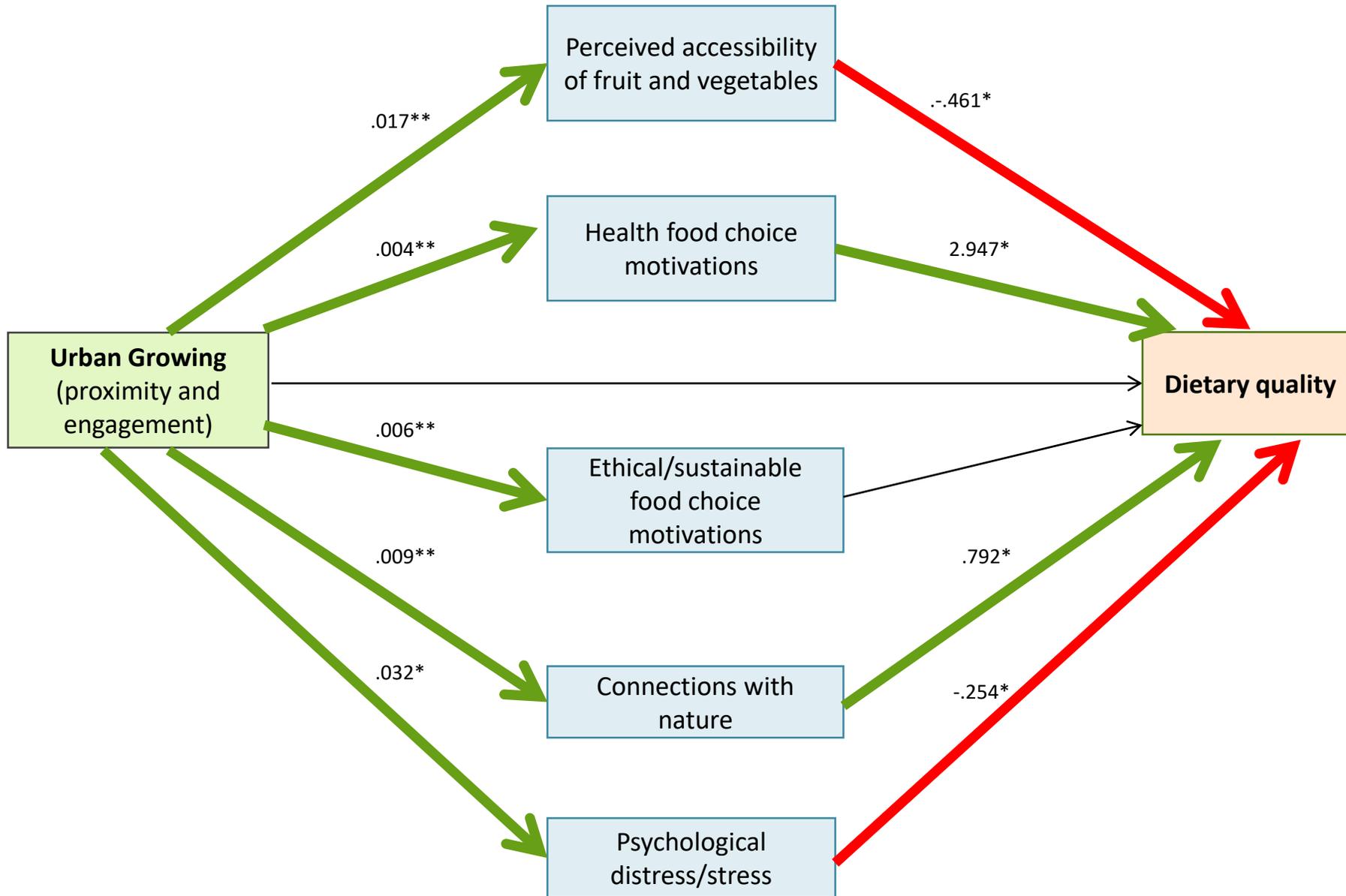
# Testing it...



# Consumer Survey

- 624 responses, final sample  $N=583$ .
- 400 female, 181 male, 2 other
- 87.5% white, 63.7% employed FT/PT
- Mean age 42.75 ( $s.d.= 15.71$ ).
- Engagement in urban agriculture – 318 “Yes”





\* $p < .05$ , \*\* $p < .001$

# Summary of results so far....

- Greater proximity to/engagement with urban growing associated with:
  - More perceived access to F&V.
  - More food choice motivations based on health and sustainability.
  - Higher connection with nature.
  - But higher psychological distress (unexpected!).
- Higher connection with nature and health food choice motivations, in turn, were associated with better quality diet.

# Next steps



## Virtual reality (VR) experiment

- Test these associations in the lab
- Adult participants (N=120) randomly allocated to one of three VR conditions: (1.) Urban agriculture environment, (2.) Bland urban environment, (3.) Rural environment.
- Food choice and intake covertly measured.



# What would rurbanisation mean for food quality and safety?

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# Main research question

**Nutritional  
Quality?**



**Safety?**

**Urban grown  
fresh produce**

**VS**

**Conventional  
and/or imported**

# Why do we expect to see differences?

- Contrasting growing conditions and practices
- Different supply chains
- Air and soil contamination in urban environments
- Use of agrochemicals



- **Freshness at point of consumption**
- **Nutritional quality**
- **Safety**

# Evaluation strategy

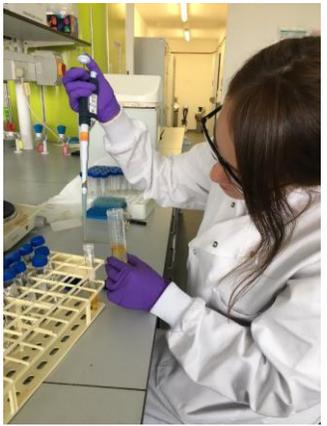


Two scoping regions



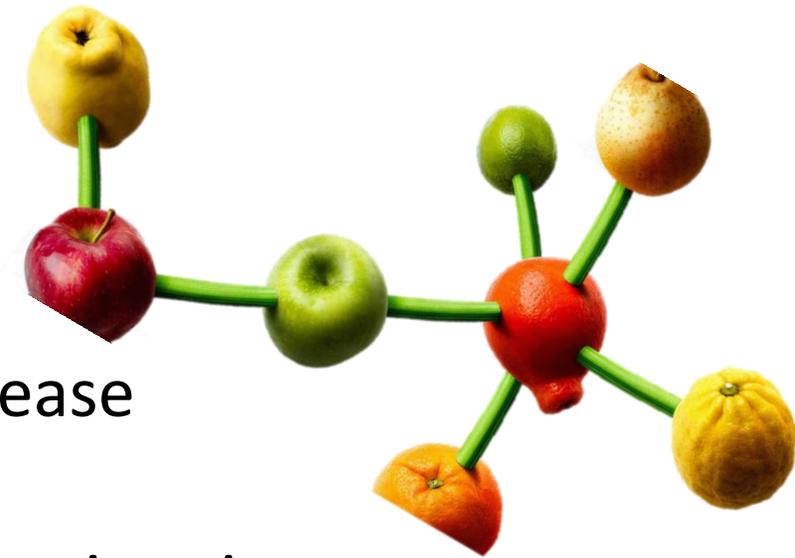
How do they compare?

Collection of plant and soil samples

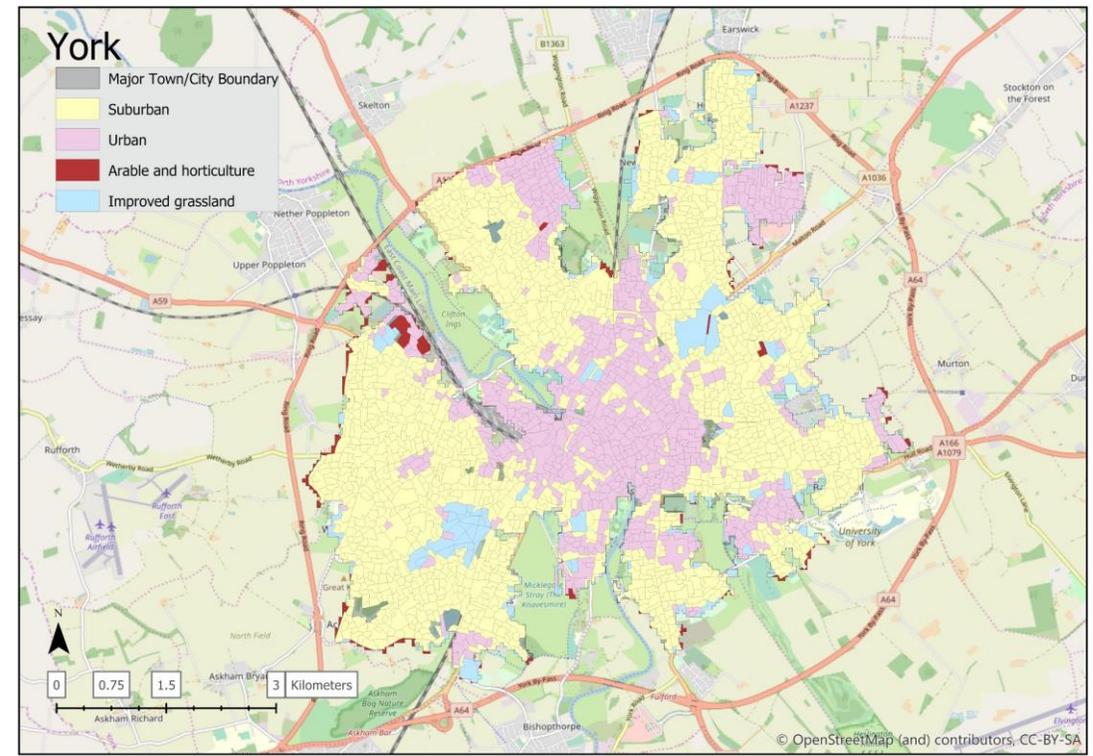
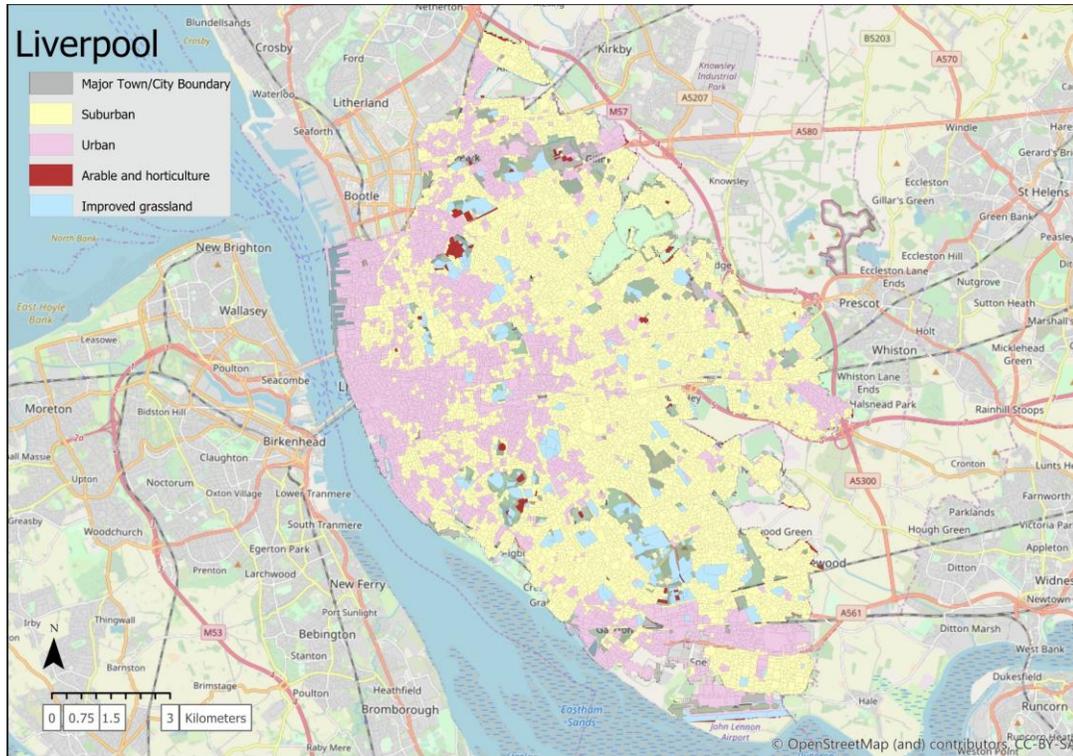


# What we'll be testing for?

- Physiological properties (e.g. colour, firmness, disease incidence/severity)
- Nutritional content and bioactive compounds (e.g. vitamins, phenolics, flavonoids, anthocyanins etc.)
- Contaminants (e.g. heavy metals, POPs, pesticide residues)
- Soil quality (e.g. organic matter, heavy metals)
- Effect of supply chain length on quality



# Work in progress – Identifying sampling locations



# Outcomes

- Region-specific evidence base regarding the nutritional quality and safety of urban agriculture → **Identify problems and develop transformational solutions**
- Contribution to knowledge through peer-review publications
- Consumer confidence on urban grown food?

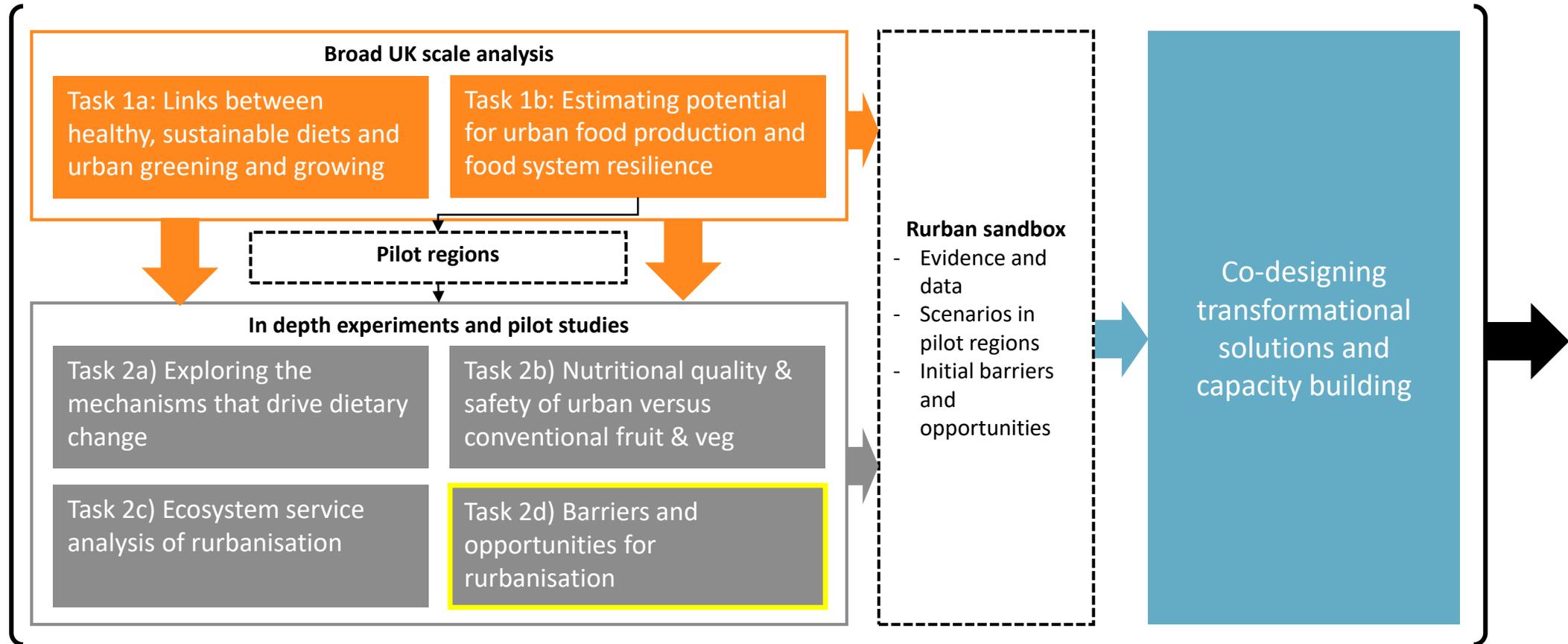


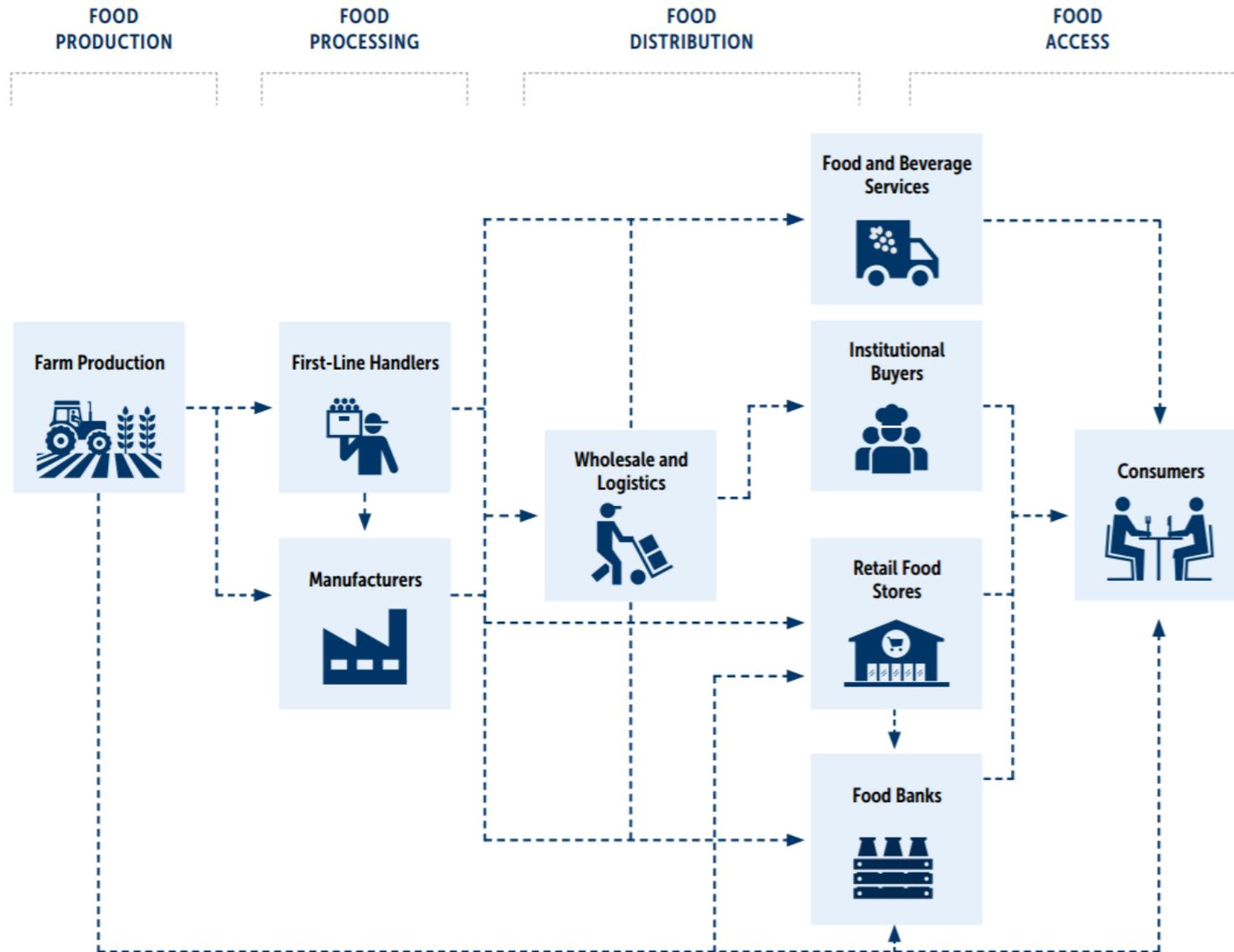
# Barriers and opportunities for rurbanisation and developing a roadmap

Dr Ling Liu, Lancaster University



# Approach

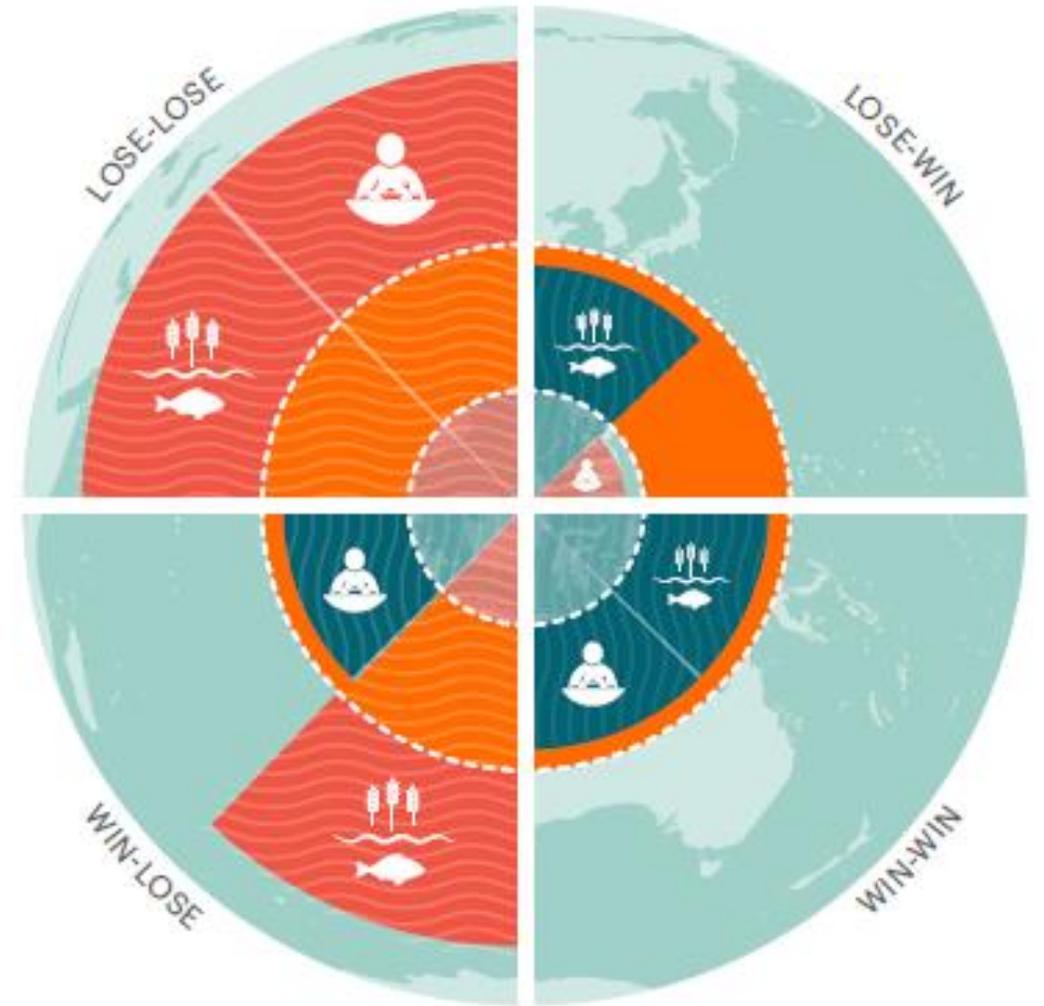




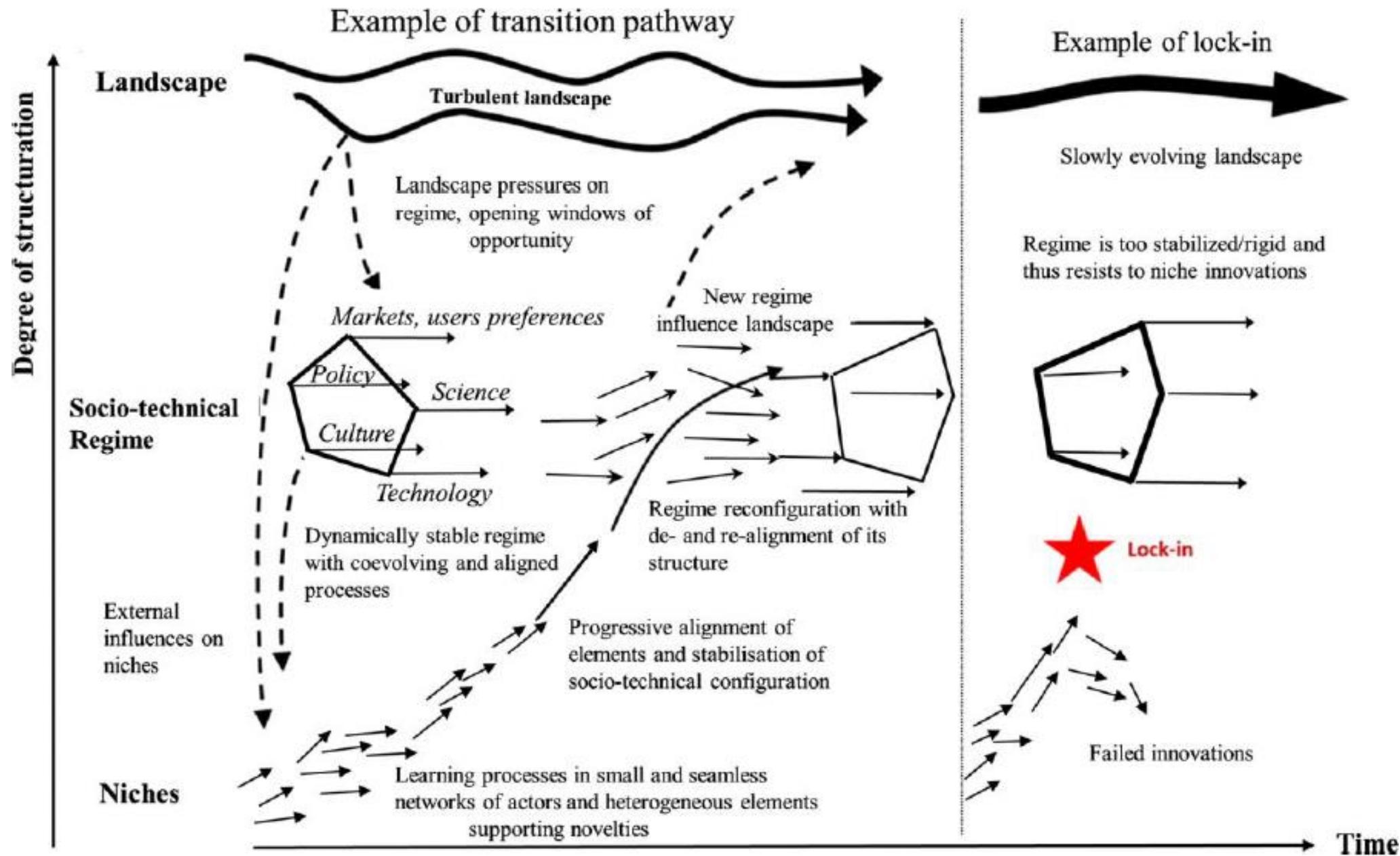
Source: Adapted from Nesheim, Malden C., Maria Oria, and Peggy Tsai Yih, eds. *A framework for assessing effects of the food system*. National Academies Press, 2015.

# Key Questions

- What do we mean by “upscaling” urban growing?
- Are there practical cases and/or scenarios for upscaling urban growing/urban agriculture?
- How those cases or scenarios can help us archiving a healthy, sustainable and resilient future for food systems?



Source: EAT-Lancet Commission



# Work in progress

- Developing focus group/interview approaches
- Conducting semi-structured interviews to identify barriers and opportunities
- Rurban Sandbox

# Thank you

Staying in touch

Sign up for our newsletter: [www.lancaster.ac.uk/lec/rurbanrevolution](http://www.lancaster.ac.uk/lec/rurbanrevolution)

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