



# **Planet on a plate: Interconnected impacts of our global food system**

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[www.fcrn.org.uk](http://www.fcrn.org.uk)

9 December 2016

# Lunch

A close-up photograph of a sandwich on a long, golden-brown baguette. The sandwich is filled with layers of ingredients: a slice of red tomato, a slice of yellow cheese, shredded green lettuce, and several slices of dark brown roast beef. The sandwich is resting on a light-colored, textured surface, possibly a tablecloth or paper.

How was it produced?

Who produced it &  
where?

Who profited?

Who got to eat?

## Why does it matter?

# Food connects us to everything

**Nutrition & health:**  
800mn hungry; 2bn  
overweight

**Other health impacts**

**Climate change – 30%**  
global emissions

**Water use &  
pollution**

**Population  
change**



**Livelihoods & survival; 1.3bn  
livelihoods in agriculture**

**Power, trade, control, equity**

**Enjoyment & social life**

**Art & culture**

**Tradition & identity**

**Ideas about justice**

**Land degradation  
& desertification**



**Species loss**

**Deforestation**



**Mores and norms**

**Innovation and ingenuity**

**Religious beliefs & taboos**

**Animal ethics & welfare**

**Ideas about 'good'**

# Planet

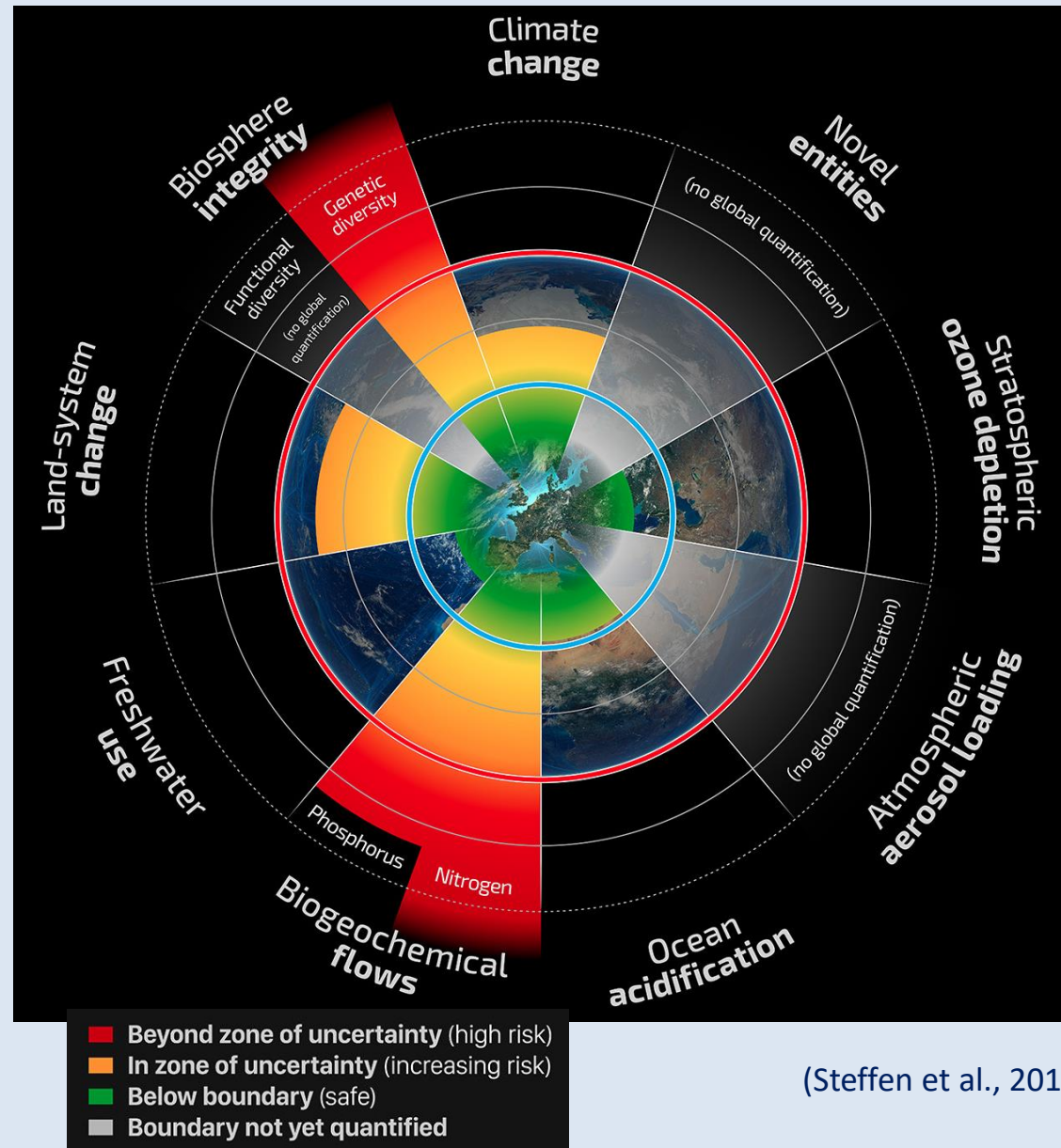




# The Planetary Boundaries concept

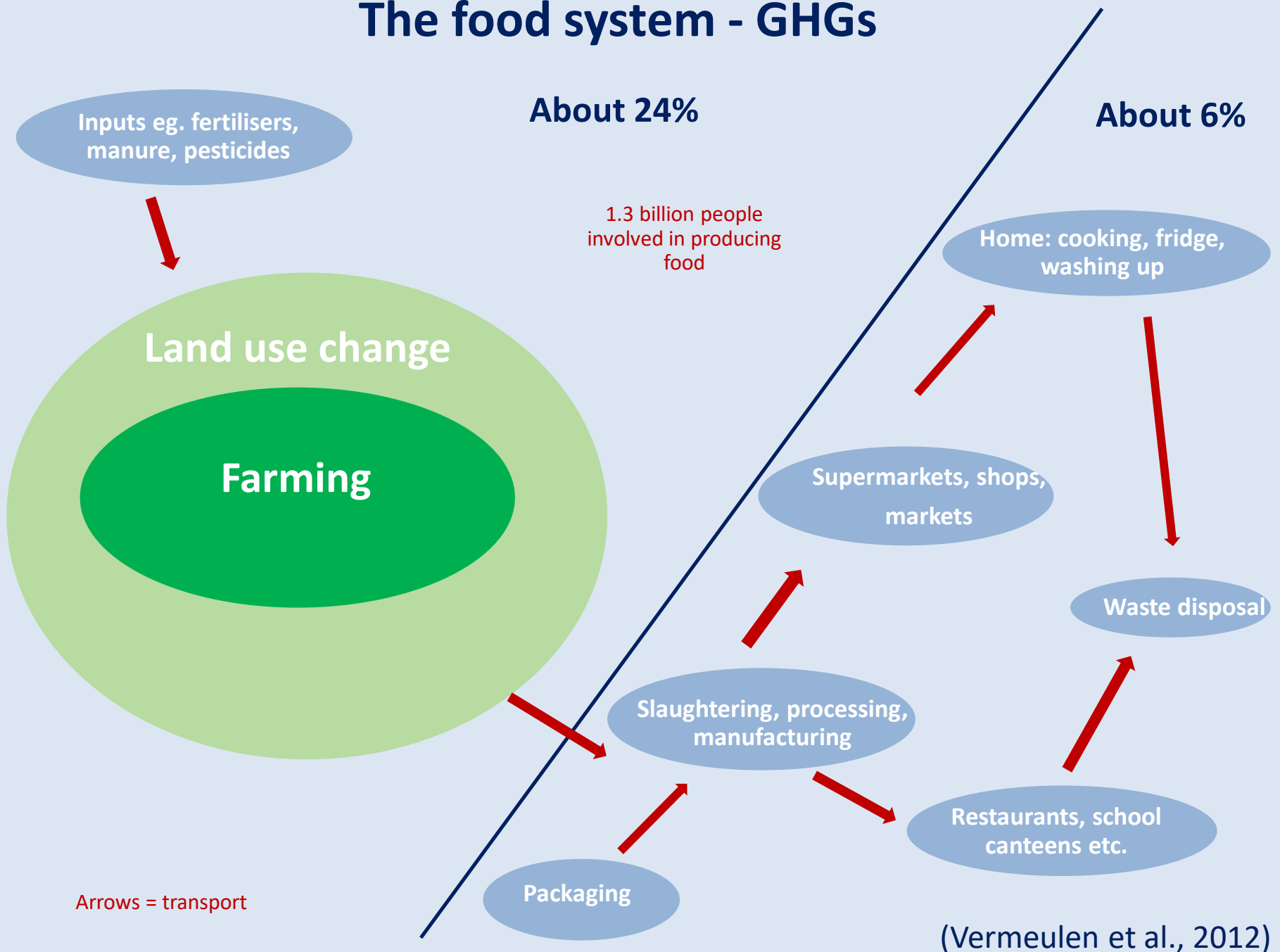


(WWF, 2015)

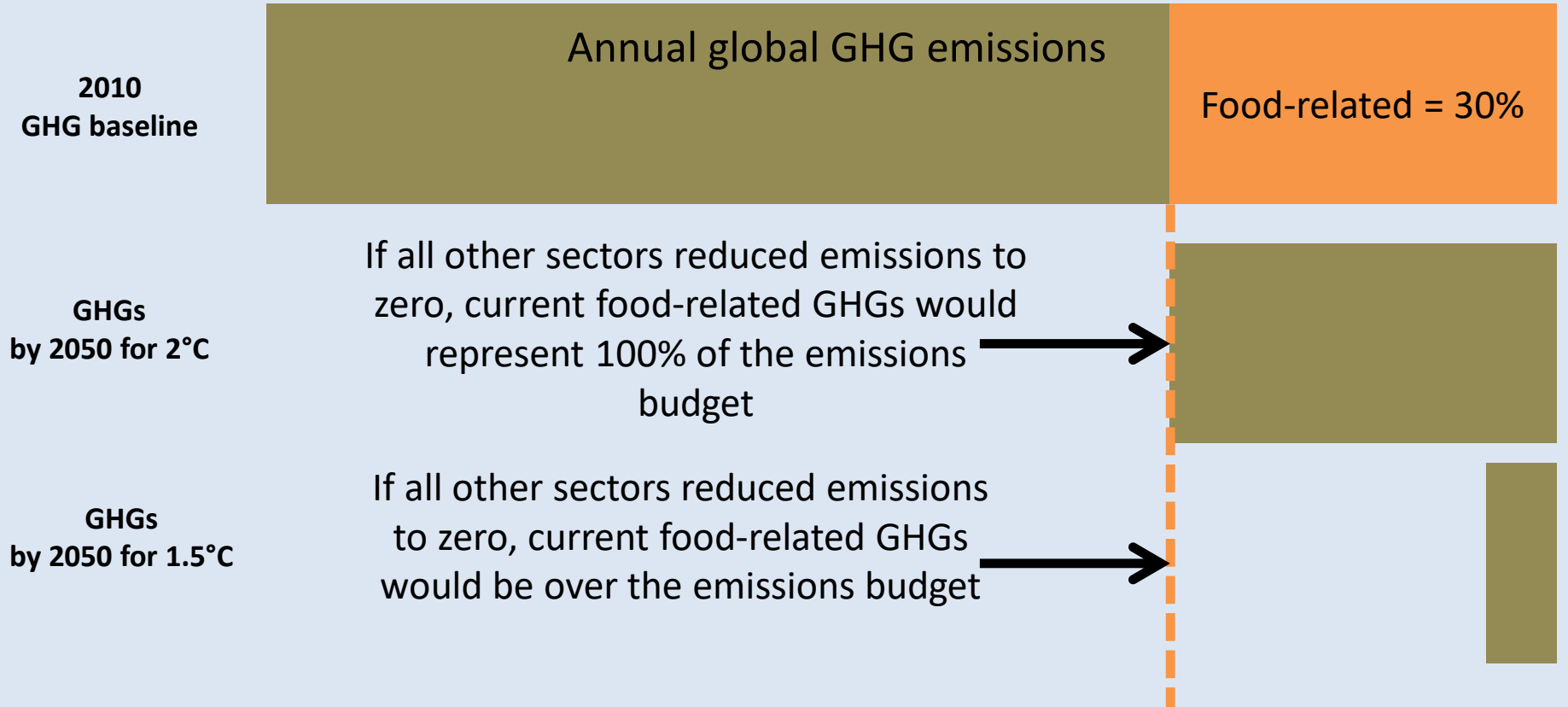


(Steffen et al., 2015)

# The food system - GHGs



# This is the scale of the climate challenge – food has to play its part



# What is land use change?





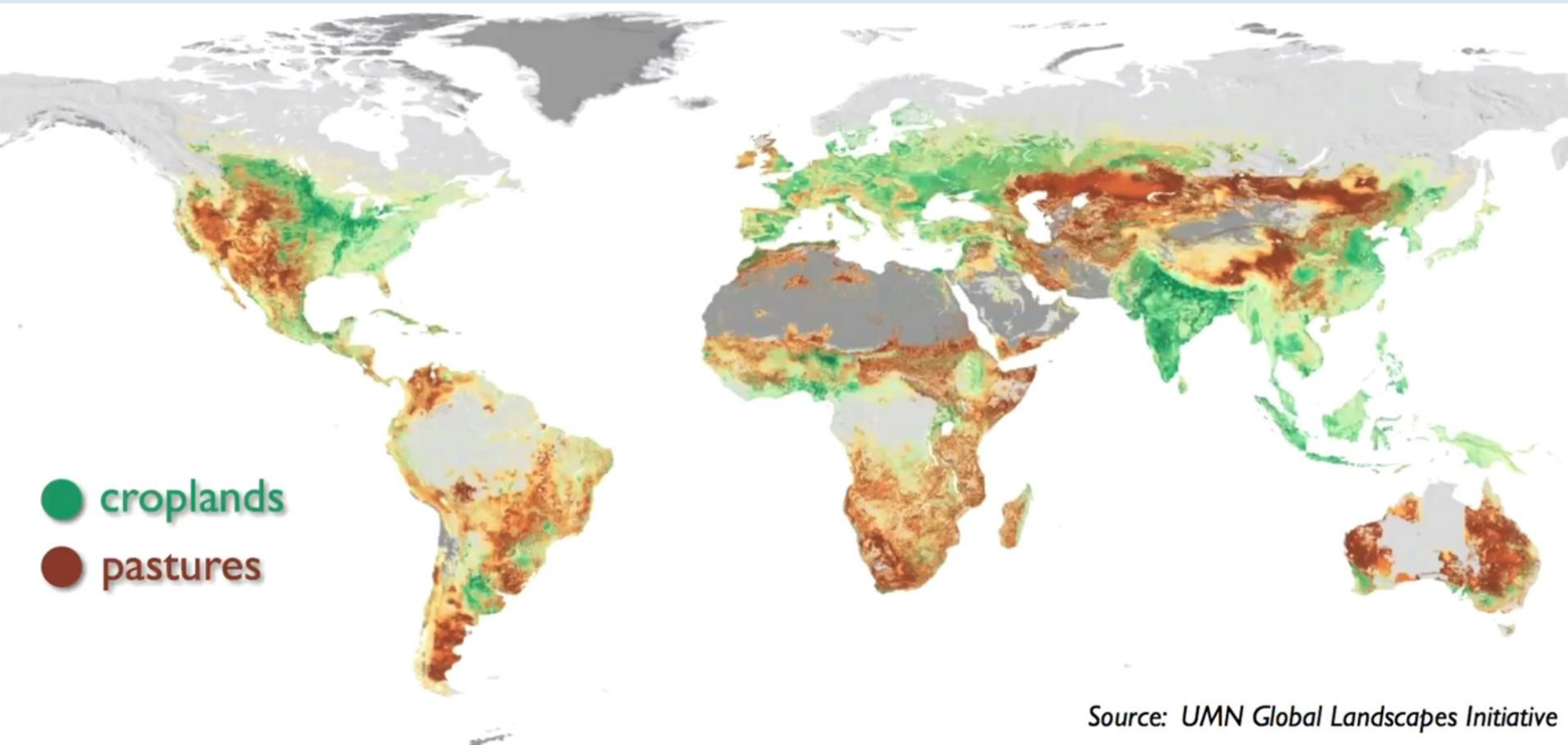
This is land use change



1700: > 95% global land = wild / semi-natural

2000: < 45% of global land = wild / semi-natural

(Ellis et al., 2010)



Source: UMN Global Landscapes Initiative

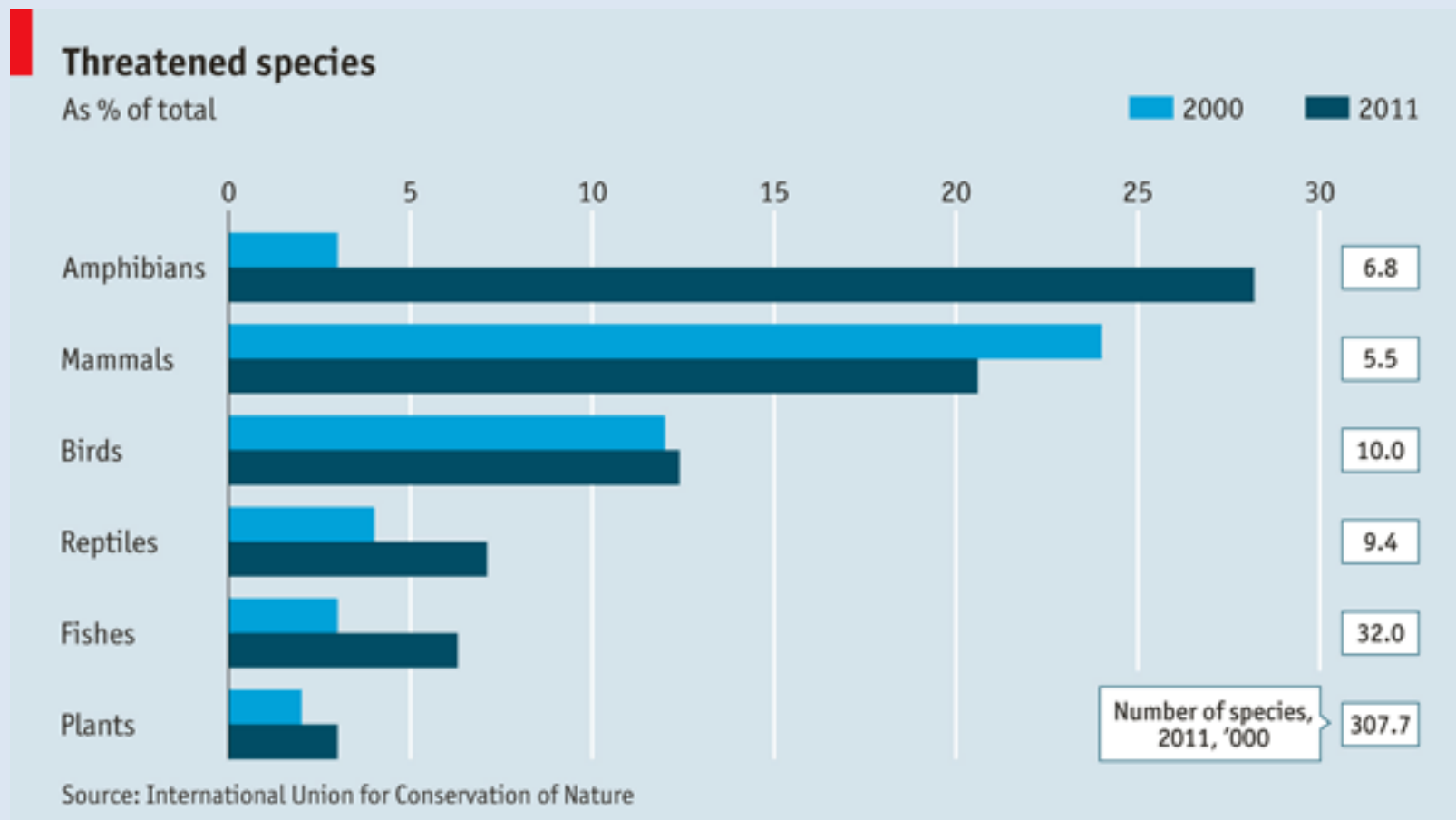
Agriculture today ~ 40% of global land

(Foley et al., 2011)

Protected areas ~ 13% of global land

(Larson et al., 2014)

# Farming destroys habitats and drives species extinction



Farming is responsible for 80% deforestation worldwide

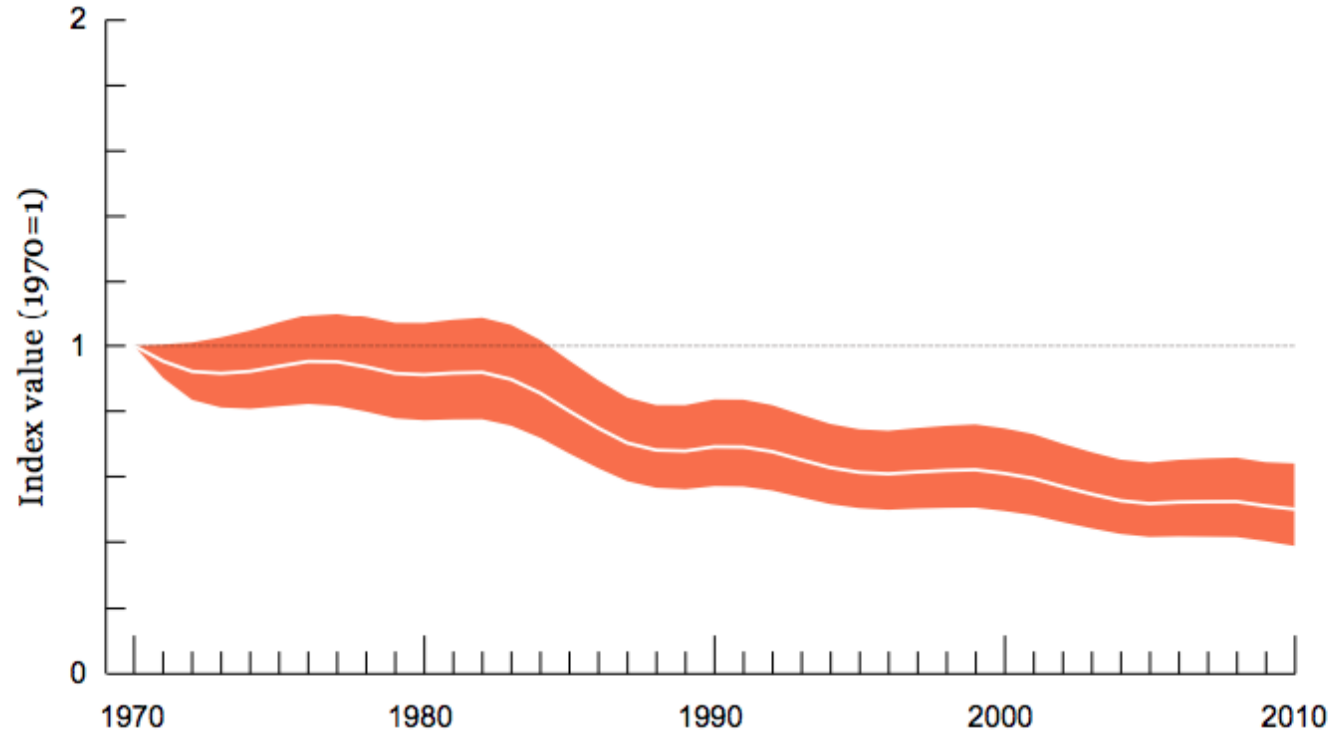
Populations: land-based vertebrates declined 38% (1970-2012)

# Populations of fish species used by humans have halved

**Figure 2: The utilized fish index declined 50 per cent between 1970 and 2010**  
(WWF-ZSL, 2015).

Key

- Utilized fish index
- Confidence limits



~1 in 4: species of sharks, rays, skates threatened with extinction

(WWF-ZSL, 2015)



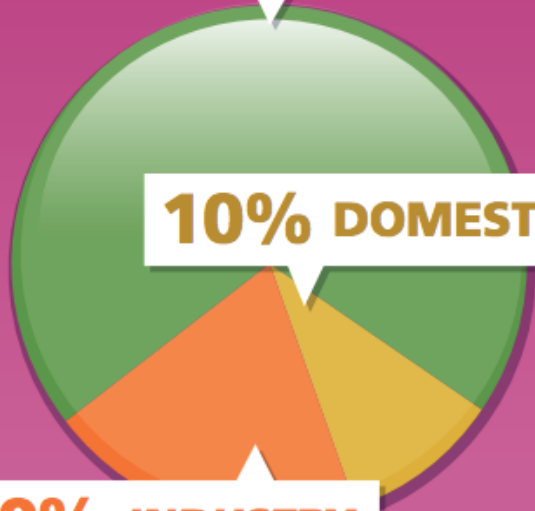
# Other problems - food is thirsty

## GLOBAL WATER WITHDRAWALS

**70% AGRICULTURE**

**10% DOMESTIC**

**20% INDUSTRY**



## EVERY DAY 1 PERSON

**DRINKS**

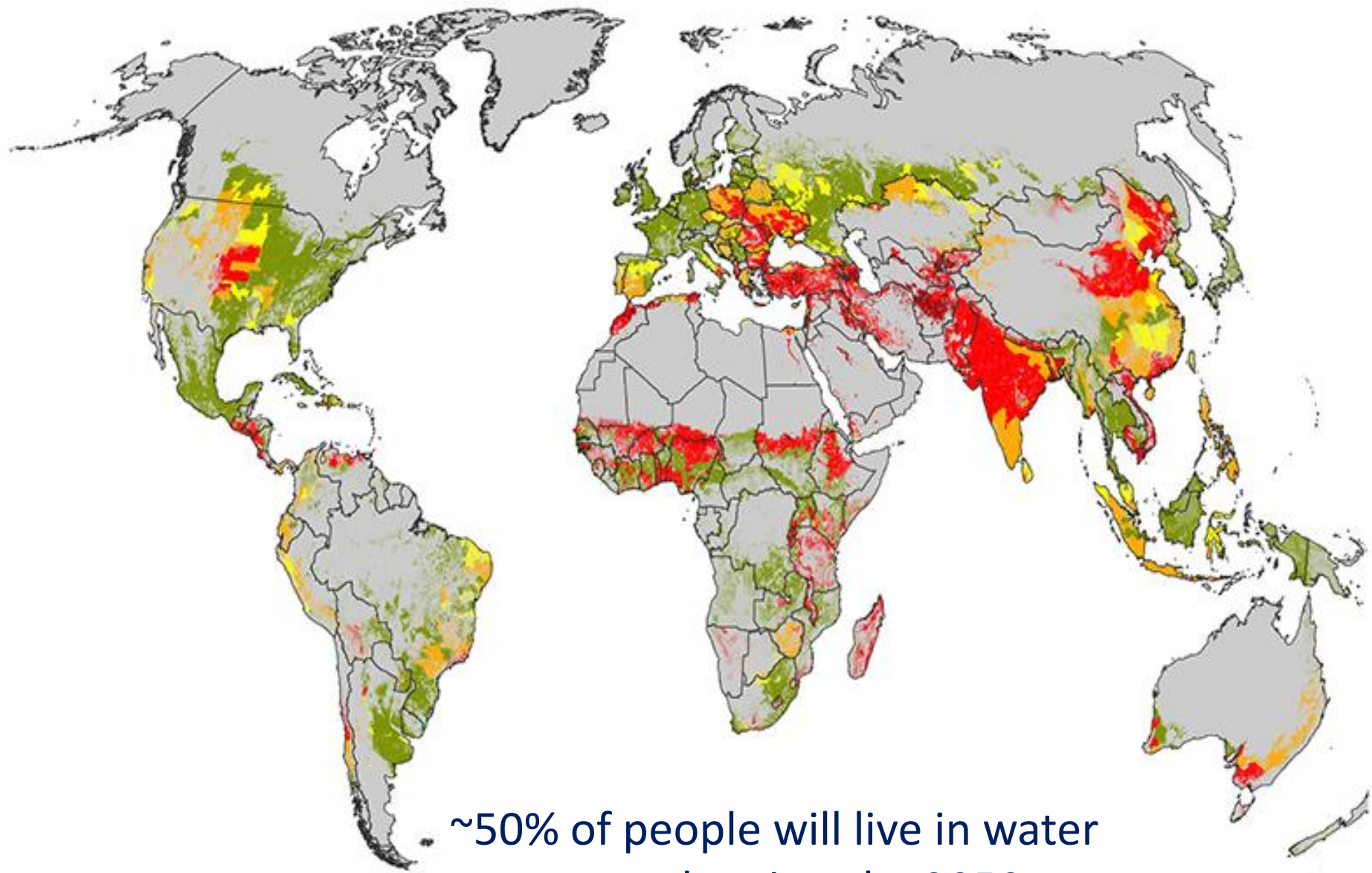


**2-4**  
LITRES  
OF WATER

**EATS**



**2000-5000**  
LITRES OF VIRTUAL WATER  
EMBEDDED IN FOOD



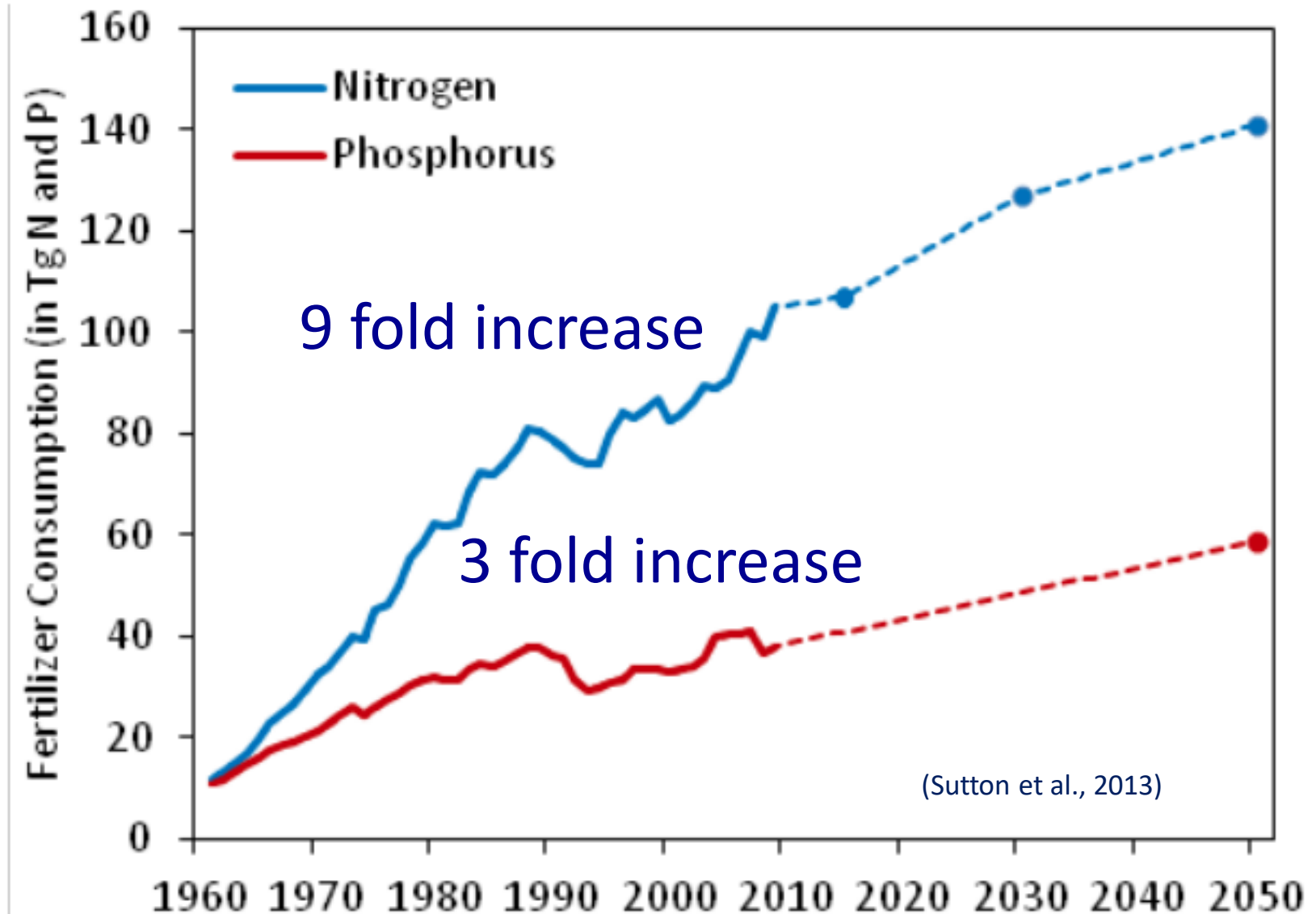
~50% of people will live in water stressed regions by 2050

(Schlosser et al., 2014)

Water Stress Condition

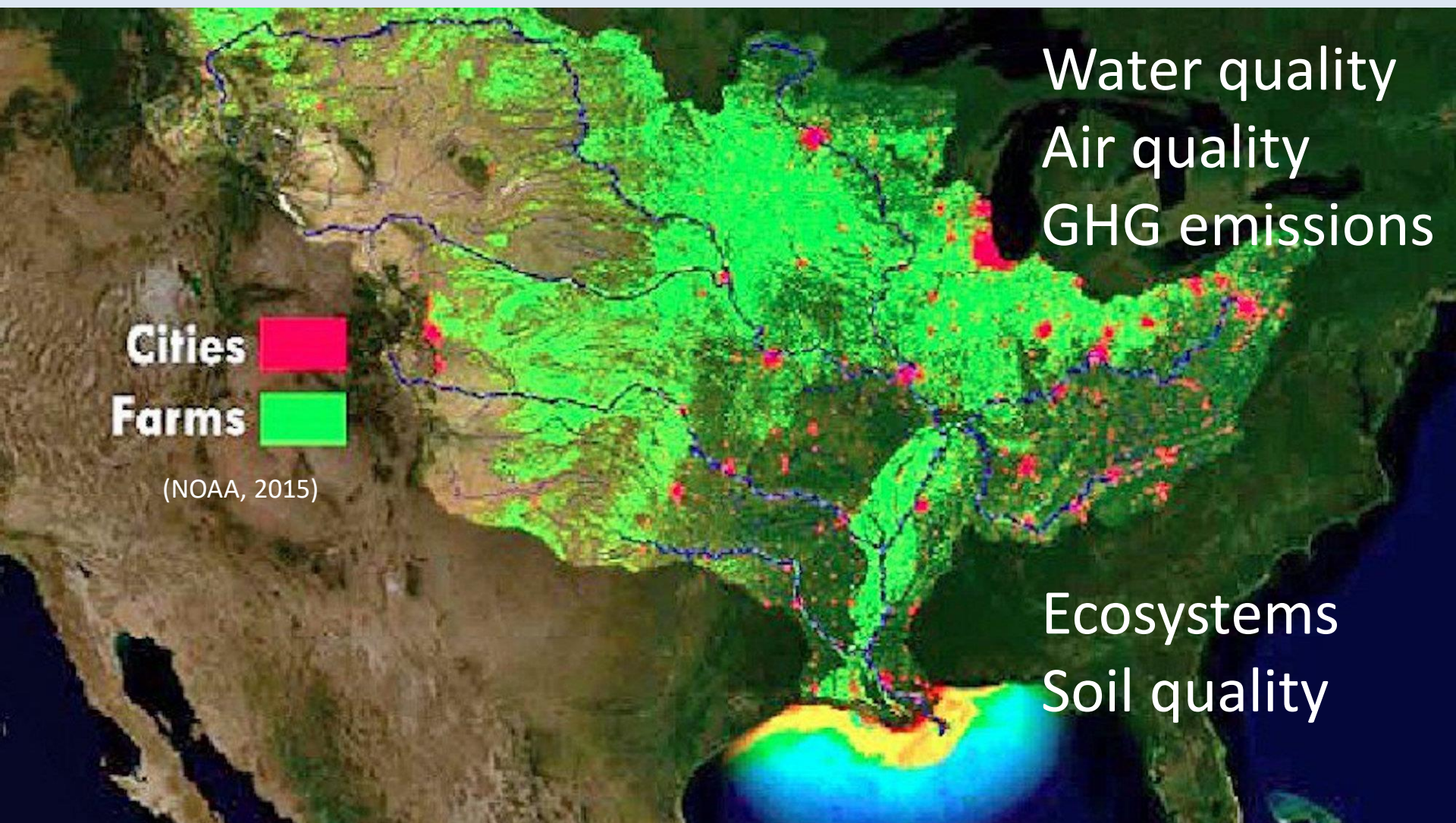


# Other problems - food is polluting





# Too many nutrients: US, EU, China



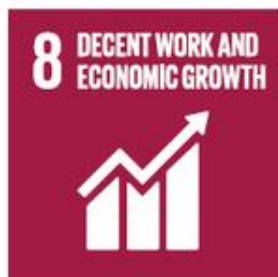
Ocean dead zones doubled each decade since 1960's

(Diaz et al., 2008)

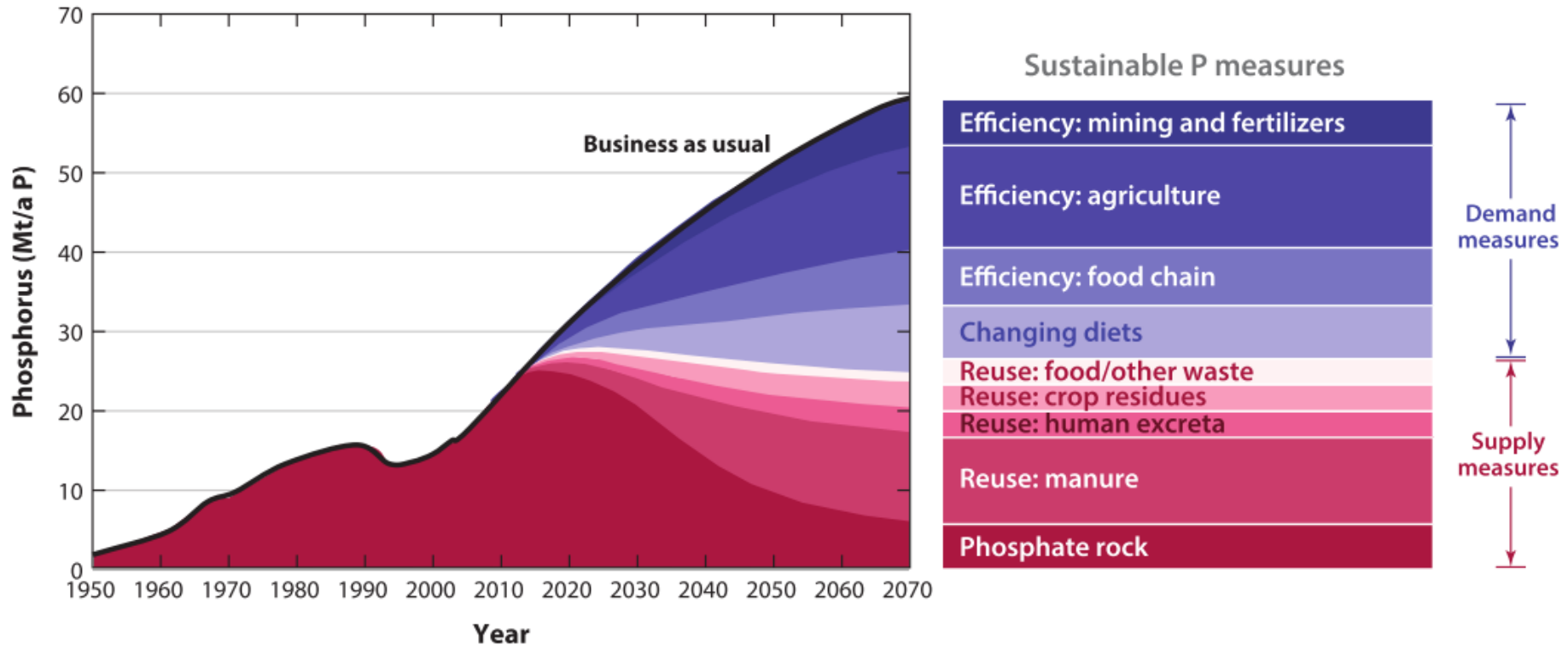




# SUSTAINABLE DEVELOPMENT GOALS



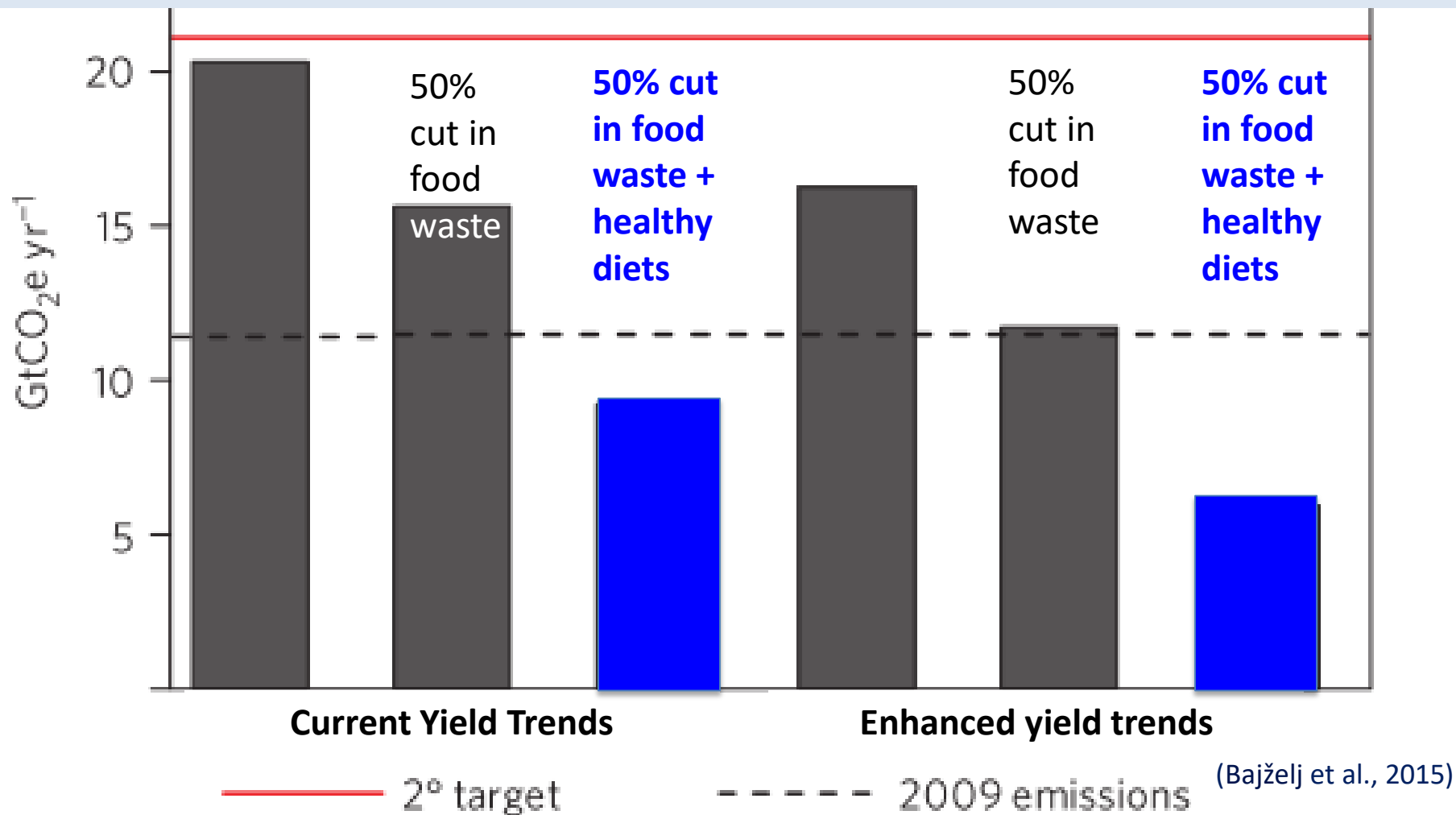
# Limits to production improvements



(Cordell and White, 2014)

# Improved diets + decreases in food waste = essential to deliver emissions reductions and provide global food security in 2050

Greenhouse gas emissions from agriculture and land use change in 2050

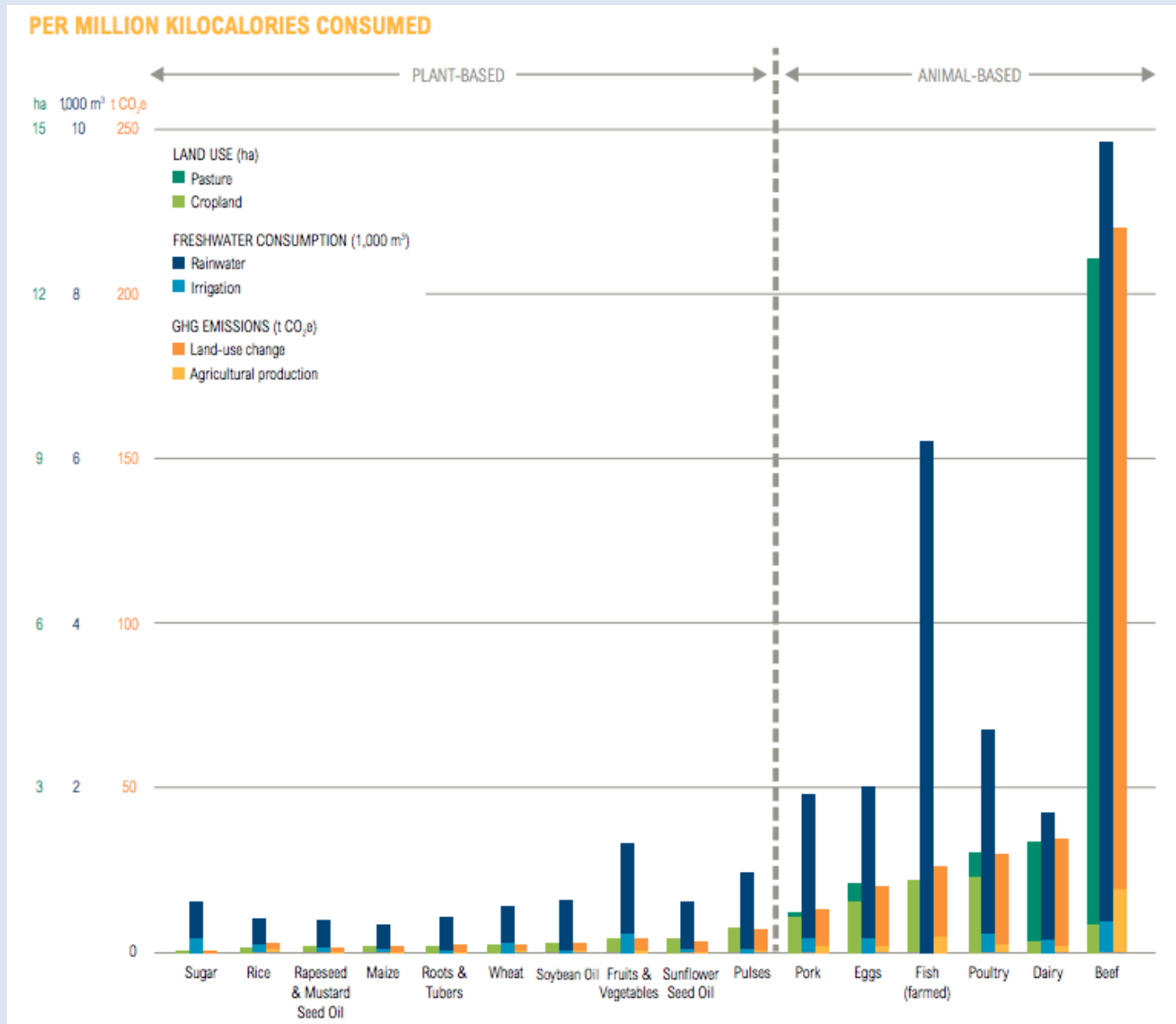




**We need to talk about  
consumption**



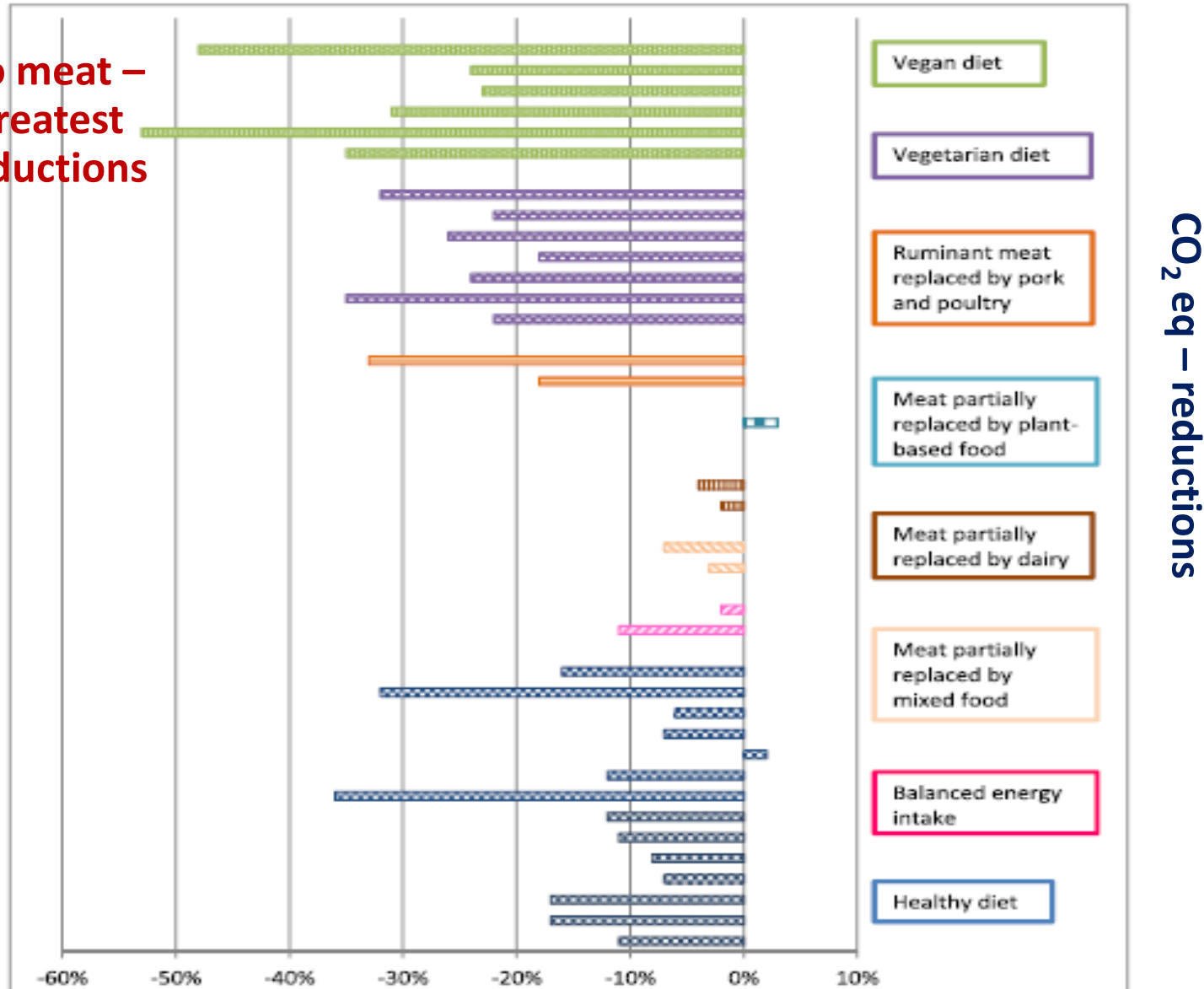
# The impacts of food groups differs



(WRI, 2016)

# A systematic review of studies shows GHG reductions are possible by switching to different diets

No meat –  
greatest  
reductions



(Hallström, 2015)

# People





# People eat differently – USA

\$341.98





# EGYPT

\$68.53





# CHAD

\$1.23





UK

\$253.15





# JAPAN

\$317.25





# MALI

\$26.39





# INDIA

\$39.27



# Two highlighted issues

- Malnutrition
- Antibiotics resistance

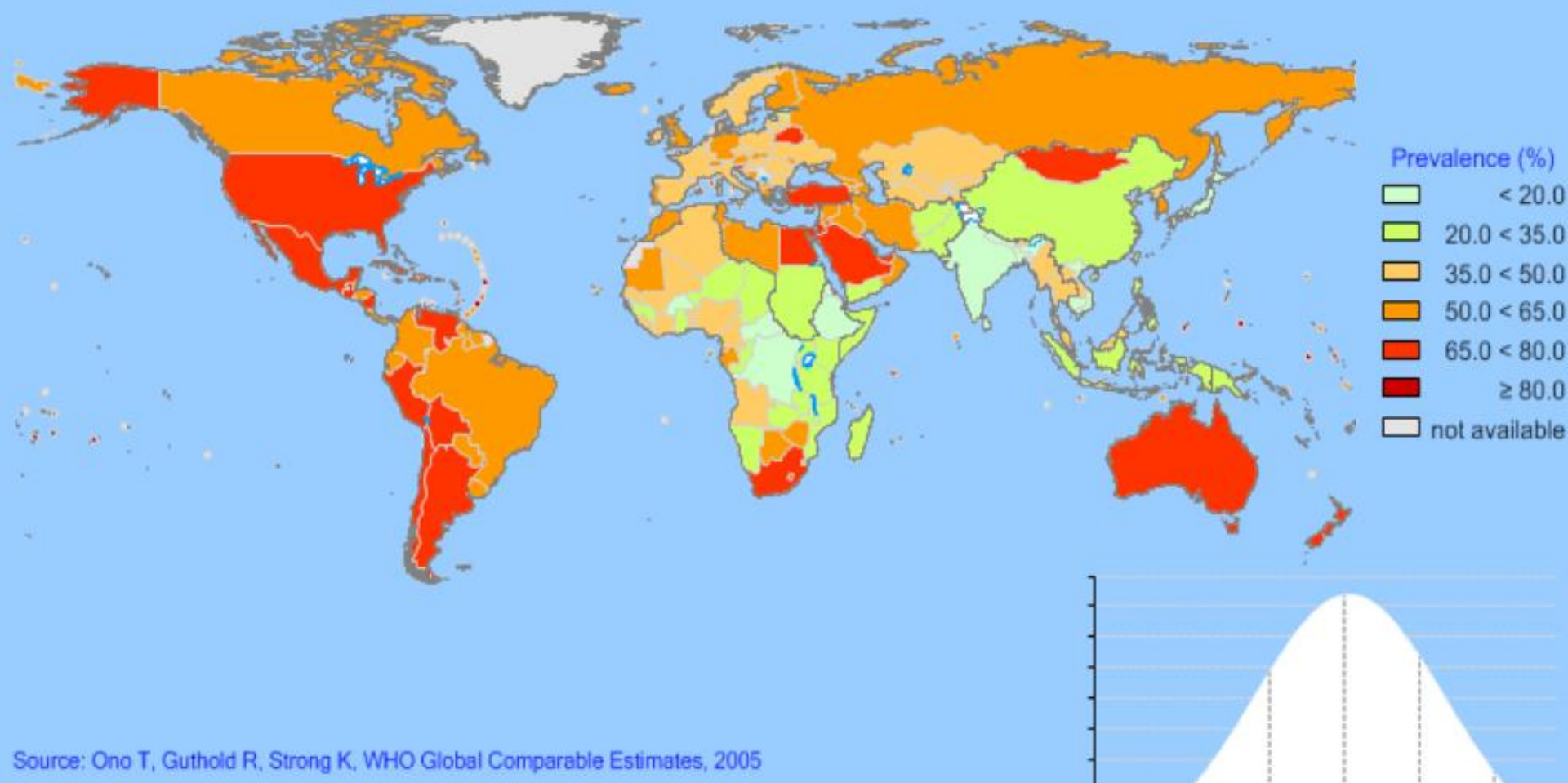
# Malnutrition across the world

- 800 million hungry
- 2 billion overweight or obese
- 30% people suffer from micronutrient deficiencies
- 3 million children under five die from malnutrition each year
- A quarter of all children stunted



# Women – overweight prevalence -WHO 2010

Estimated Overweight & Obesity (BMI  $\geq 25$  kg/m<sup>2</sup>) Prevalence, Females, Aged 15+, 2010

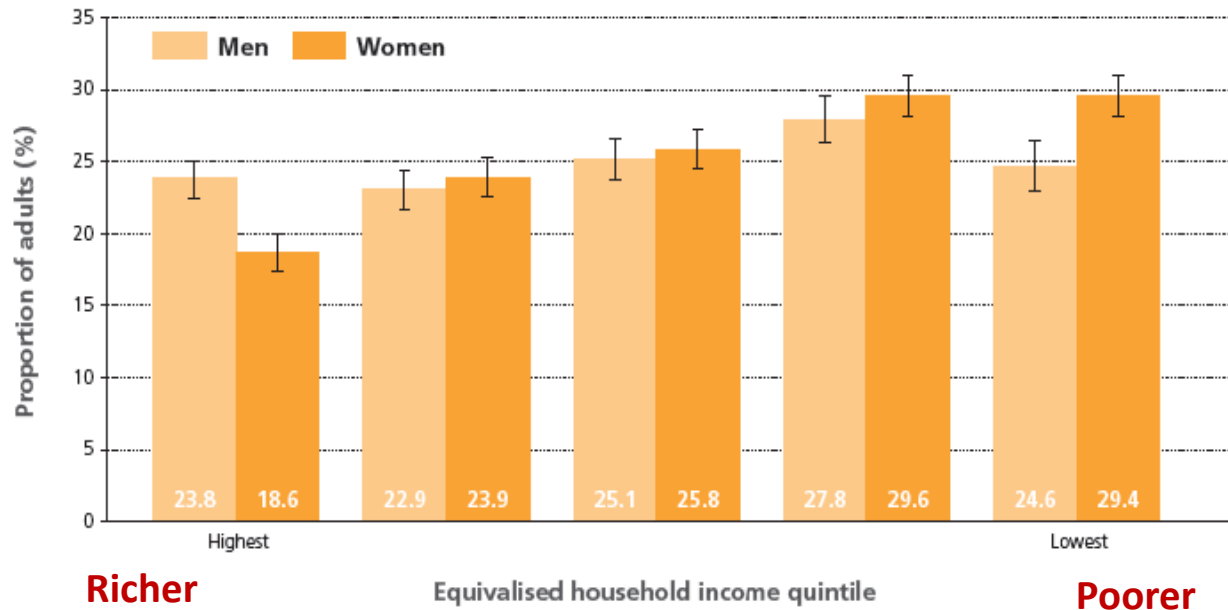




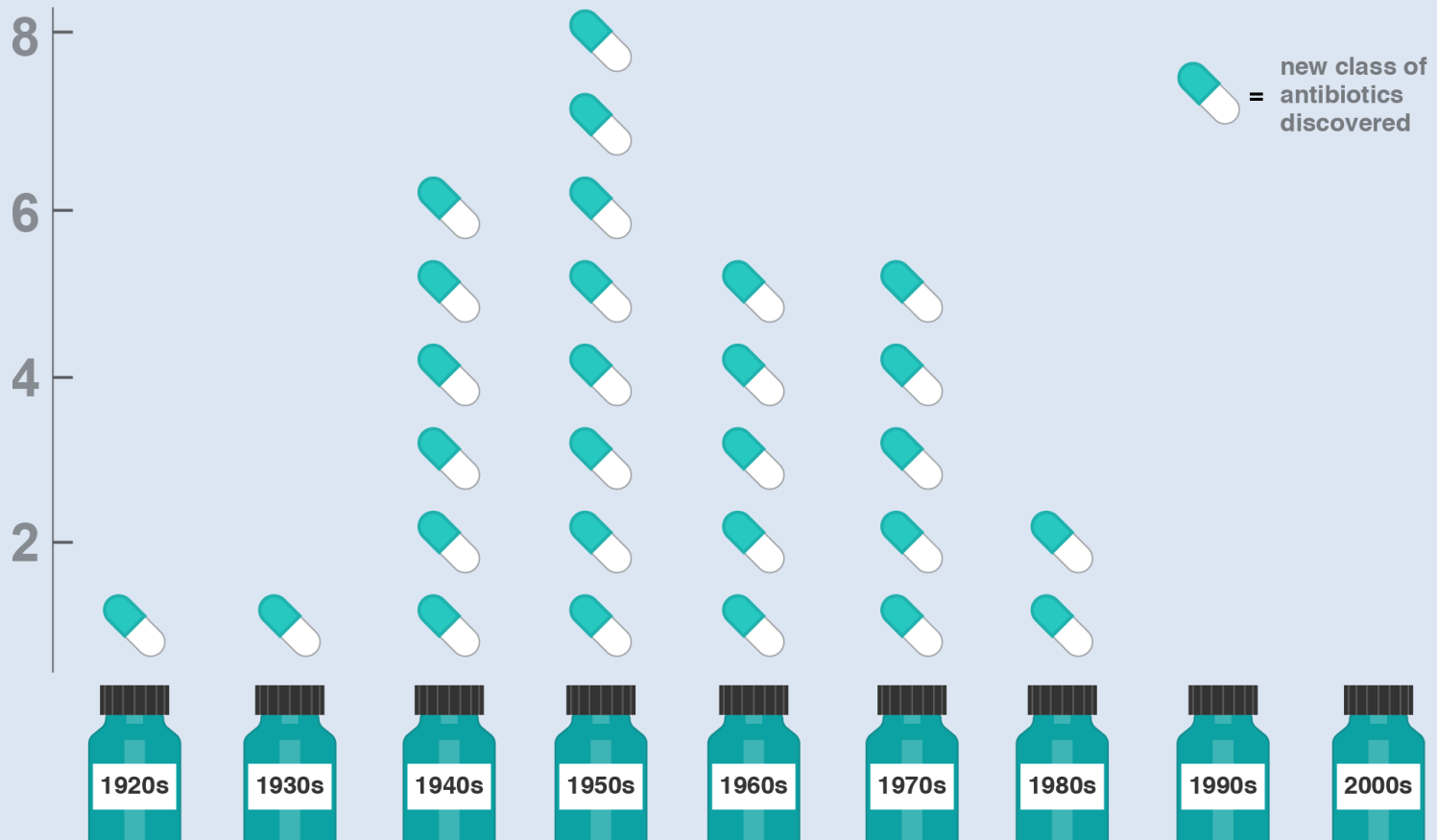
But the poor are now getting fat & the rich are getting thin...



**FIGURE 1:** Prevalence of obesity in adults (aged 16 and over) by equivalised household income quintile. England, 2004–08

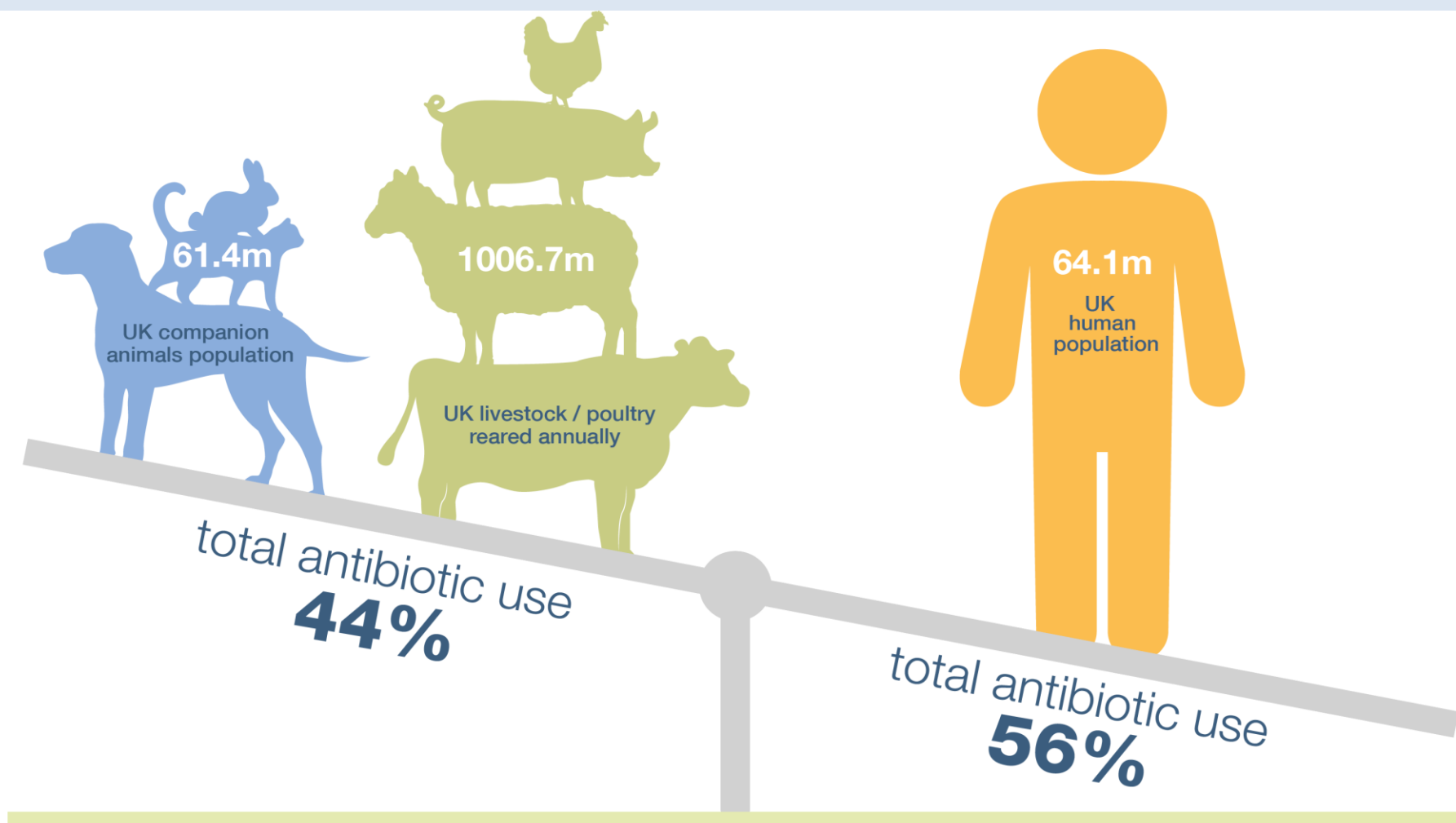


# Antibiotic resistance is growing



- Experts estimate that in 2050, 10 million people could die from infections that are resistant to antibiotics each year.

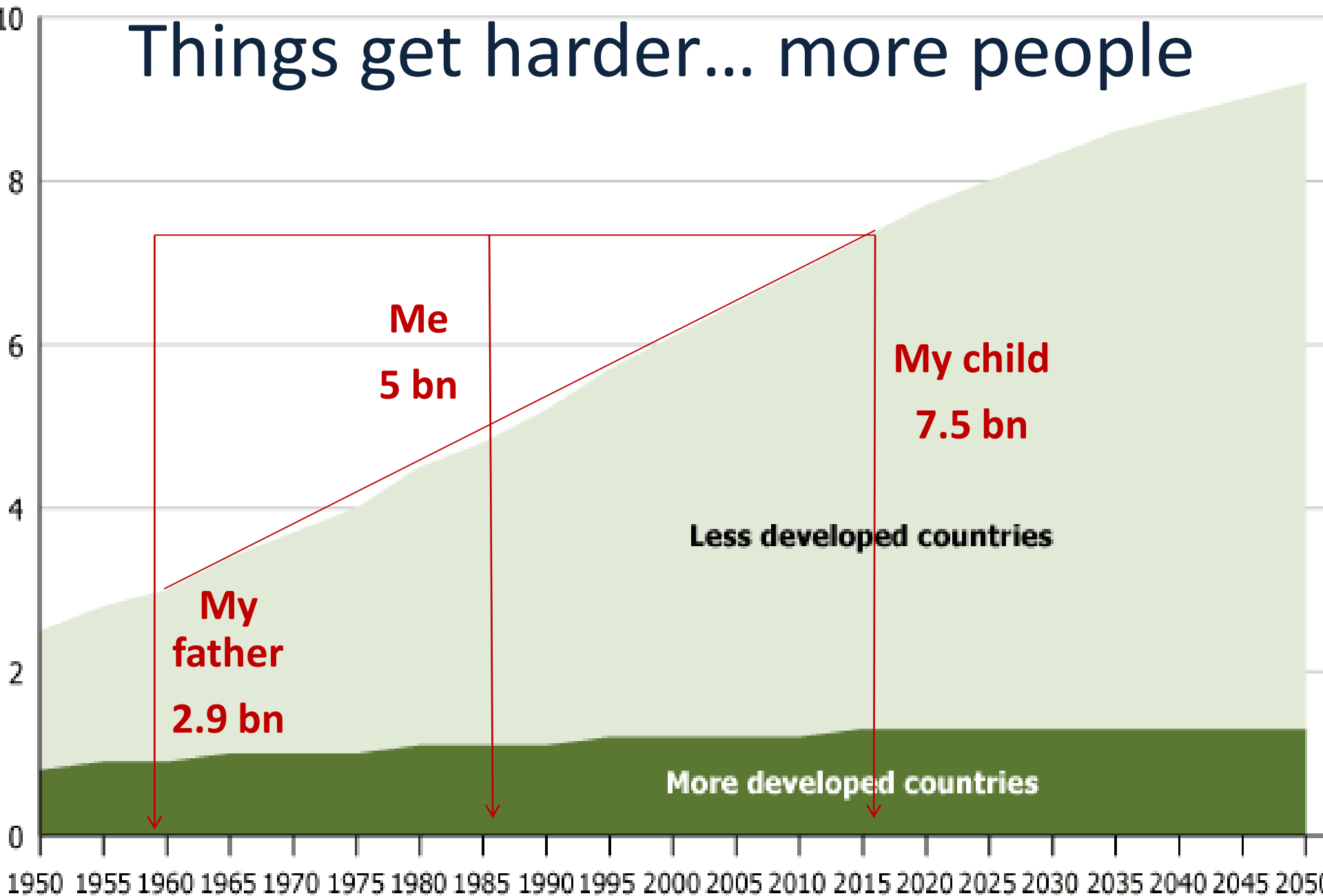
# Antibiotics are used in farming



Sources: [www.farmantibiotics.org](http://www.farmantibiotics.org), ONS, UK One Health Report, PFMA, BPC and Agriculture in the UK 2013 (estimated population numbers).

Population, in billions

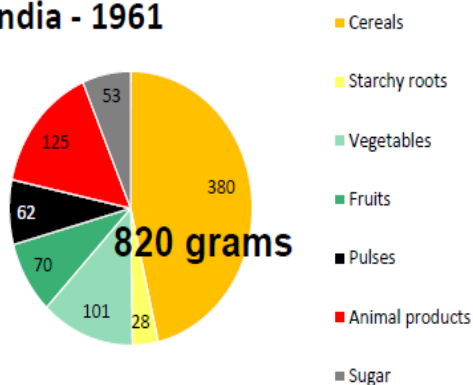
# Things get harder... more people



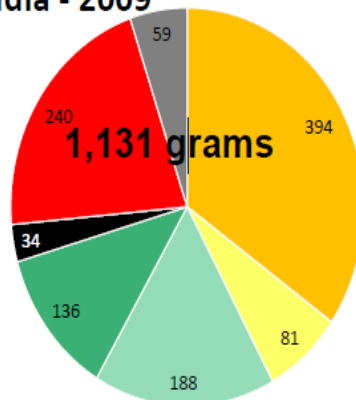


# Eating more – esp. more high impact foods

India - 1961

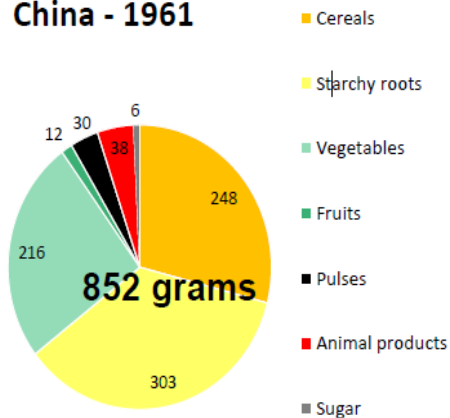


India - 2009

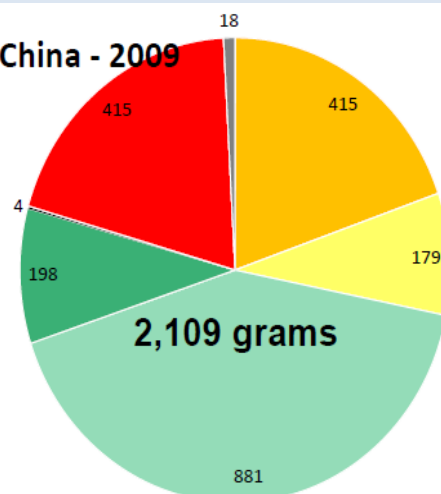


(The red sections are animal products)

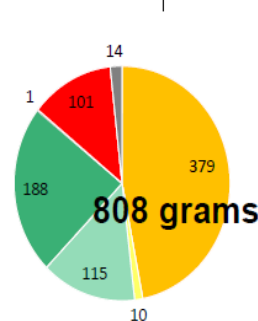
China - 1961



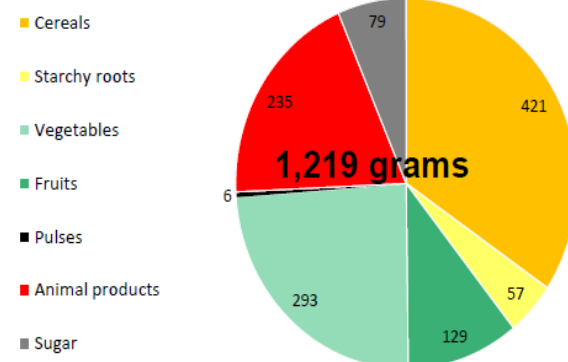
China - 2009



Thailand - 1961



Thailand - 2009



# Trade-offs can be numerous...e.g.

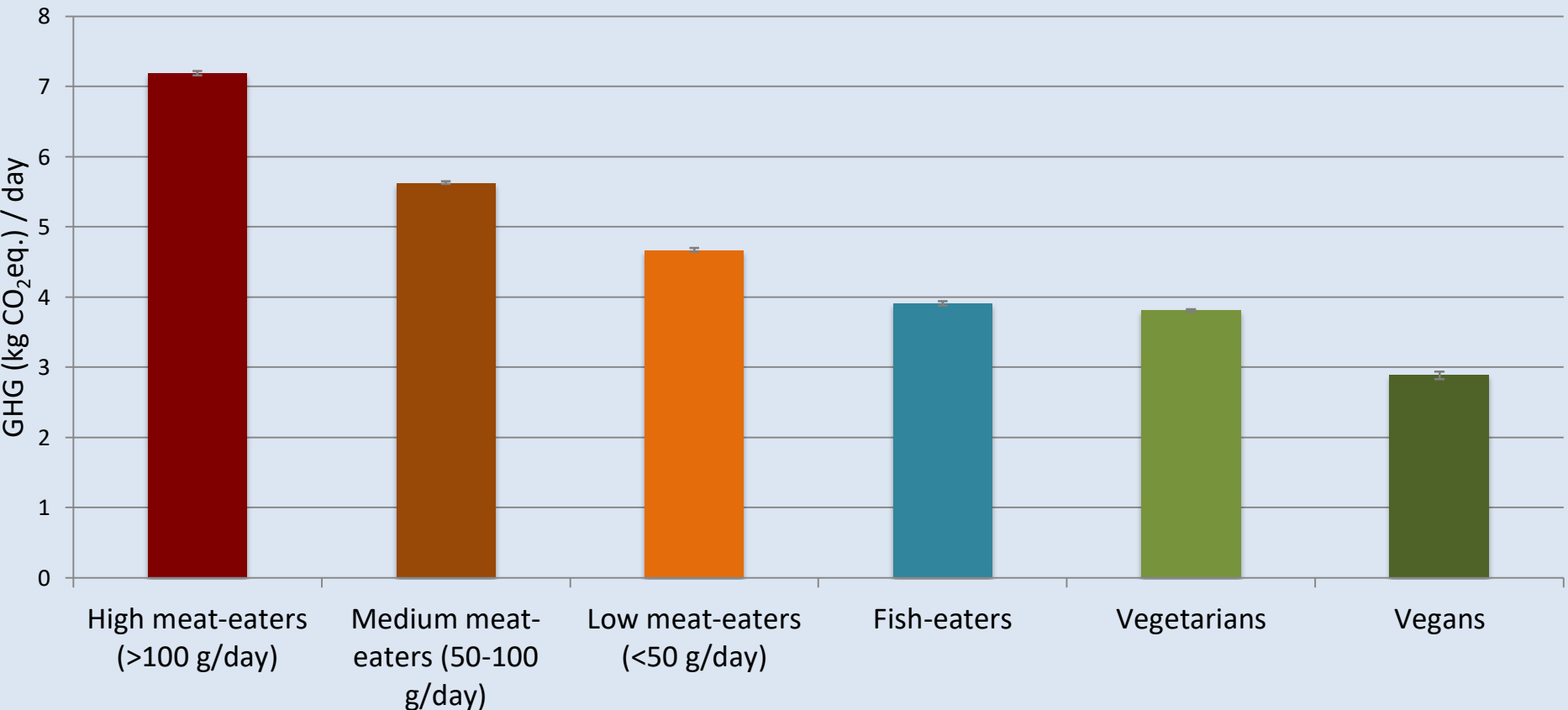
- **Between health and the environment:**
  - Eating omega 3 fatty acids from fish is good for cardiovascular and brain health, but puts pressure on fish stocks in our oceans.
  - Food processing can improve resource efficiency (e.g. sausages) but at a cost to health (e.g. due to the addition of salt and use of fattier cuts).
- **Between environmental impacts:**
  - Some fish have a lower GHGs than meat but more fish consumption could put extra pressure on fish stocks and marine biodiversity.
  - Switching from ruminant meat to poultry reduces GHG emissions but increases reliance on prime arable land.

## Yet we end on a positive note...

- Current diets - high environmental impacts & often not healthy.
- Healthy diets not automatically lower in GHGs
- BUT win wins are possible

...as not all is lost

Real life non-meat diets have lower GHGs than various meat-based diets (UK example)



Scarborough, P., Appleby, P.N., Mizdrak, A., Briggs, A.D.M., Travis, R.C., Bradbury, K.E., and Key, T.J. (2014) Dietary greenhouse gas emissions of meat-eaters, fish-eaters, vegetarians and vegans in the UK. *Climatic Change*, 125(2), 179-192



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Specific questions to fill information gaps. Any questions: Any answers. Someone in our membership will be able to provide an answer.



New FCRN Research Matching. Research needed; Partnerships wanted; Research project sought.

### FCRN Foodsource



A free and evolving resource on food systems and sustainability.

Foodsource consists of 10 informally peer-reviewed chapters providing a clear, accessible, balanced and scientifically robust overview of the many interlinked social and environmental issues related to our food system.



### FCRN publications



May 2016

Plates, pyramids and planet – Developments in national healthy and sustainable dietary guidelines: a state of play assessment



### Blogs/interviews



Posted: 10 November 2016  
by karenluyckx

Using food waste as pig feed



### New members



John Strohl (smokemaster)

Organisation: Voinovitch School, Ohio University  
Sector: Research Institution  
United States

### Tweets by @FCRNetwork

FCRN Retweeted



Professor Tim Lang

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## From the FCRN: 9 November 2016

### Research library

Systematic review on the impacts of dietary change on greenhouse gas emissions, land use, water use, and health

Social norms as solutions: Policies may influence large-scale behavioural tipping

Reducing meat consumption in developed and transition countries to counter climate change and biodiversity loss: a review of influence factors

Using the concept of 'nutritional yield' as a metric to evaluate synergies and tradeoffs for sustainable agriculture

FAO Report 2016: The State of Food and Agriculture

Transdisciplinary Perspectives on Transitions to Sustainability

### Opportunities

The Center for International Forestry Research (CIFOR) looking for female Board of Trustees members

Lecturer in Conservation and Environment (Social Science) at DICE in Kent, UK

PhD opportunity: Modelling the evolution of diet in England

Research Assistant vacancy at CCRI, University of Gloucestershire, UK

### Events

OneHealth EcoHealth combined congress 2016 in Melbourne, Australia

Third International Conference of the Global Research Forum on Sustainable Production and Consumption

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# FCRN foodsource

A project of the FCRN, supported by  
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fondation  
daniel & nina carasso  
sous l'égide de la Fondation de France

A free and evolving resource on food systems and  
sustainability

1. Overview of food system challenges

2. The environmental impacts of food products: introduction to  
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3. Food systems & greenhouse gas emissions

Thank you

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