

# The Mismatch of Food System Dynamics and Diet: forward to the past or something new?

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# 1. OUR FOOD PROBLEM

**The rich world is eating unsustainably; LDCs catching up**

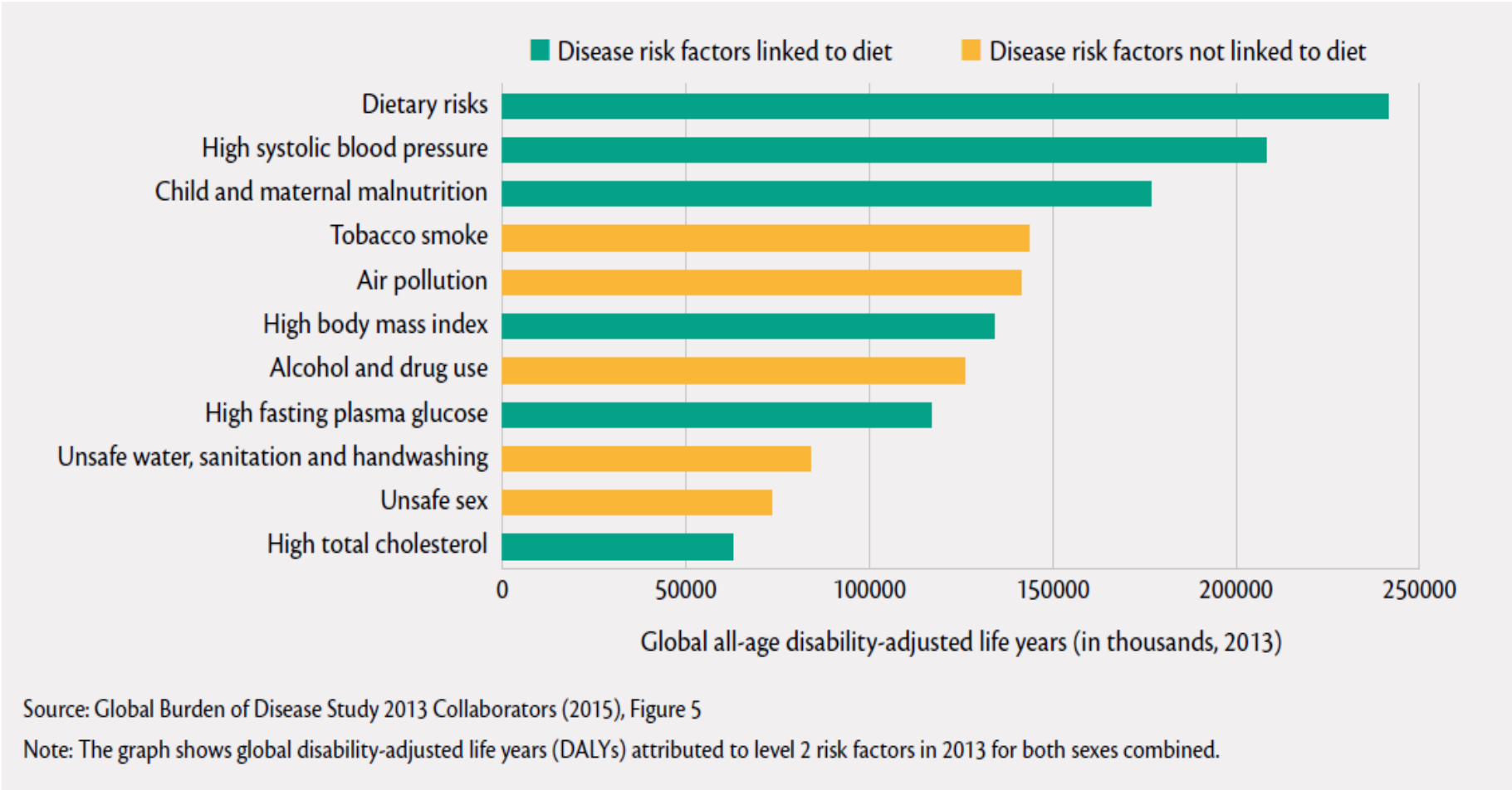
**Environment: CO<sub>2</sub>e, H<sub>2</sub>O, Biodiversity**

**Health: NCDs, safety, antibiotics**

**Economy: € \$ £, work, market concentration**

**Society: class, culture, values**

# Six of top 11 risk factors driving global burden of disease are related to diet



Source: Lancet 2015 summarised in GLOPAN (2016) <http://glopan.org/sites/default/files/ForesightReport.pdf>

# Global/regional realities compared to 'healthy' diet ideal

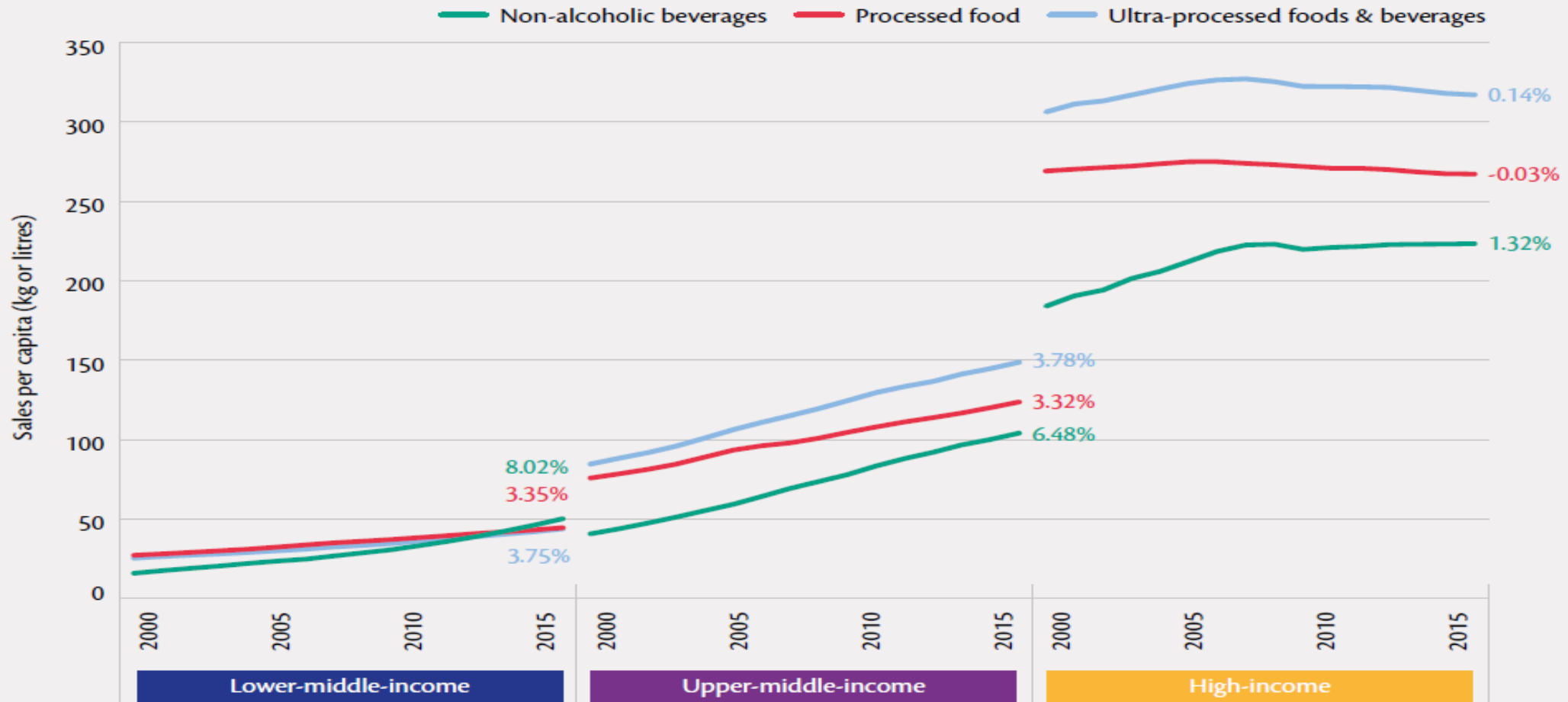
Source: Berners-Lee et al 2018

Food type	Healthy diet (kcal/p/ day)	Current (2013) global and regional consumption (kcal/p/day)							
		World	Industrial- ised Asia	North America & Oceania	Europe inc. Russia	Latin America	South & South- east Asia	North Africa, West & Central Asia	Sub- Saharan Africa
Fruit and vegetables	255 (minimum)	159 <sup>b</sup>	294	129 <sup>b</sup>	142 <sup>b</sup>	112 <sup>b</sup>	82 <sup>b</sup>	154 <sup>b</sup>	193 <sup>a</sup>
Sugar and sweeteners	150 (maximum)	189 <sup>a</sup>	68	383 <sup>b</sup>	264 <sup>b</sup>	297 <sup>b</sup>	195 <sup>a</sup>	214 <sup>b</sup>	153 <sup>a</sup>
Vegetable oils	360 (maximum)	219	179	626 <sup>b</sup>	359	296	116	304	173
Meat, dairy and fish	624 (maximum)	499	624	1059 <sup>b</sup>	1035 <sup>b</sup>	637 <sup>a</sup>	257	404	170

# The nutrition transition

Source: Baker 2016 in GLOPAN 2016 p51

**FIGURE 3.6: Trends in per capita sales volumes of non-alcoholic beverages, processed foods and ultra-processed foods by country income group, 2000–15, with 15-year average growth rates shown**

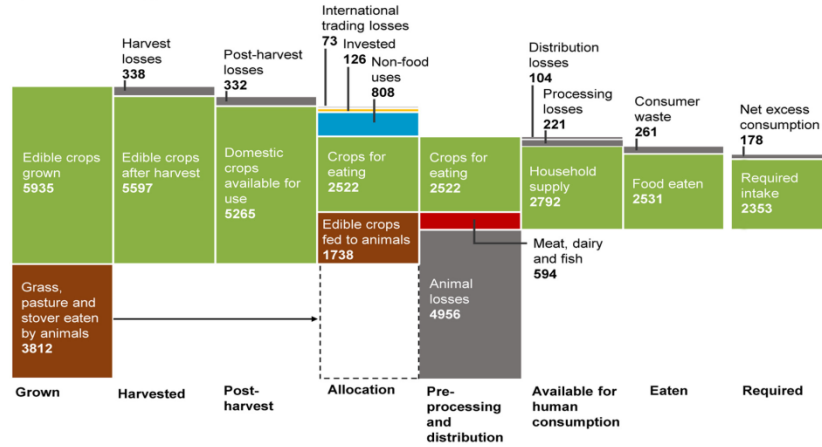


Source: Baker (2016)

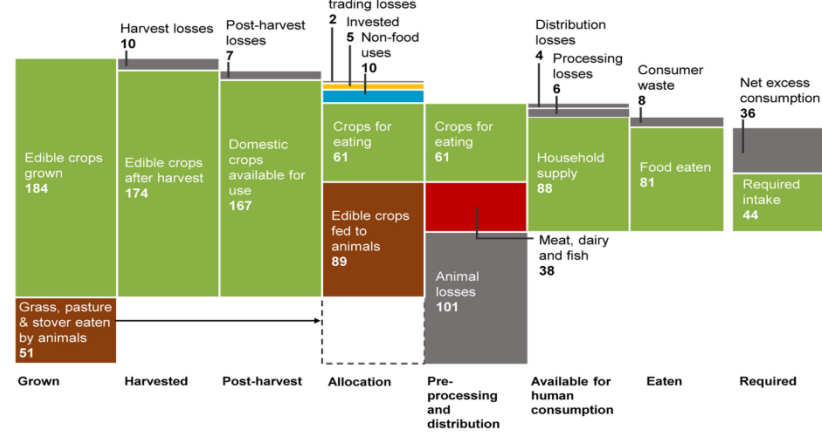
# Food chains lose nutrients

## Berners-Lee et al (2018)

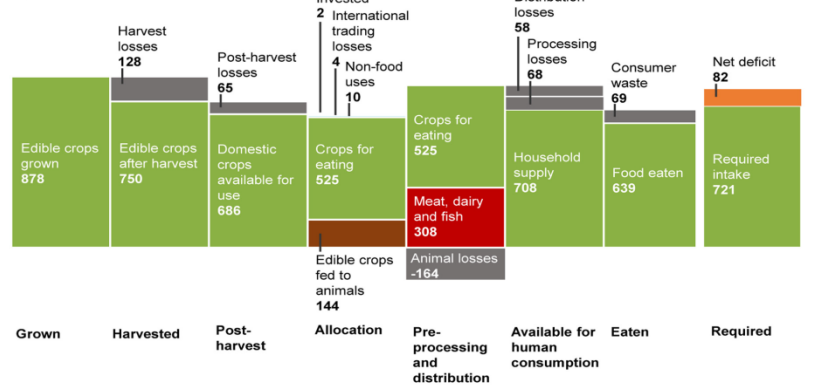
a) Global food energy flow



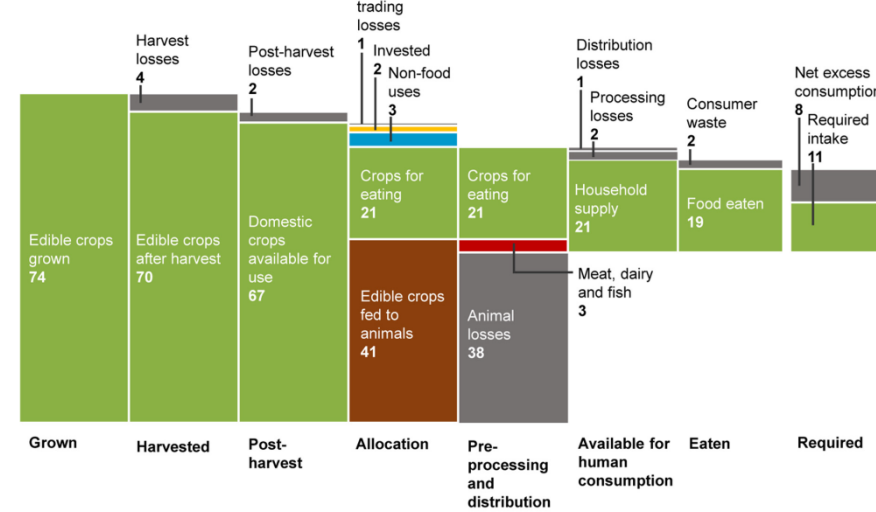
b) Global food protein flow



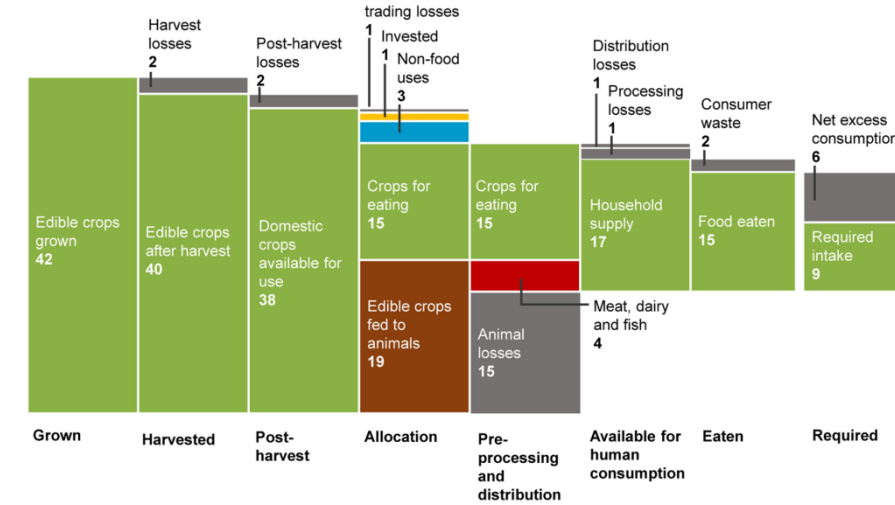
c) Global food vitamin A flow



d) Global food iron flow



e) Global food zinc flow



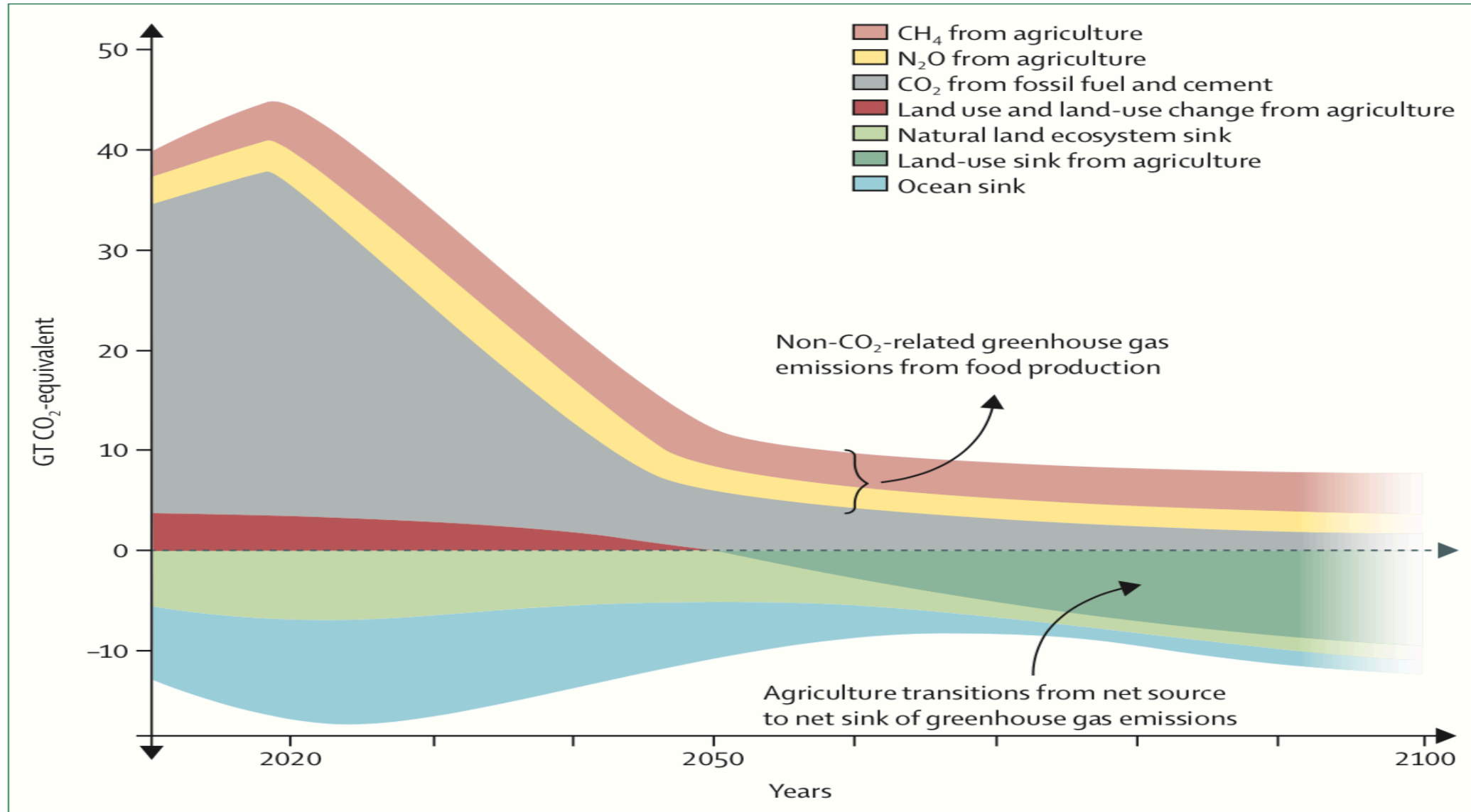
# Global health costs estimated

Harvard & WEF (2011) [www.weforum.org/EconomicsOfNCD](http://www.weforum.org/EconomicsOfNCD)

- 2010-30 NCDs estimated to cost US **\$30 trillion+**
  - = 48% of global GDP in 2010
  - will push millions of people below poverty line
- CVD set to rise 2010-2030 globally by 22%
  - costing US\$ 20,032 bn over 2010-30
- Diabetes cost to global economy set to rise from \$500 bn (2010) to \$745 bn (2030)
- Higher impact will be in lower & middle income countries than in high income countries
  - = the effect of the Nutrition Transition
  - But can even rich countries can afford health care?

# Food Production if Safe Operating Space for Climate

Source: EAT-Lancet Commission report 'Food in the Anthropocene', *The Lancet*, January 2019



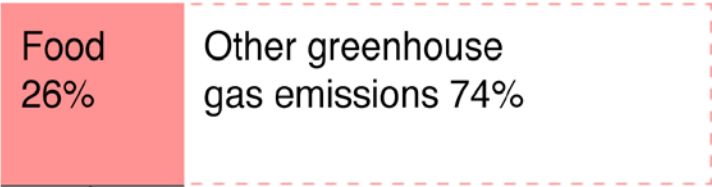


# Food's greenhouse gas effect

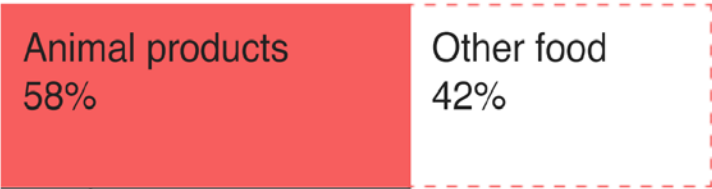
## How much impact does food have?

Proportion of total greenhouse gas emissions from food

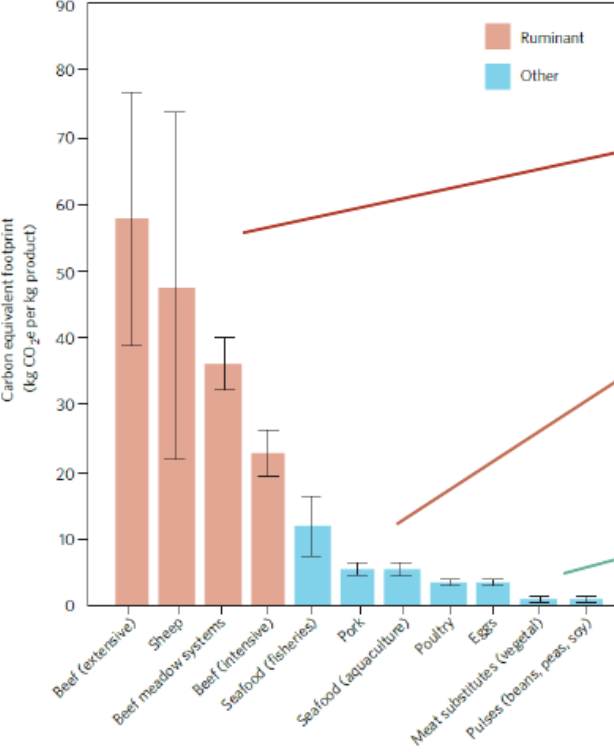
A quarter of global emissions come from **food**



More than half of food emissions come from **animal products**



Half of all farmed animal emissions come from **beef and lamb**



Ruminants have highest GHG per KG of product

Pork, poultry and seafood are lower than ruminant meats (beef and sheep)

Fruit, vegetables and grains are generally similar to meat substitutes and pulses

Source: Ripple et al (2014) *Nature Climate Change*, amended by FCRN

# Eating genetic diversity is in decline

- 391,000 known plant species, 5,538 are known to have been used as human food \*
- 3 crop species – rice, wheat and maize – provide 50% of the world's calories from plants.
- 146 country study found 103 species gave 90% of world's plant food supply\*\*
- Gene pool decline also within individ crops: FAO est c 75% genetic diversity of agric crops lost in C20th \*\*\*
- RAFI survey of 75 US crop species found 97% varieties listed in old USDA catalogues now extinct \*\*\*\*
- Studies in Germany found c 90% historical diversity of crops has been lost & S Italy c 75% crop varieties gone \*\*\*\*\*

## SOURCES:

\* Bioversity: [https://www.bioversityinternational.org/fileadmin/user\\_upload/research/research\\_portfolio/Diet\\_diversity/Bioversity\\_International\\_Dietary\\_Diversity.pdf](https://www.bioversityinternational.org/fileadmin/user_upload/research/research_portfolio/Diet_diversity/Bioversity_International_Dietary_Diversity.pdf)

\*\* Prescott-Allen, R and C Prescott-Allen (1990); How Many Plants Feed the World?, *Conservation Biology*, 4:4, 365-374

\*\*\* FAO (1998) *Special: Biodiversity for Food and Agriculture*, Rome <http://www.fao.org/sd/EPdirect/EPre0039.htm>

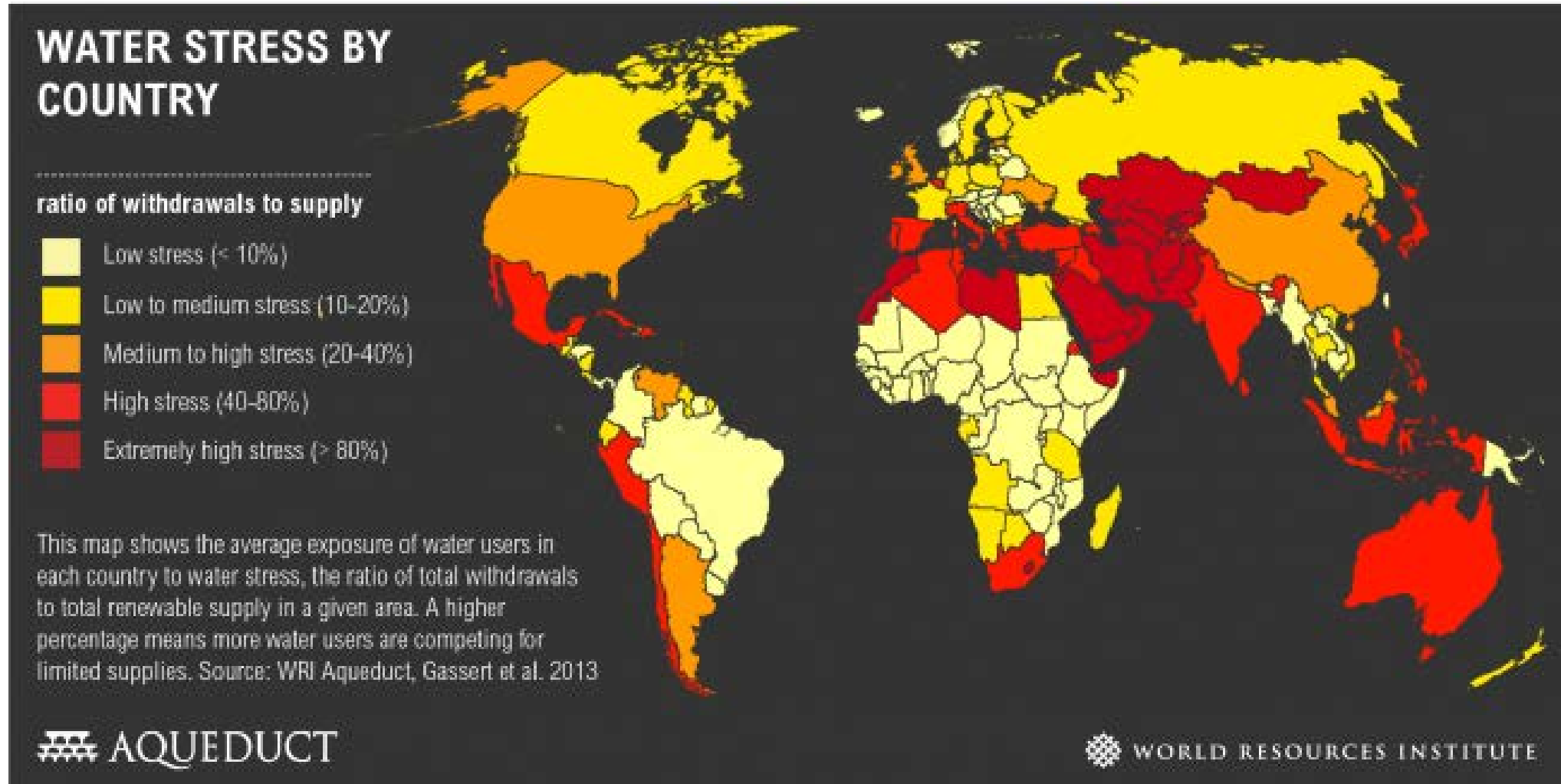
\*\*\*\* Fowler C, Mooney P(1990); *The Threatened Gene* Lutworth Press

\*\*\*\*\*Hammer K, T Gladis & A Diederichsen (2002); In situ and on-farm management of plant genetic resources, *Europ. J. Agronomy* 19, 509-517

# Water stress

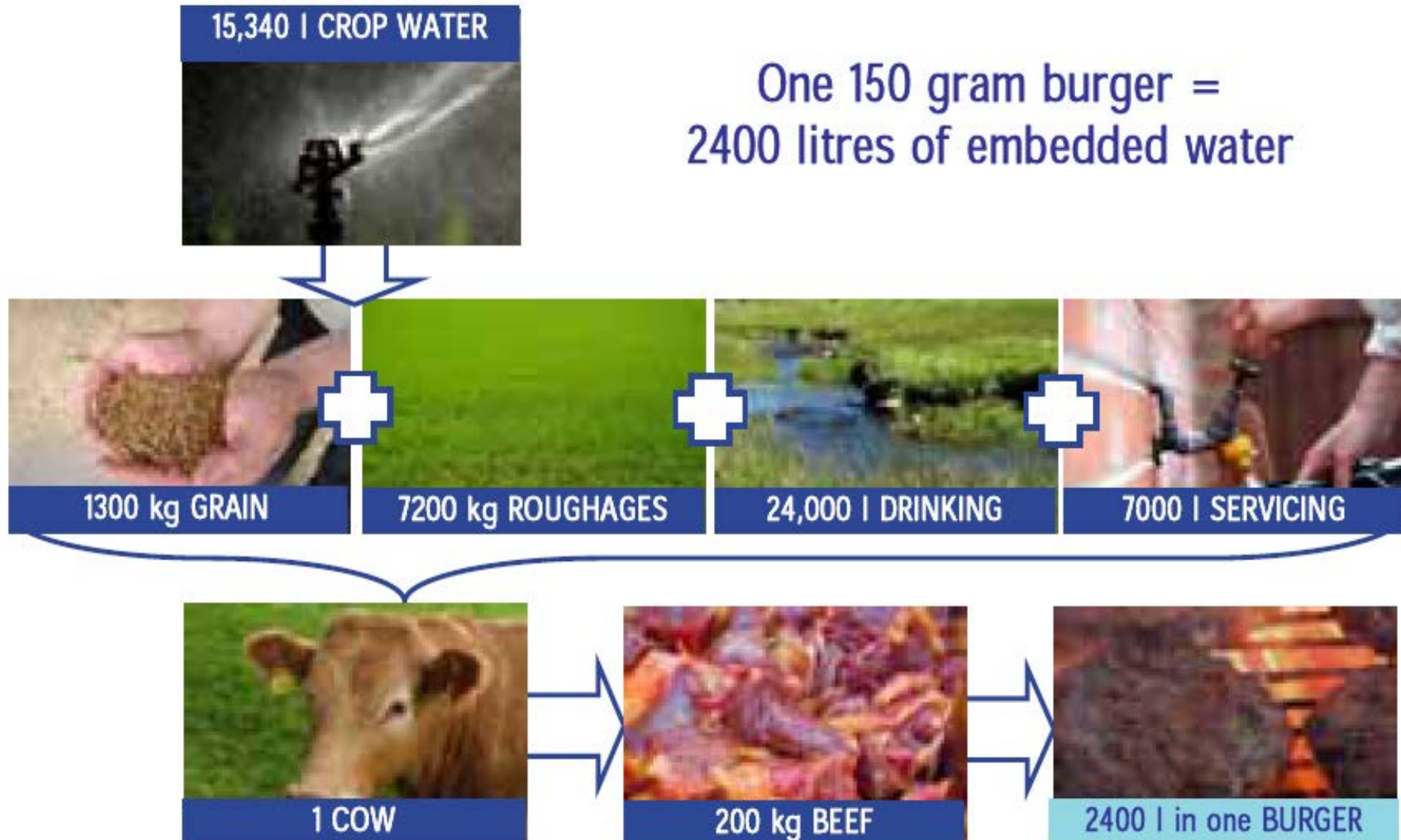
source: WRI 2013

<http://www.wri.org/resources/charts-graphs/water-stress-country>



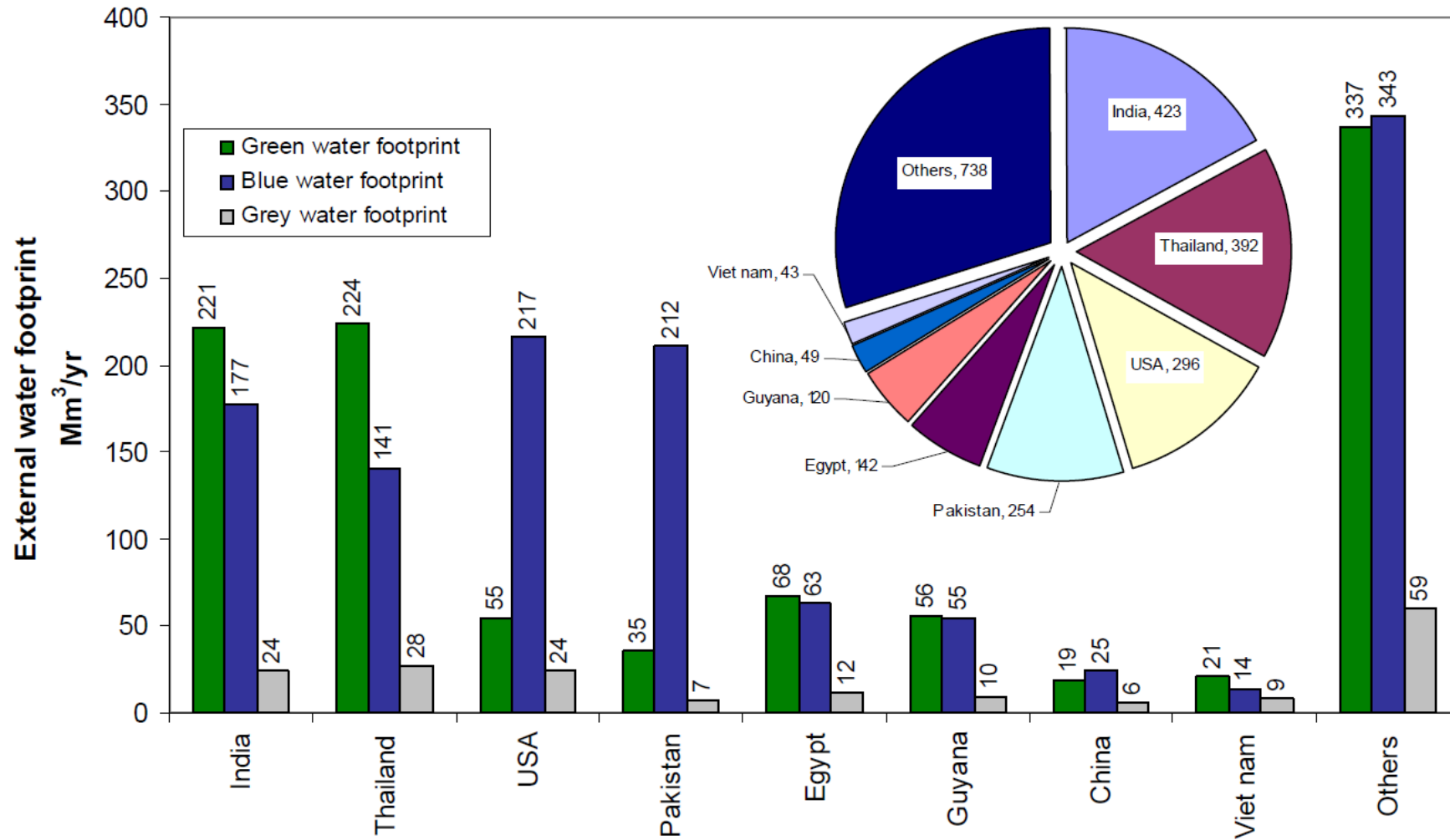
# Embedded H<sub>2</sub>O in food (NL)

source: Chapagain & Hoekstra 2004



# Importation of water to EU in the form of rice (average of EU 27)

source: Chapagain & Hoekstra UNESCO-IHE (2010) pg 29



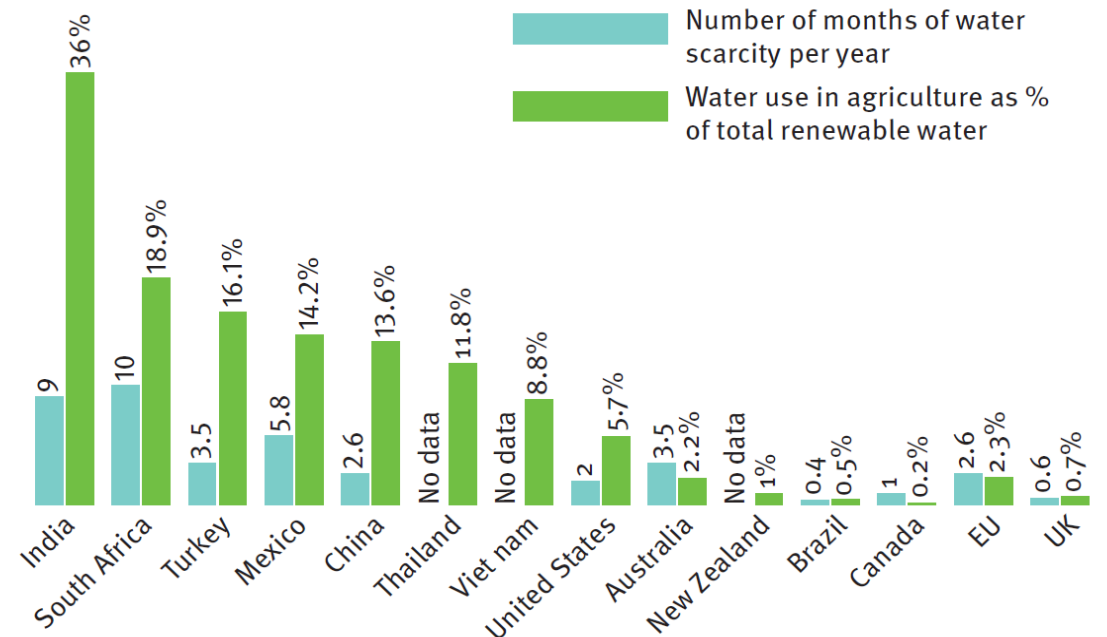
# UK Water Importation in fruit & veg

source: Hess & Sutcliffe, Cranfield University, 2018

- UK imports 13.5 bn kg of fresh fruit & veg p.a.
- = 560 million m<sup>3</sup> of freshwater p.a.
- = 211 kg/capita/year
- 74% of this is from countries with water vulnerabilities
- **increased by 36% in 1996 – 2015**

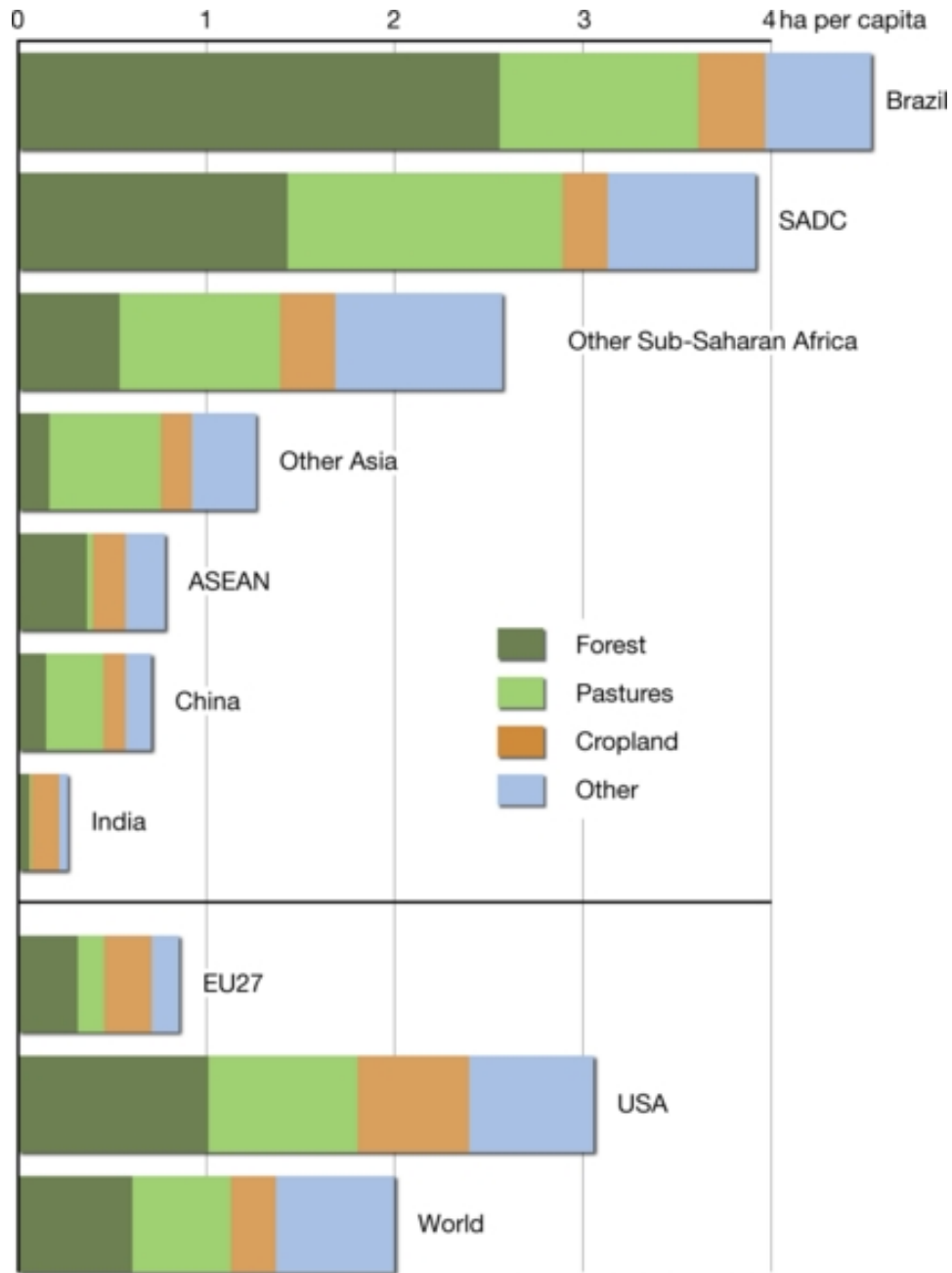
## Water Stress in non-EU countries exporting food to the UK

source: Elliott & Tipper 2018



## **2. THE SUSTAINABLE DIETS CHALLENGE**

**Sustainable Diets = 'multi-criteria' approach to food**



Source: FAOSTAT 2008

# Land use by type, hectares per capita, by region

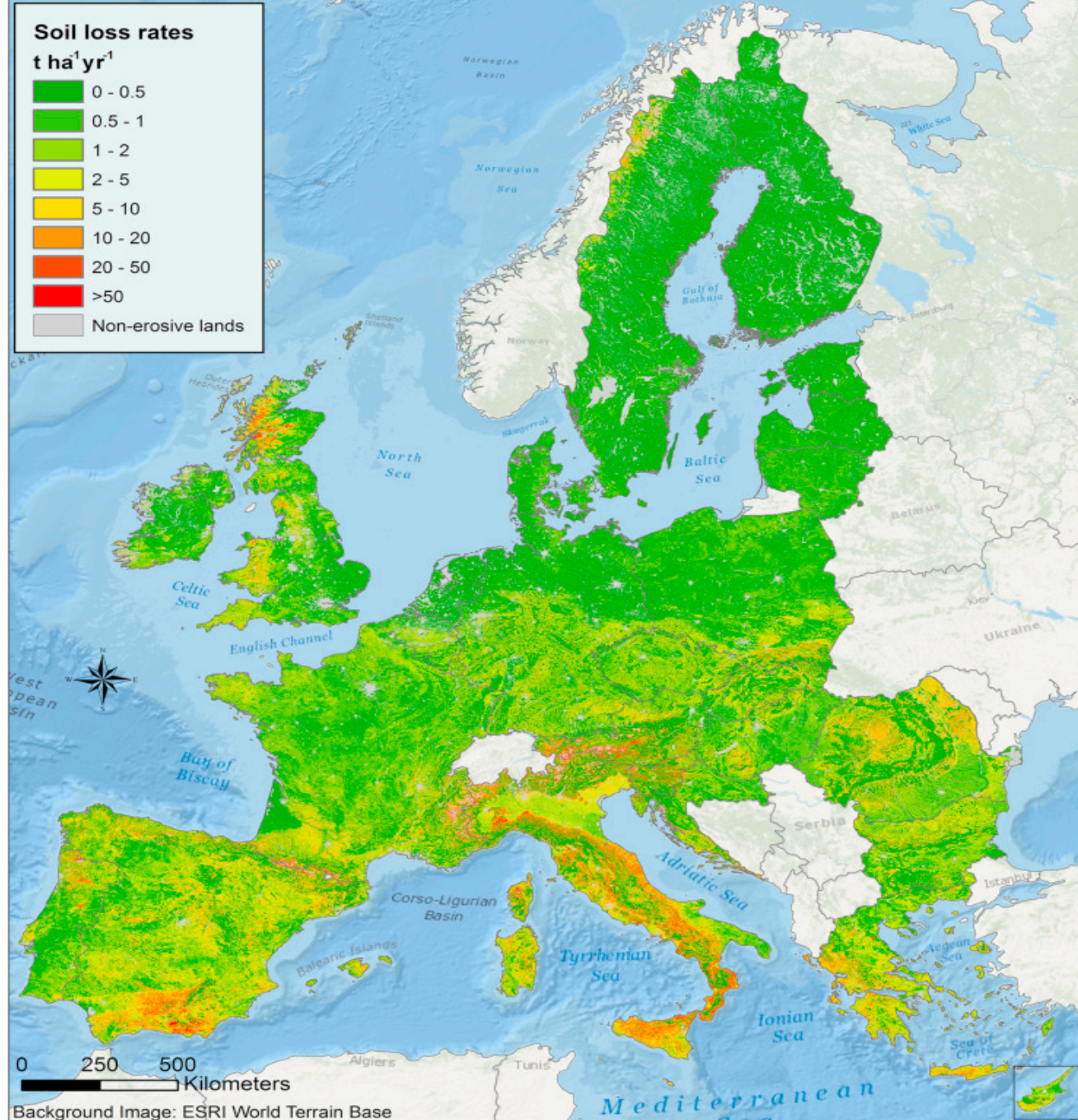
Source: FAOSTAT in:

UNEP GRID Arendal

[http://www.grida.no/graphicslib/detail/the-development-potential-available-land-per-capita-in-land-use-class\\_1068](http://www.grida.no/graphicslib/detail/the-development-potential-available-land-per-capita-in-land-use-class_1068)



# Soil loss in the European Union

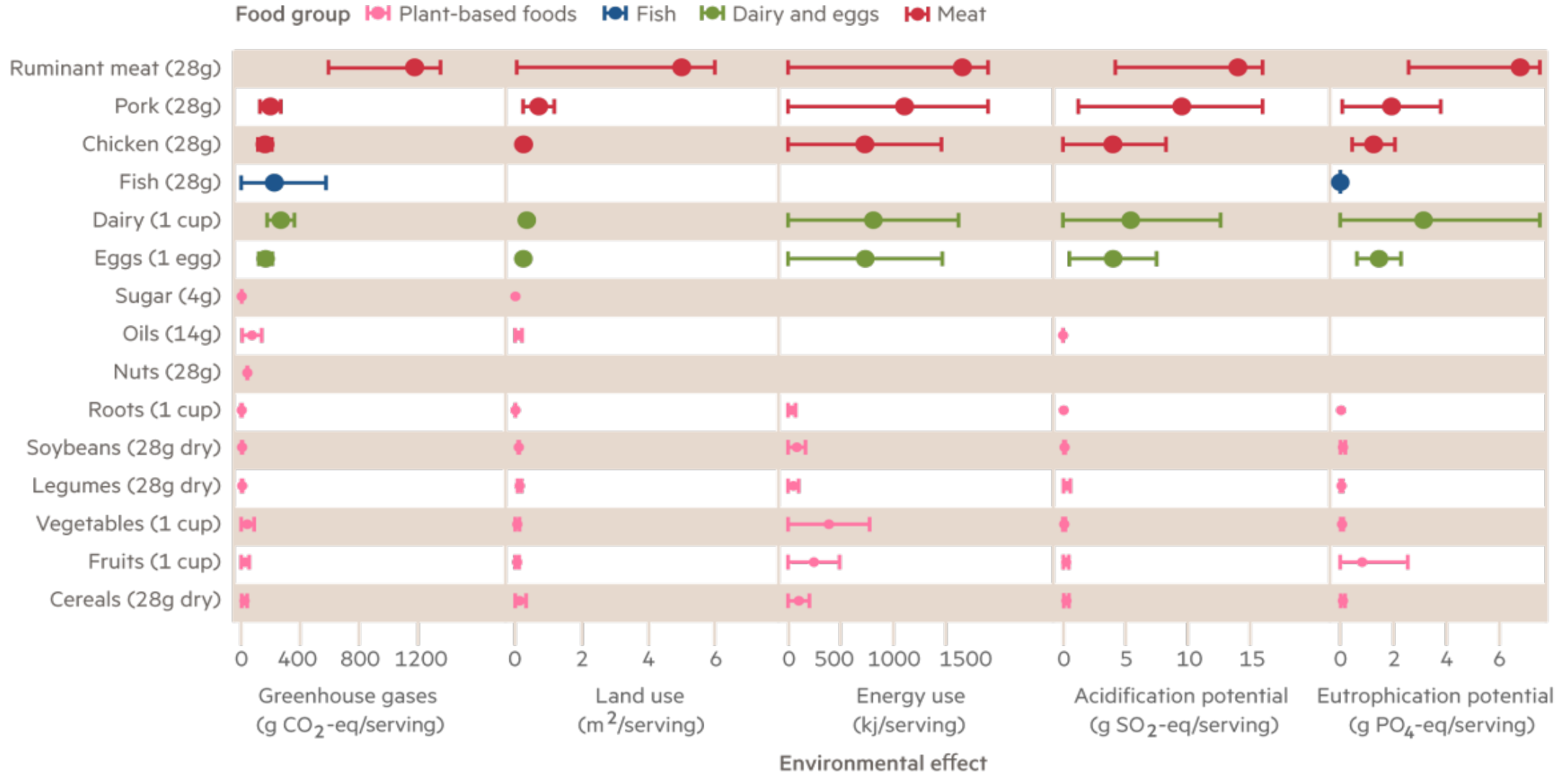


## Soil loss in the EU

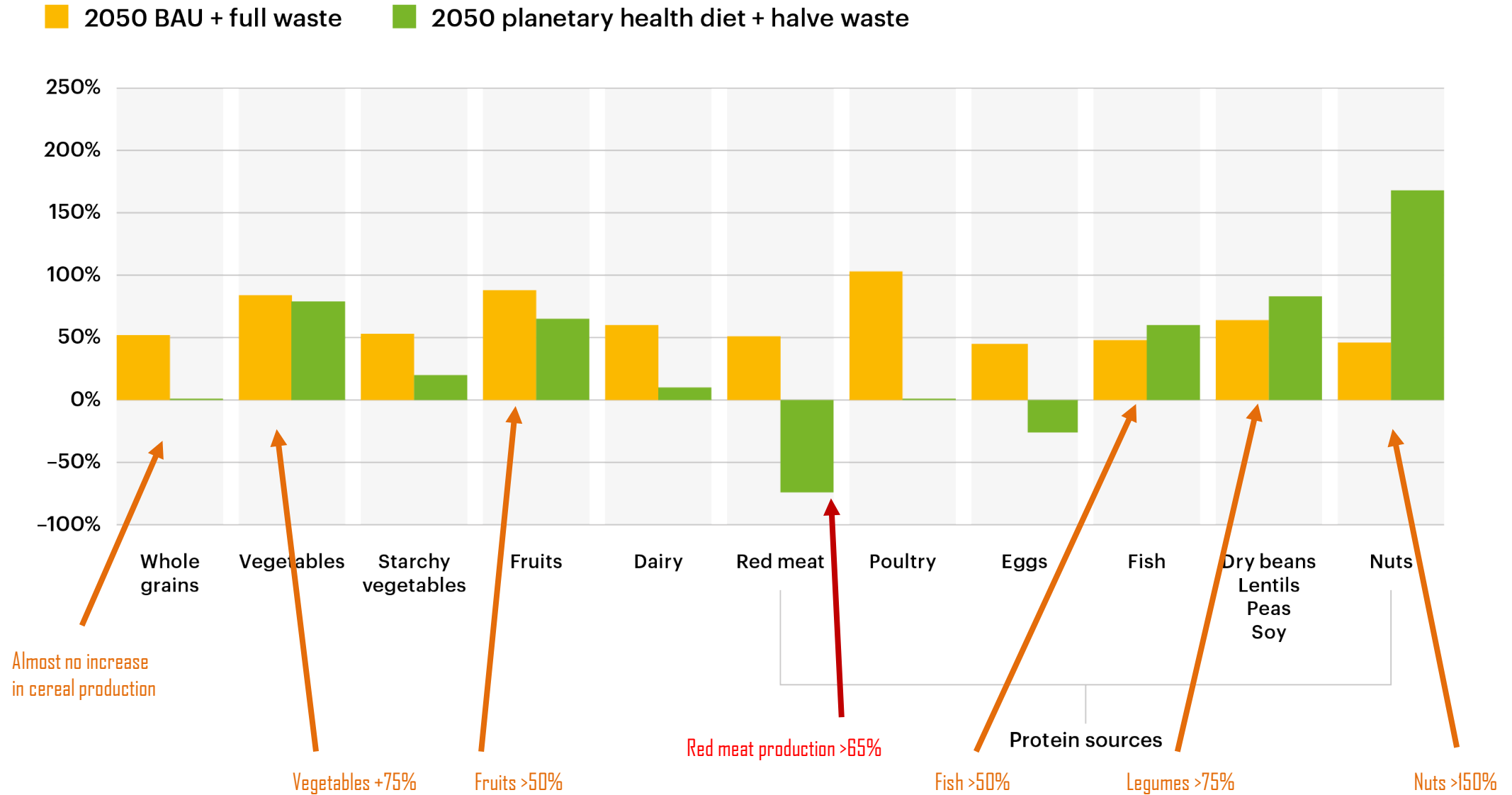
source: Panagos et al (2015)

# EAT-Lancet Commission 2019

## Environmental effects per serving of food produced



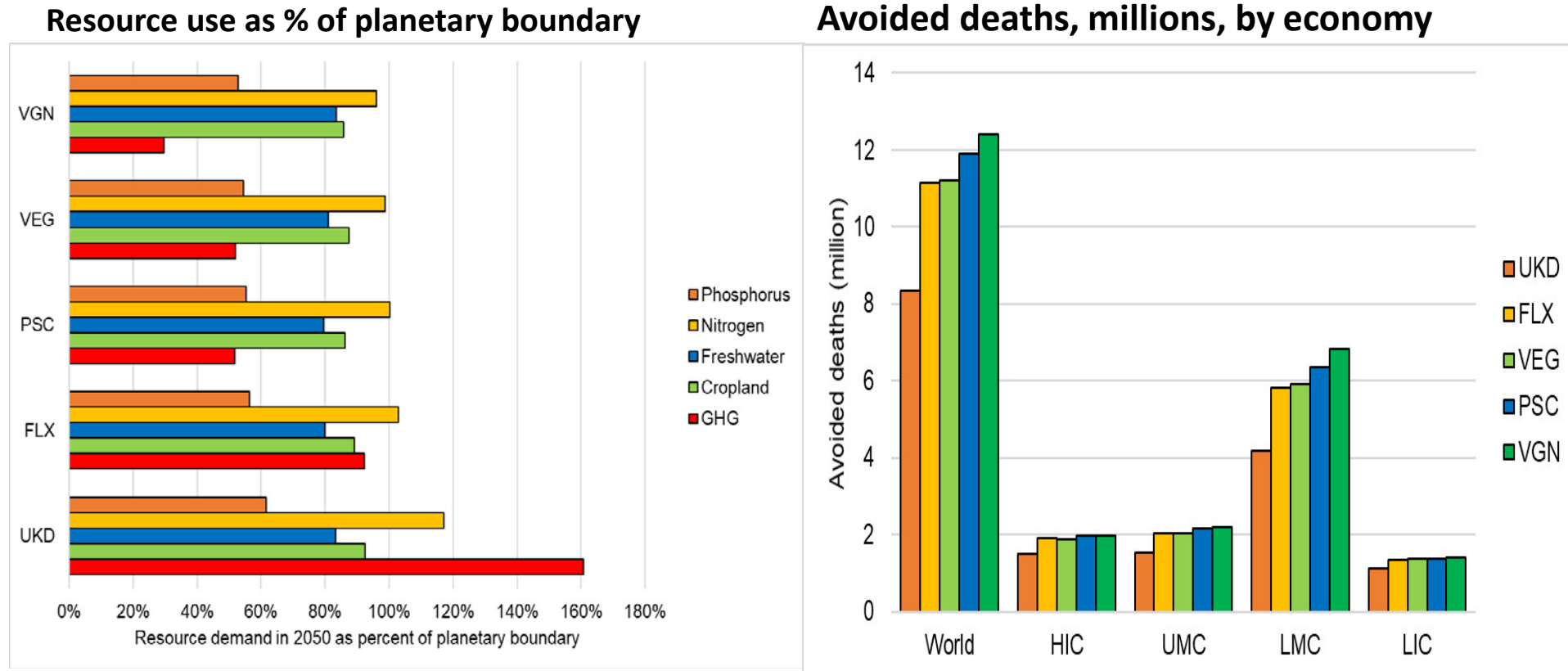
# Change in Food Production / Land Use



Source: EAT-Lancet Commission report 'Food in the Anthropocene', *The Lancet*, January 2019

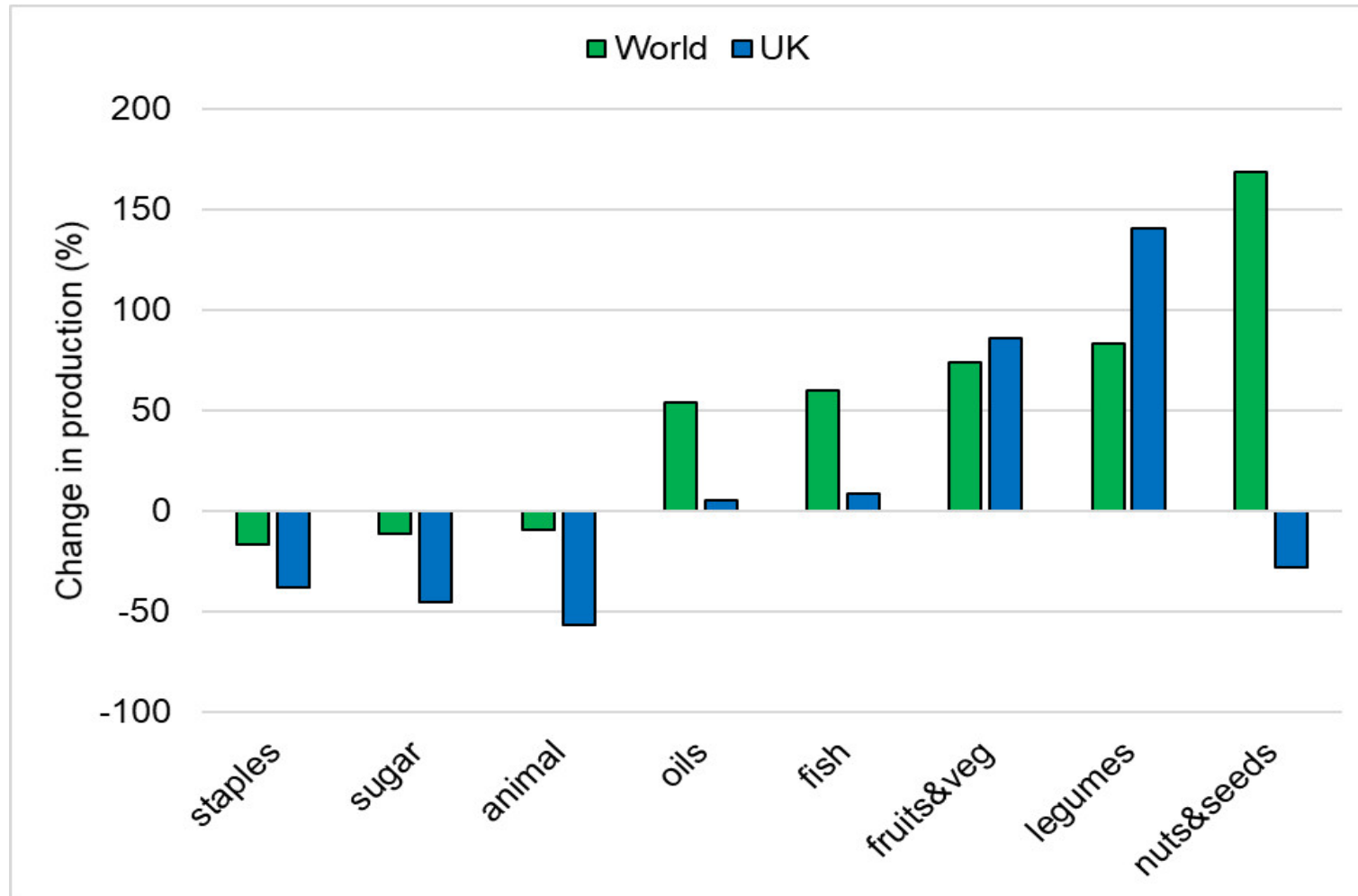


# What if everyone ate according to dietary guidelines?



Source: EAT-Lancet Commission report 'Food in the Anthropocene', *The Lancet*, January 2019

# Implications for change in production, Flexitarian diet, world / UK



Source:  
Springmann 2019  
for FFCC, based on  
EAT-Lancet  
Commission

### **3. WHO IS IN CONTROL?**

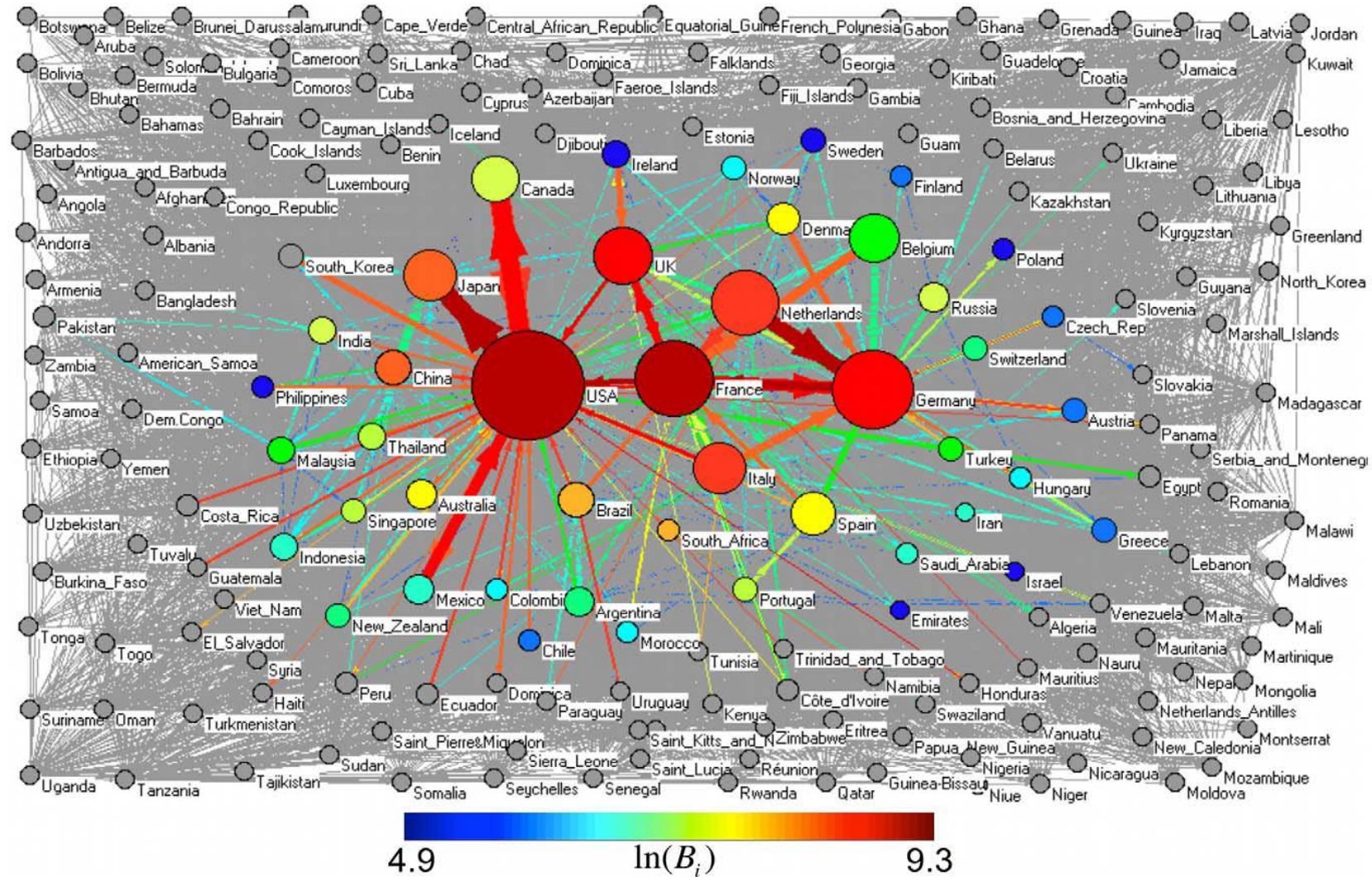
**Weak government – ‘hollowed out’ states**

**Consumerism**

**Concentrated markets**

## The complete International Agro-Food Trade Network in 1998

Source: Ercsey-Ravasz et al 2012 *PLoS ONE* doi:10.1371/journal.pone.0037810.g004



Ercsey-Ravasz M, Toroczkai Z, Lakner Z, Baranyi J (2012) Complexity of the International Agro-Food Trade Network and Its Impact on Food Safety. *PLoS ONE* 7(5): e37810. doi:10.1371/journal.pone.0037810  
<http://journals.plos.org/plosone/article?id=info:doi/10.1371/journal.pone.0037810>



## **4. WHAT ARE OUR OPTIONS?**

**Different levers for change**

**Use food system power or change the food system?**

**cultural 'rules' or political economy?**

**Past vs Futurism?**

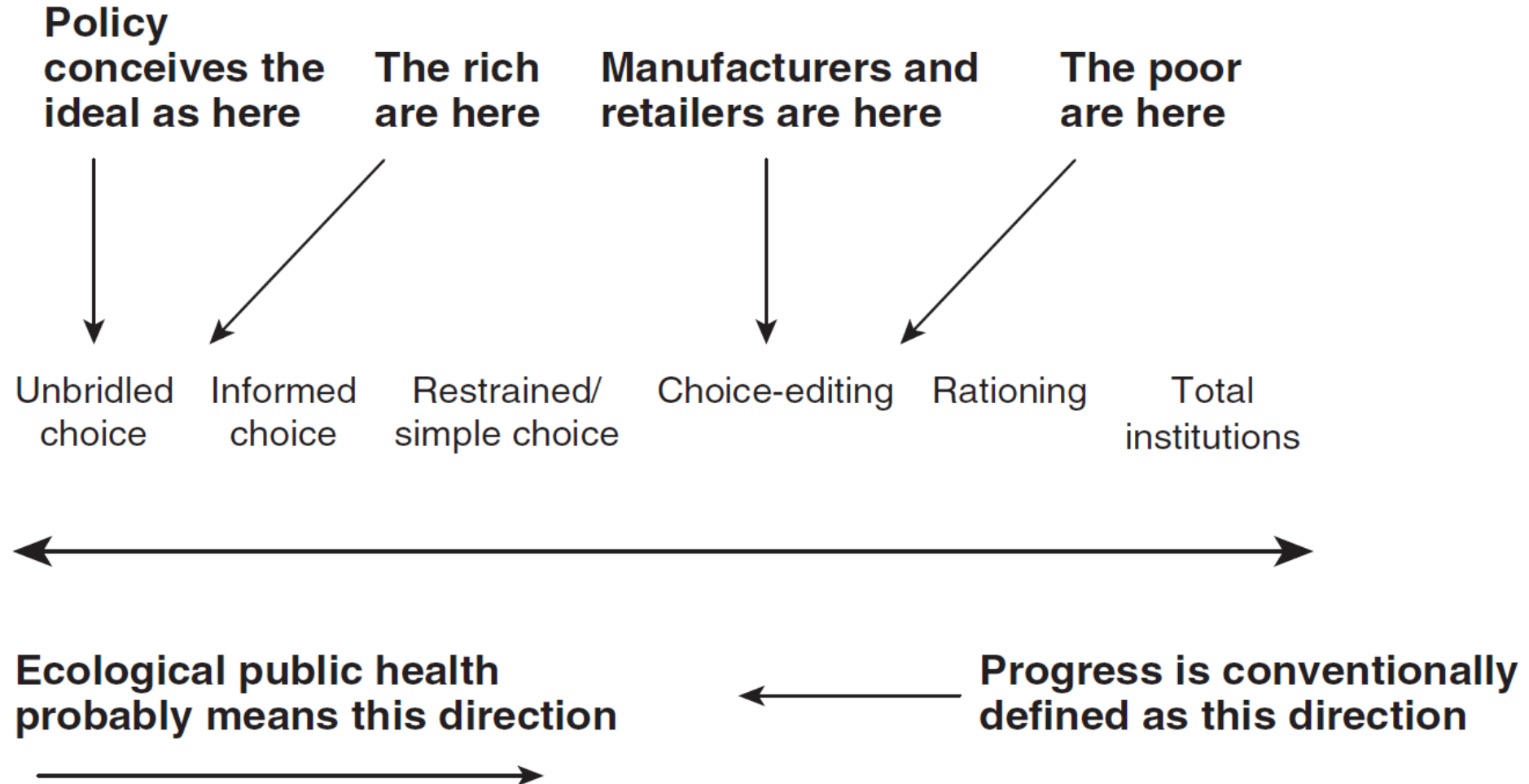
**Technology or people?**

# Option 1: Appeal to reason ... informed consumers

- Labelling
  - But there is no sustainable food labelling in EU
  - It took 20 years to achieve QUID labels!
  - How could we label for biodiversity?
- Information assumes rationality of consumer choice
  - Advertising and marketing budgets are huge
    - E.g. Coca-Cola's marketing budget = 2 x WHO's entire budget
  - Choice is framed by money, class, accident of birth...

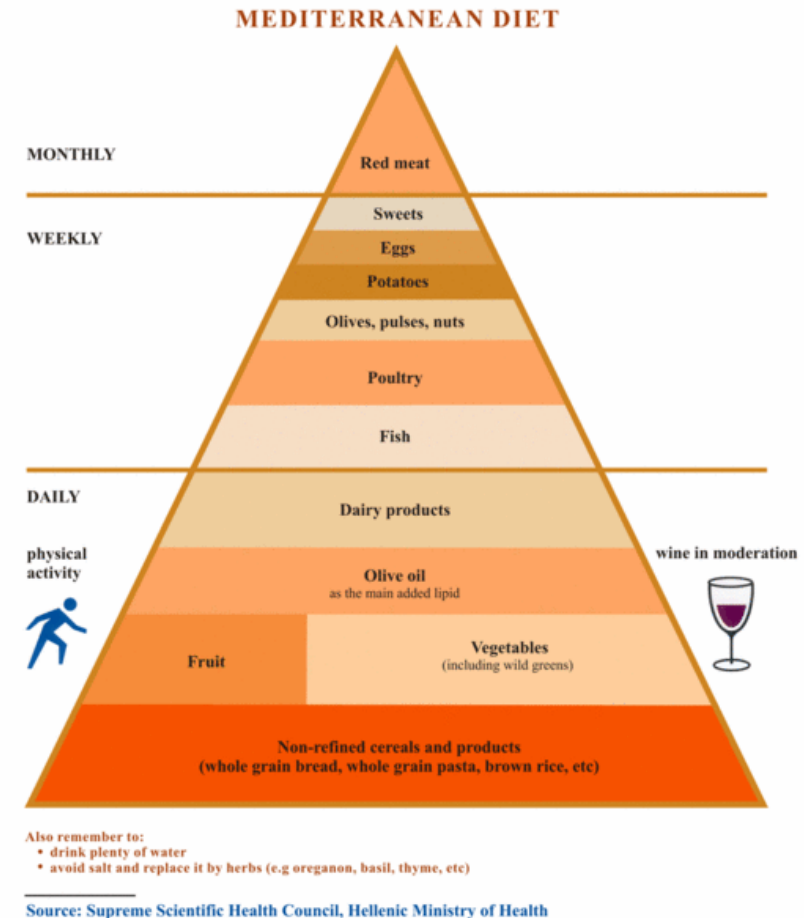
# Choice as a spectrum, framed by circumstance

source: Lang, Barling & Caraher (2009). *Food Policy*. Oxford University Press



# Option 2: appeal to cultural legacy

- The Mediterranean Diet
- Brazil's dietary guidelines (2014)
  - [http://189.28.128.100/dab/docs/portaldab/publicacoes/guia\\_alimentar\\_populacao\\_ingles.pdf](http://189.28.128.100/dab/docs/portaldab/publicacoes/guia_alimentar_populacao_ingles.pdf)
- Michael Pollan:
  - eat only what your grandmother recognises
- BUT...
  - lifestyles have changed
  - rise of ultra-processed foods



National Nutrition Guide for Greek Adults  
(Greek: Διατροφικοί Οδηγοί Για Ενήλικες)

# Option 3: 'Modernised' Heritage e.g. *New Nordic Diet*

- Key principles:
  - Health + gastronomic potential + Nordic identity + sustainability
- Overall guidelines:
  - (i) more calories from plant foods and fewer from meat;
  - (ii) more foods from the sea and lakes; and
  - (iii) more foods from the wild countryside.
- Lessons so far:
  - Serious about: chefs, identity, seasonality

# Option 4: Leave it to industry

- The argument is that only industry has control
  - Policy gives power to industry .... But is it enough?
- Actions so far
  - Some action on low carbon supply chains
  - New product development e.g. meatless food products
  - Waste reduction e.g. circular economy (food as material)
- Lessons so far:
  - Reluctance to act unless all do
  - Product development sits within consumerism not changing it

# Option 5: Leave it to markets (consumer-industry dynamics)

- Popular with politicians – business is responsible
  - ‘Hollowed out’ state
- e.g. veganism as market opportunity
- But...
  - Hype and ‘food wash’ take over
  - Too slow
  - Downplays multi-criteria problem
  - Ignores state levers: law, tax, etc

cartoon: Tony Husband, *Private Eye*,  
1499, 28 June 2019, page 30



# Option 6: Hi-tech solutions



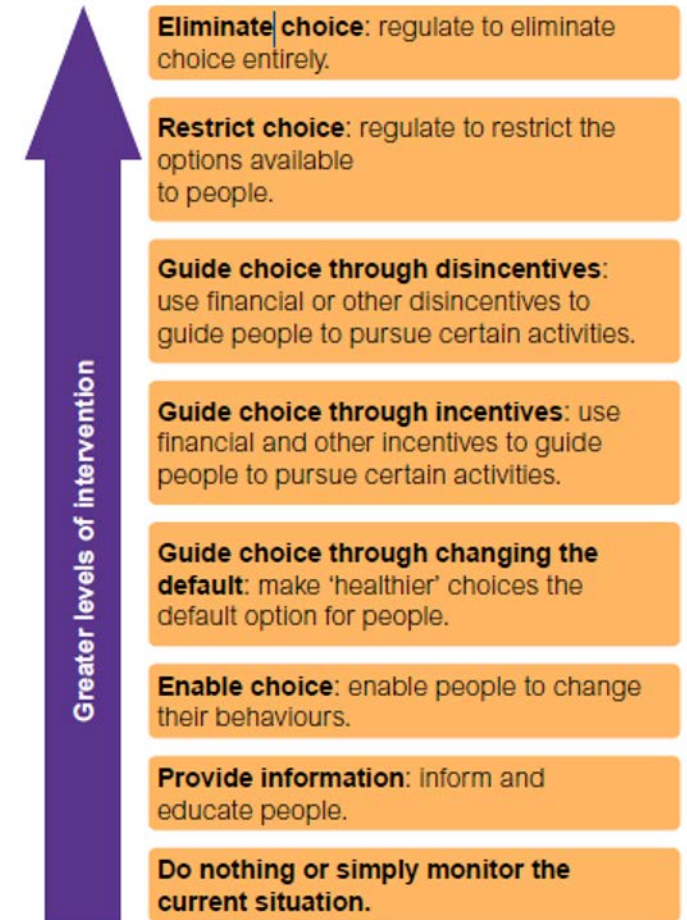
- Lab-based meat
- Nanotechnology
- Synthetic biology
- Industrial insects
- Genetic modification
- Robotics
- Nutrigenomics





# Option 7: Multiple actions at multi-level

- Soft and hard interventions
- Global to local
- **SDG<sup>2</sup>** strategy: SDGs for SDGs
- National processes within Global goals
- Set goals for dietary transition
- National Guidelines to reframe production
- Public engagement:
  - Citizens juries & conventions, public events



Nuffield Council on Bioethics' Intervention Ladder

# CONCLUSIONS

**'Change or go bust'**

**This is possible but will be hard**

**A multi-level world needs multi-lever, multi-actor,  
multi-sector, multi-disciplinary coherence**

**We are all part of this transition**

**There is no single solution**



# Sustainable diets: the centre of good C 21<sup>st</sup> food system



## What this means:

- Multi-criteria
- Public engagement
- Ecological public health
- Diversity of evidence
- Multi-sector, multi-level
- Reconnection

# THE LANCET

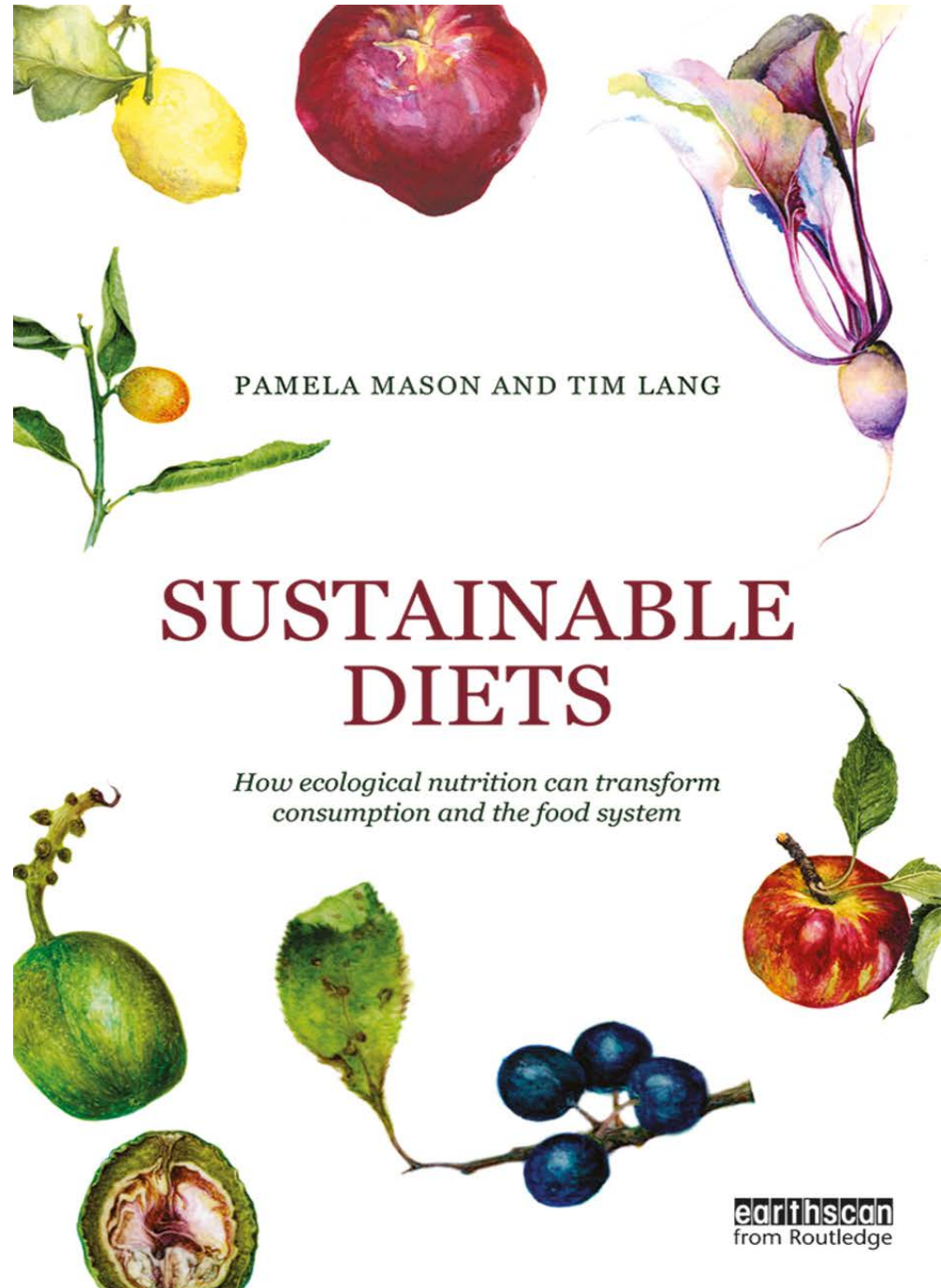
January, 2019

www.thelancet.com

Food in the Anthropocene: the EAT-Lancet  
Commission on healthy diets from  
sustainable food systems



"Food in the Anthropocene represents one of the  
greatest health and environmental challenges of  
the 21st century."



PAMELA MASON AND TIM LANG

## SUSTAINABLE DIETS

*How ecological nutrition can transform  
consumption and the food system*

**earthscan**  
from Routledge