



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

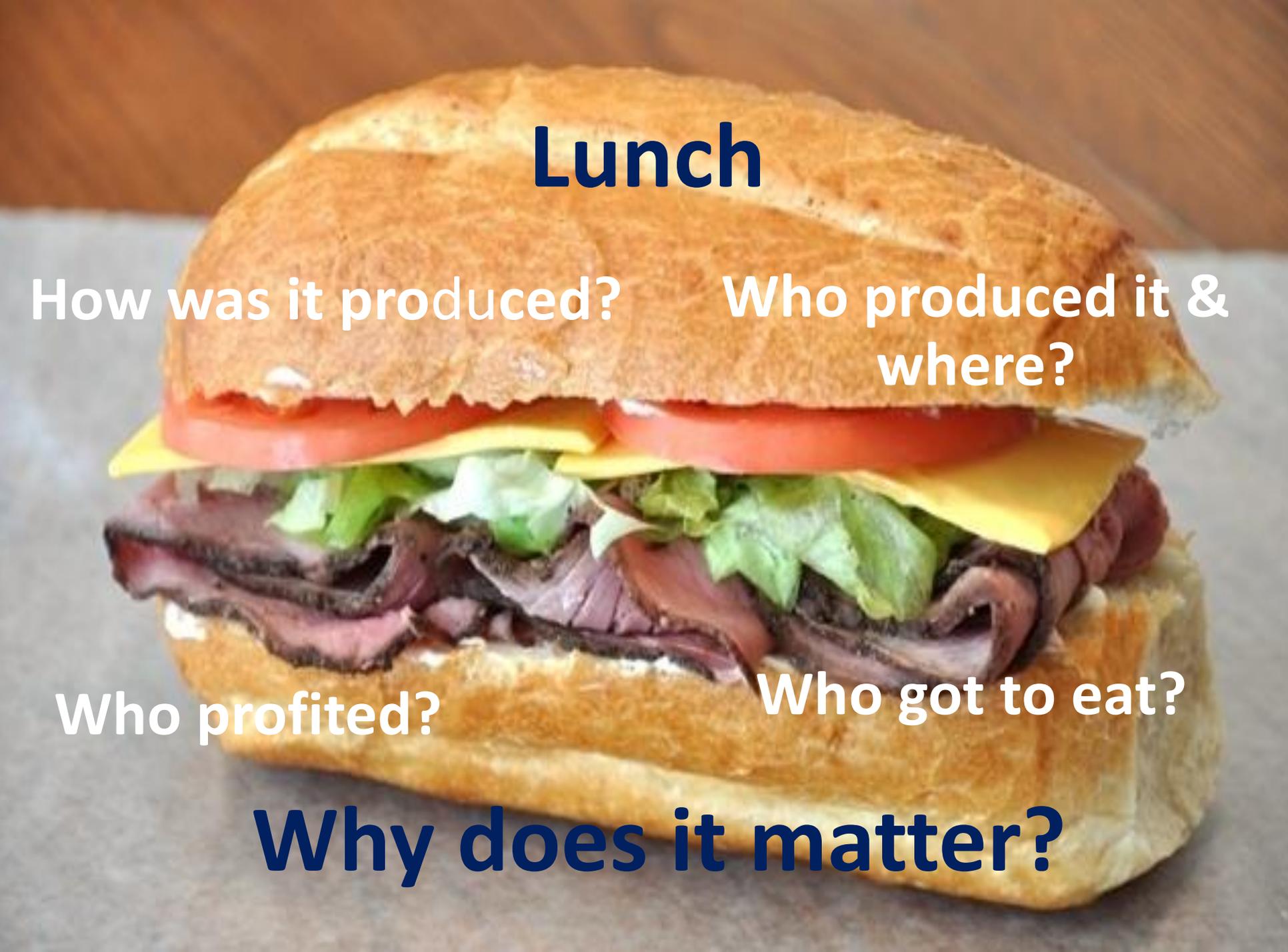
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[www.fcrn.org.uk](http://www.fcrn.org.uk)

9 December 2016



# Lunch

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**



**Land degradation  
& desertification**



**Species loss**

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



**Deforestation**

**Power, trade, control, equity**

**Enjoyment & social life**

**Mores and norms**

**Art & culture**

**Innovation and ingenuity**

**Tradition & identity**



**Religious beliefs & taboos**

**Ideas about justice**

**Ideas about 'good'**

**Animal ethics & welfare**

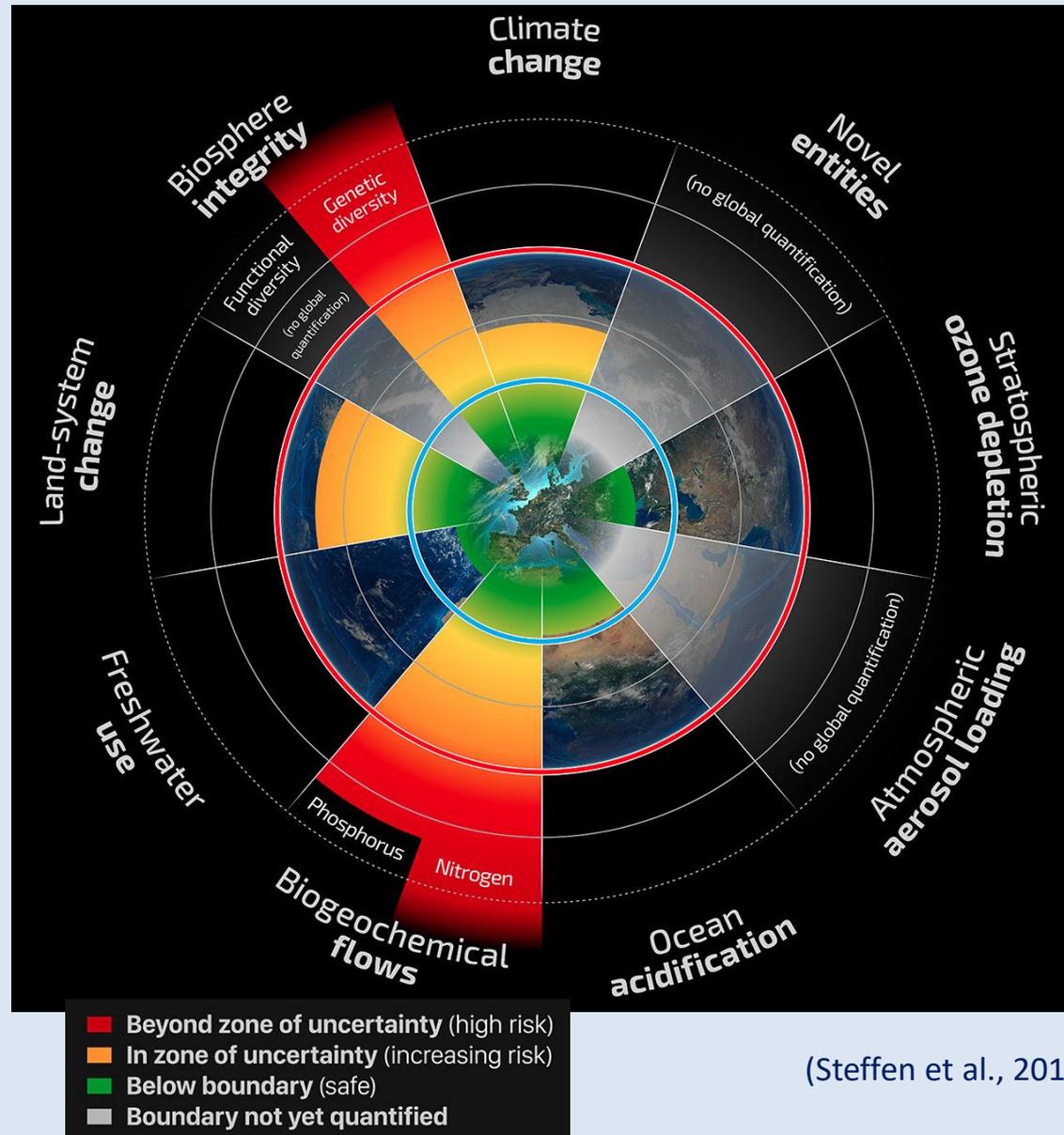
# Planet



# The Planetary Boundaries concept

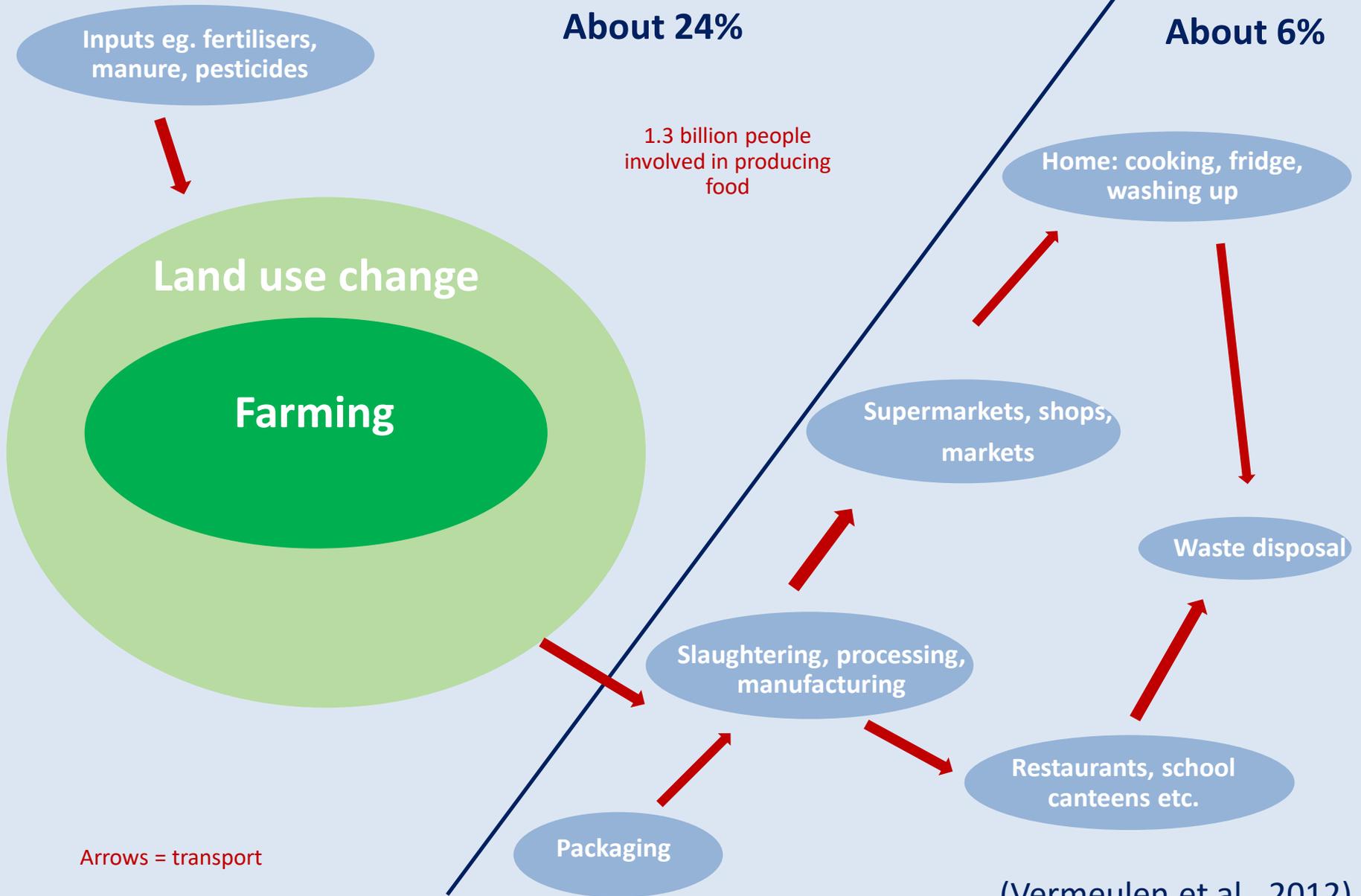


(WWF, 2015)



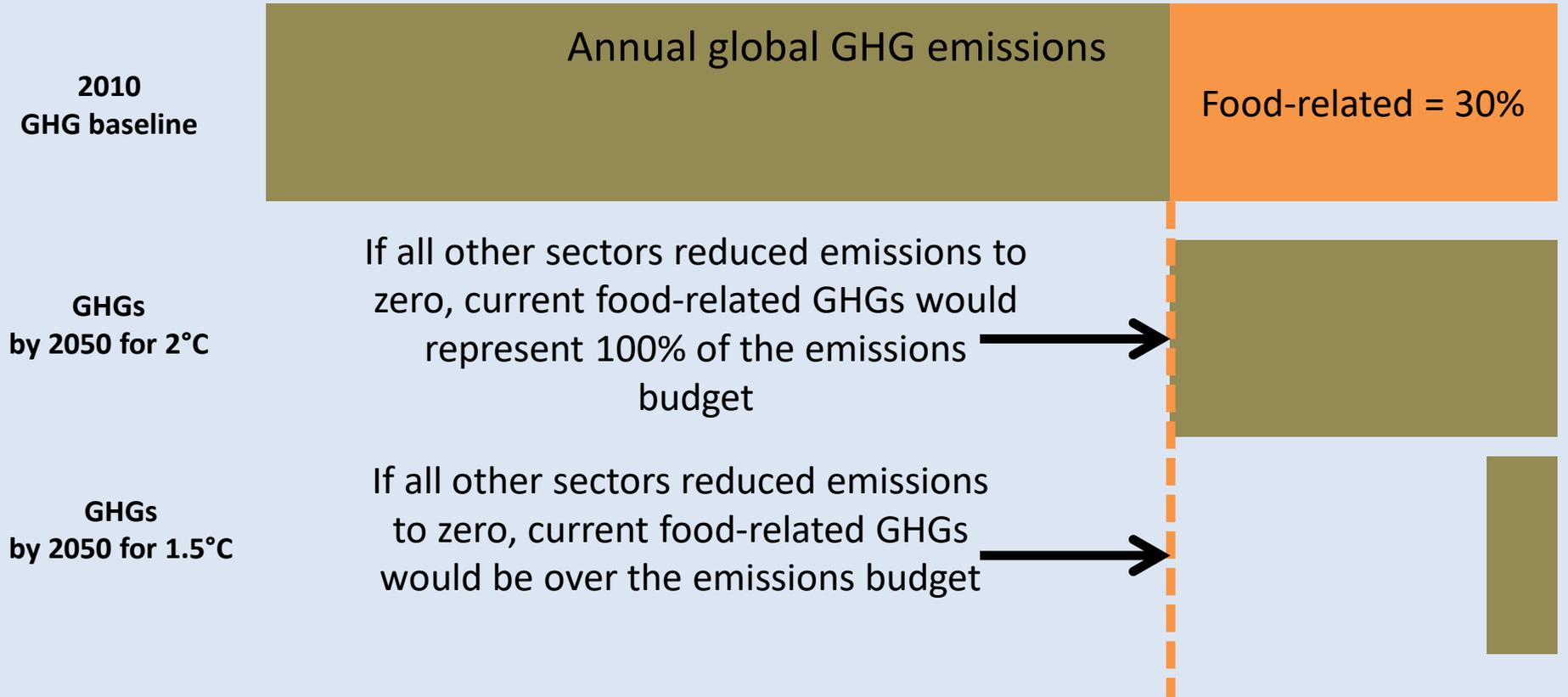
(Steffen et al., 2015)

# The food system - GHGs



(Vermeulen et al., 2012)

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



# What is land use change?



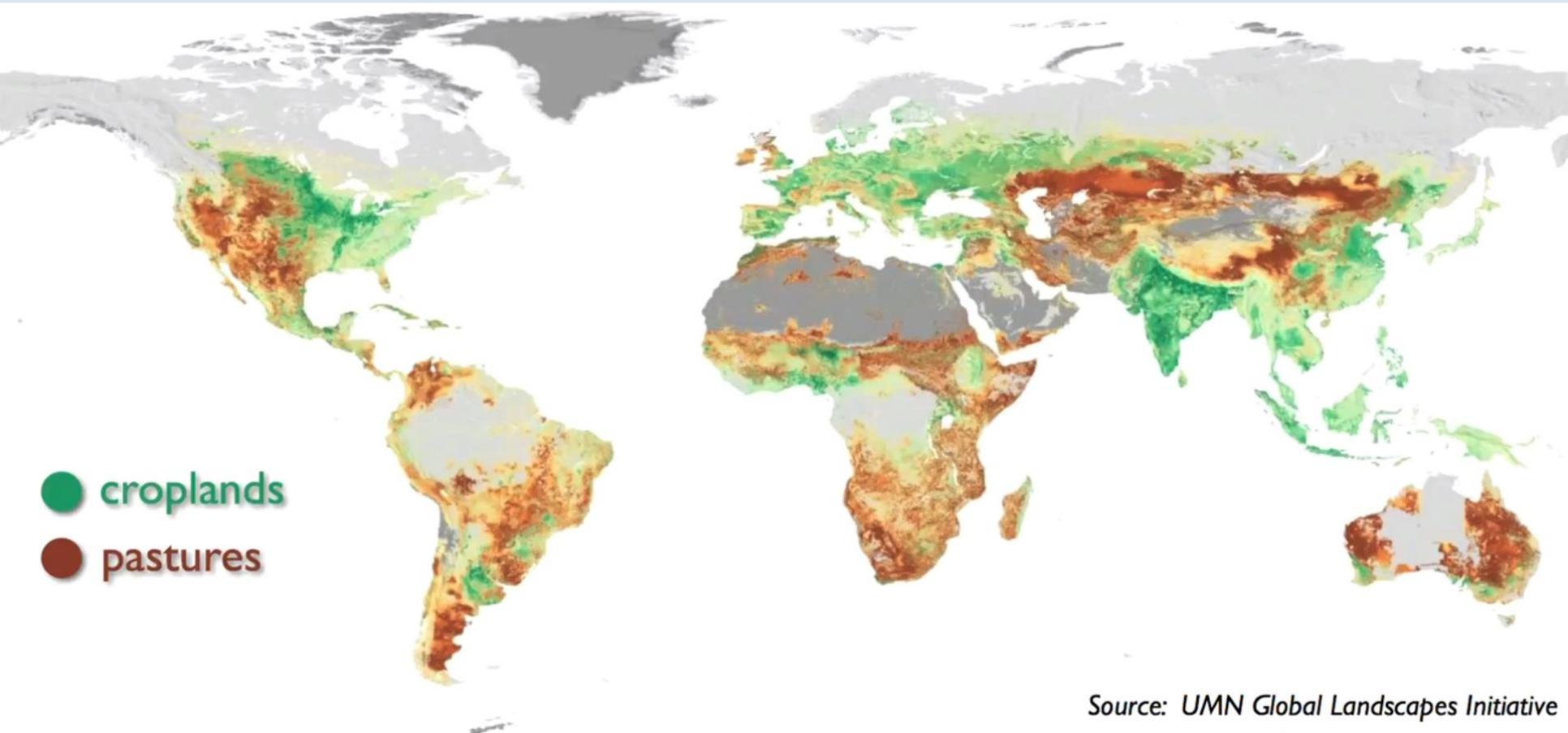
This is land use change



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

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

(Ellis et al., 2010)



Source: UMN Global Landscapes Initiative

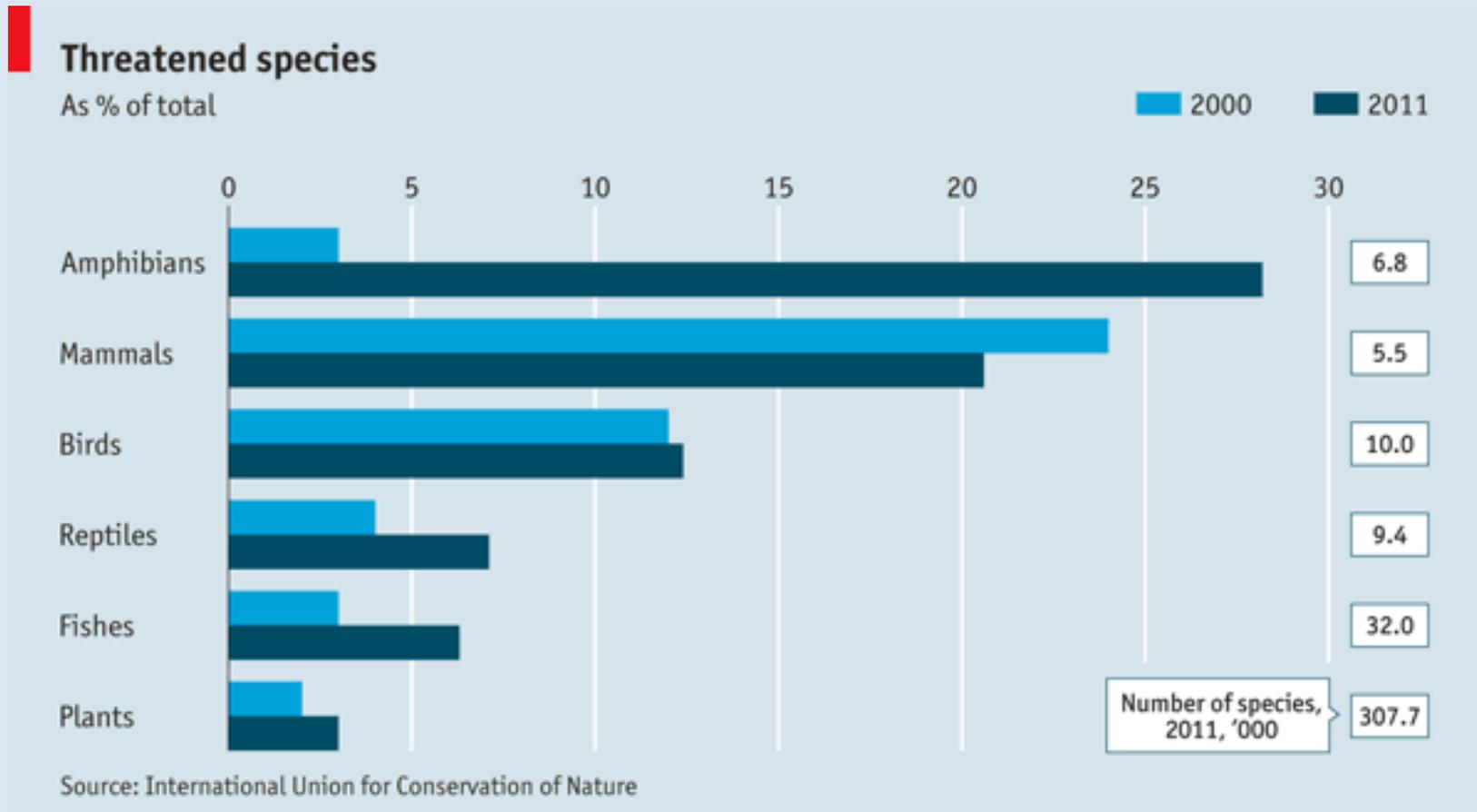
Agriculture today ~ 40% of global land

(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

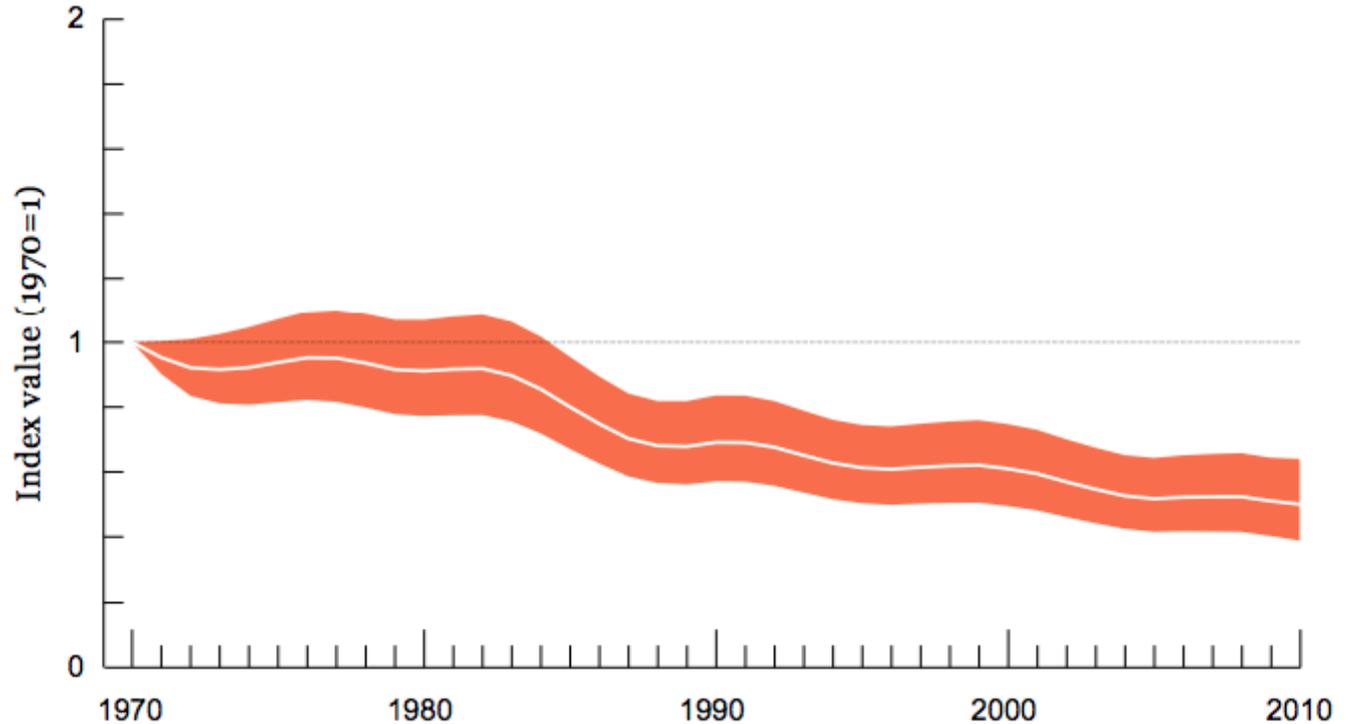
Populations: land-based vertebrates declined 38% (1970-2012)

# 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

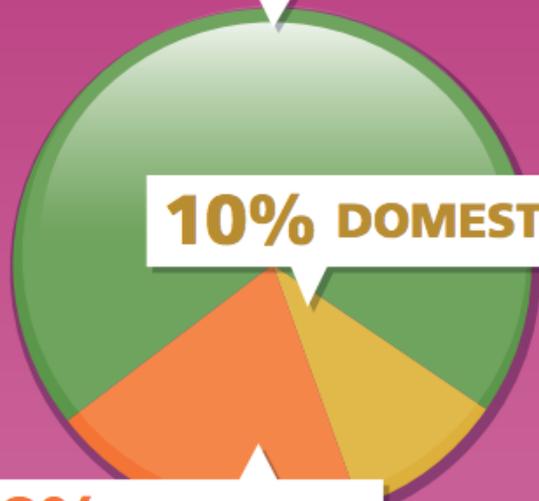


~1 in 4: species of sharks, rays, skates threatened with extinction

# Other problems - food is thirsty

## GLOBAL WATER WITHDRAWALS

**70% AGRICULTURE**



**10% DOMESTIC**

**20% INDUSTRY**

## EVERY DAY 1 PERSON

### DRINKS



**2-4**

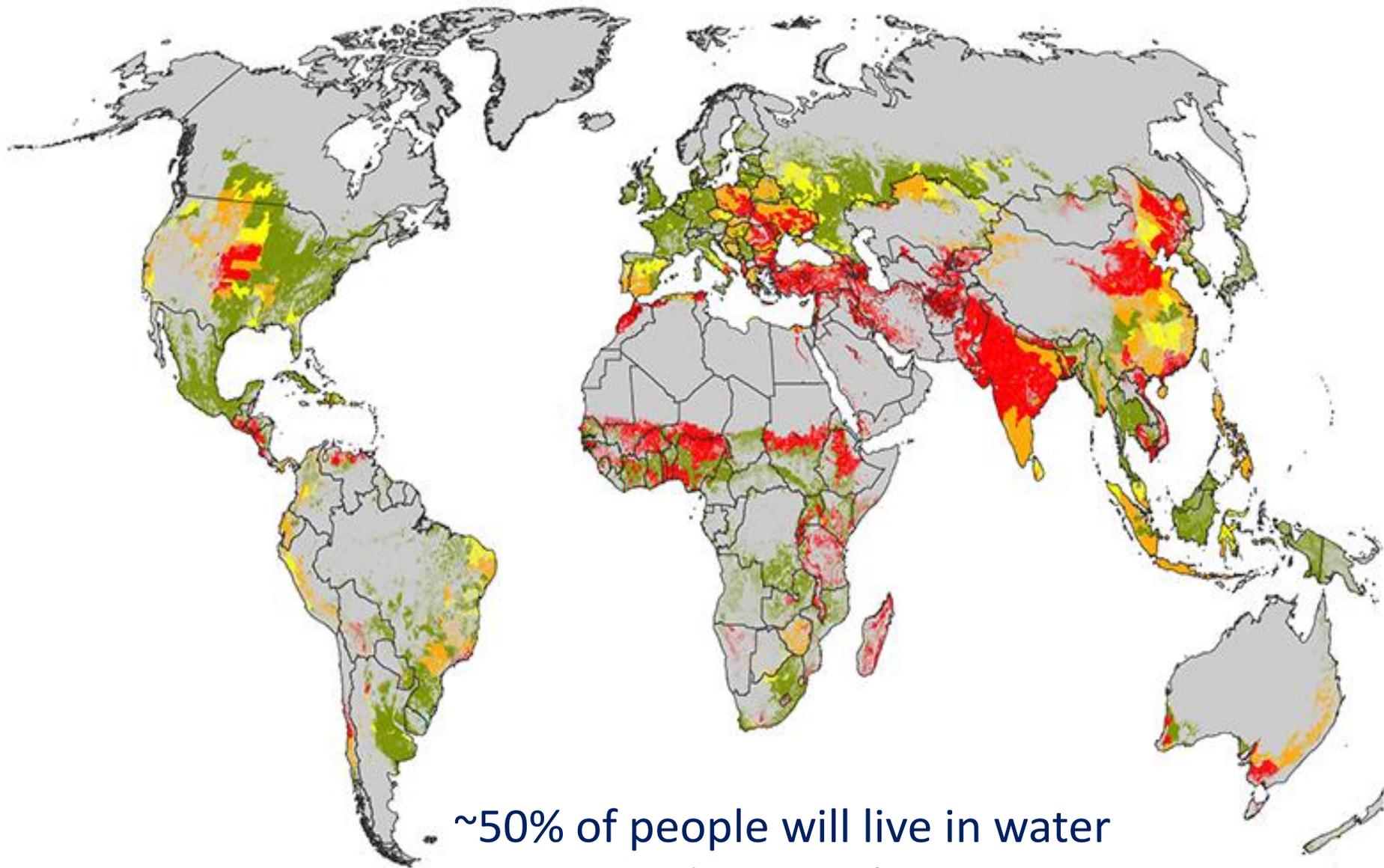
LITRES  
OF WATER

### 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**

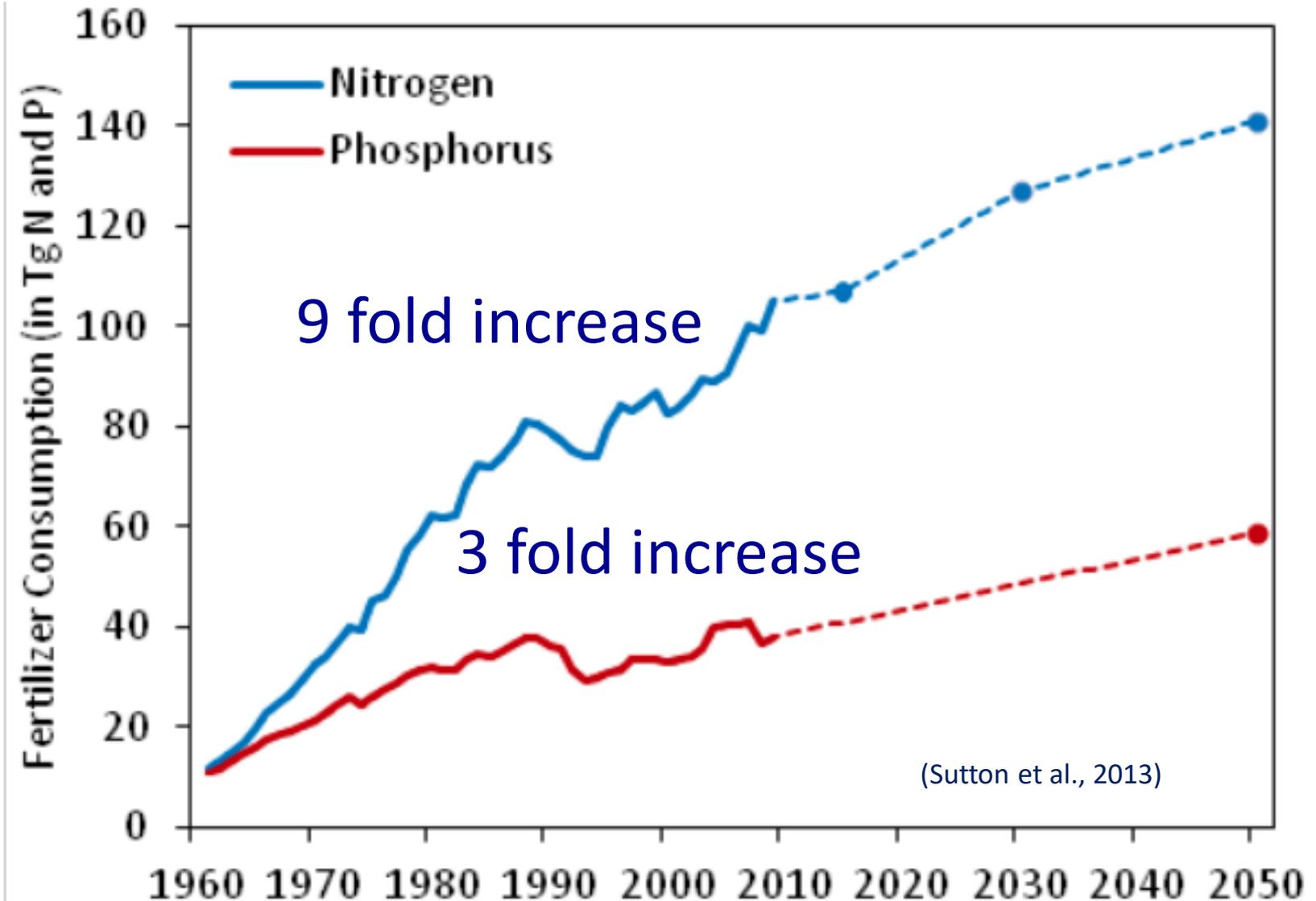


Lower

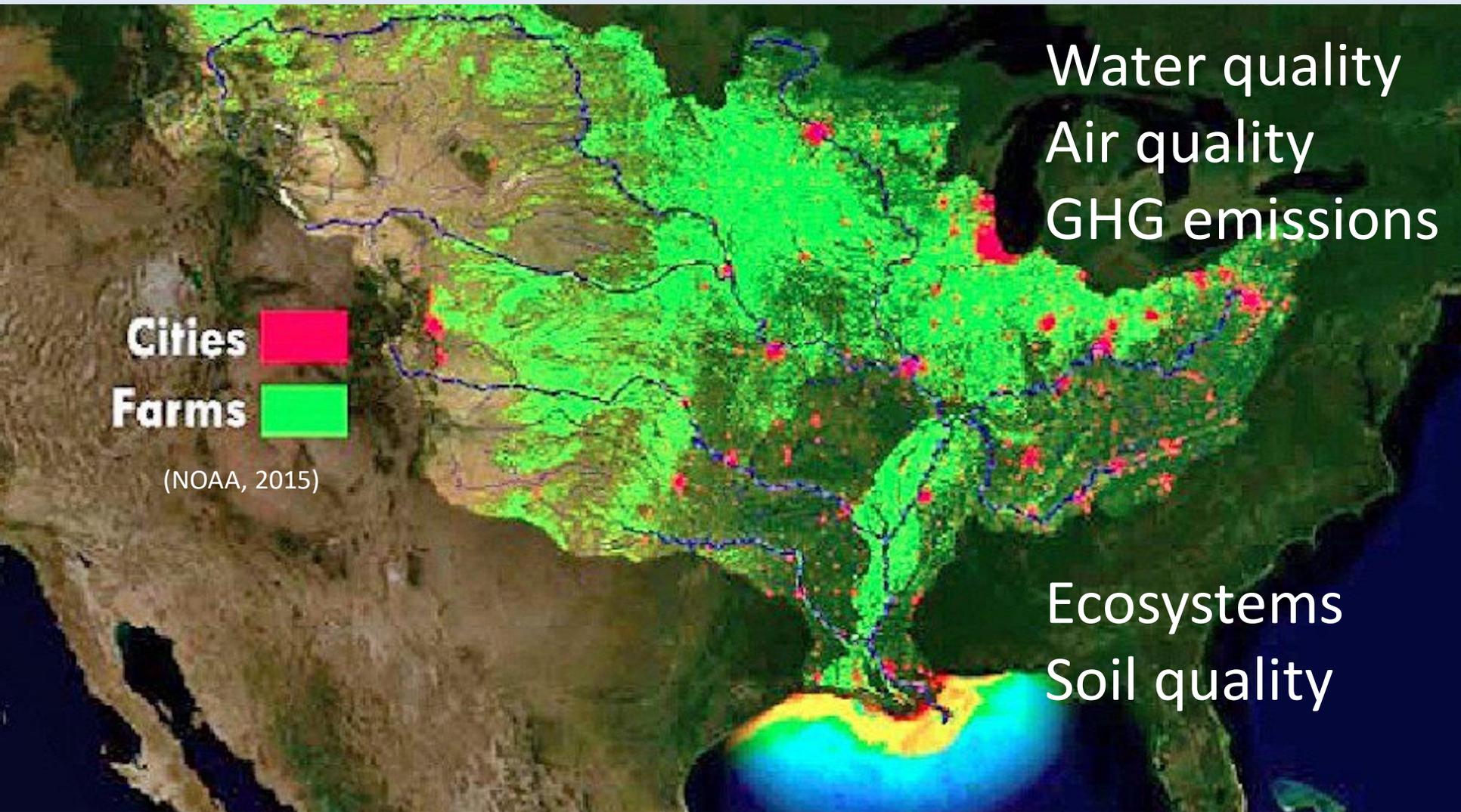
Near Normal

Higher

# 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

**1** NO POVERTY

**2** ZERO HUNGER

**3** GOOD HEALTH AND WELL-BEING

**4** QUALITY EDUCATION

**5** GENDER EQUALITY

**6** CLEAN WATER AND SANITATION

**7** AFFORDABLE AND CLEAN ENERGY

**8** DECENT WORK AND ECONOMIC GROWTH

**9** INDUSTRY, INNOVATION AND INFRASTRUCTURE

**10** REDUCED INEQUALITIES

**11** SUSTAINABLE CITIES AND COMMUNITIES

**12** RESPONSIBLE CONSUMPTION AND PRODUCTION

**13** CLIMATE ACTION

**14** LIFE BELOW WATER

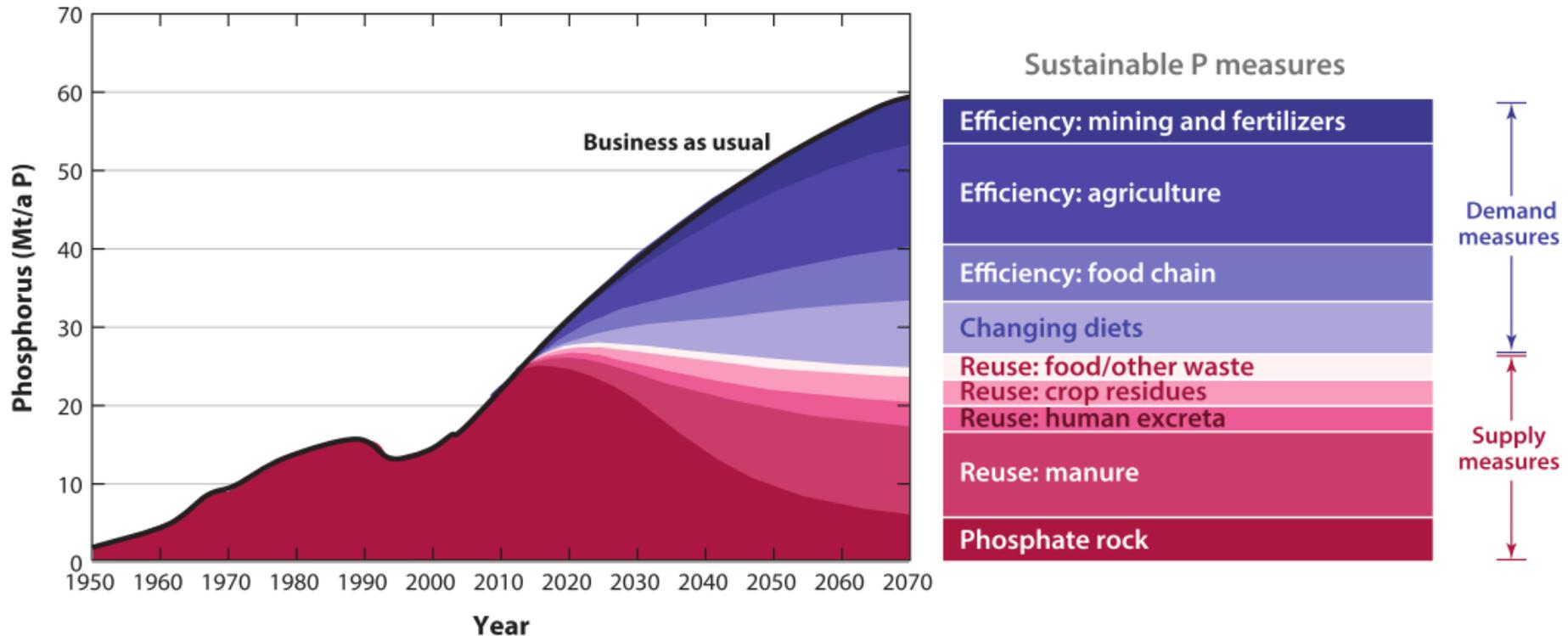
**15** LIFE ON LAND

**16** PEACE, JUSTICE AND STRONG INSTITUTIONS

**17** PARTNERSHIPS FOR THE GOALS

  
SUSTAINABLE DEVELOPMENT GOALS

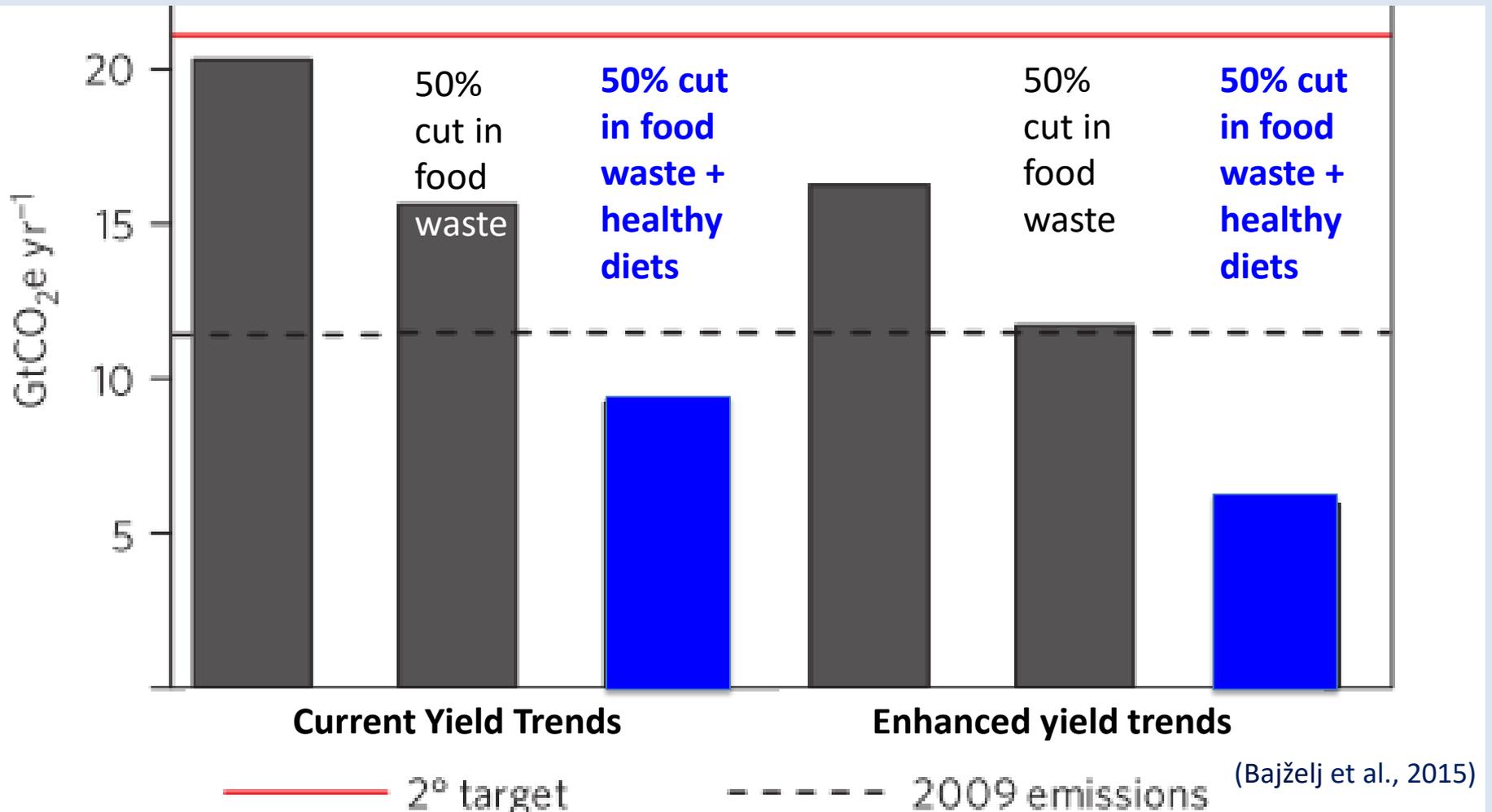
# Limits to production improvements



(Cordell and White, 2014)

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

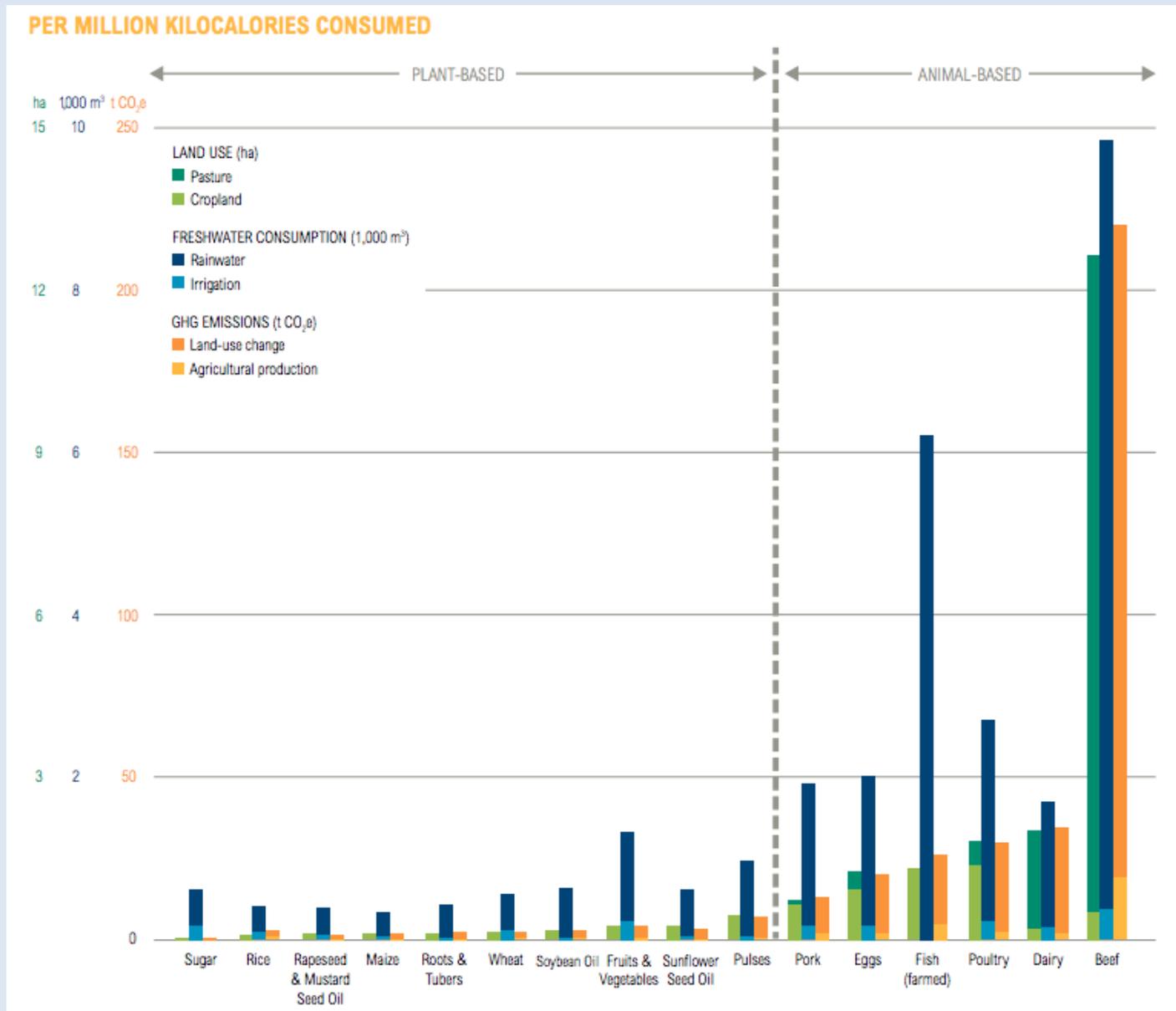
Greenhouse gas emissions from agriculture and land use change in 2050





**We need to talk about  
consumption**

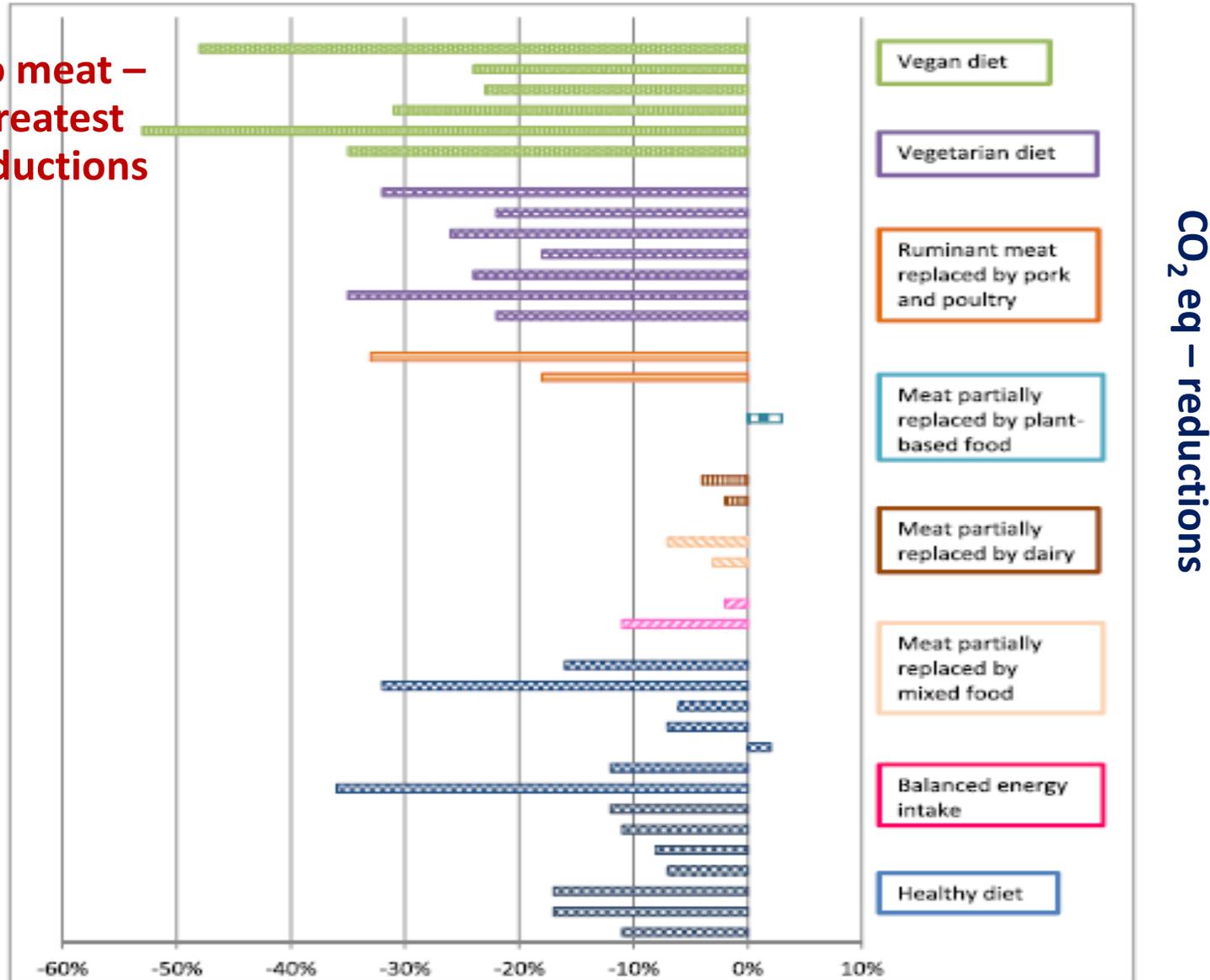
# The impacts of food groups differs



(WRI, 2016)

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

No meat – greatest reductions



# People





# EGYPT

\$68.53



# CHAD

\$1.23



UK

\$253.15



# JAPAN

\$317.25



# MALI

\$26.39



# INDIA

\$39.27



# Two highlighted issues

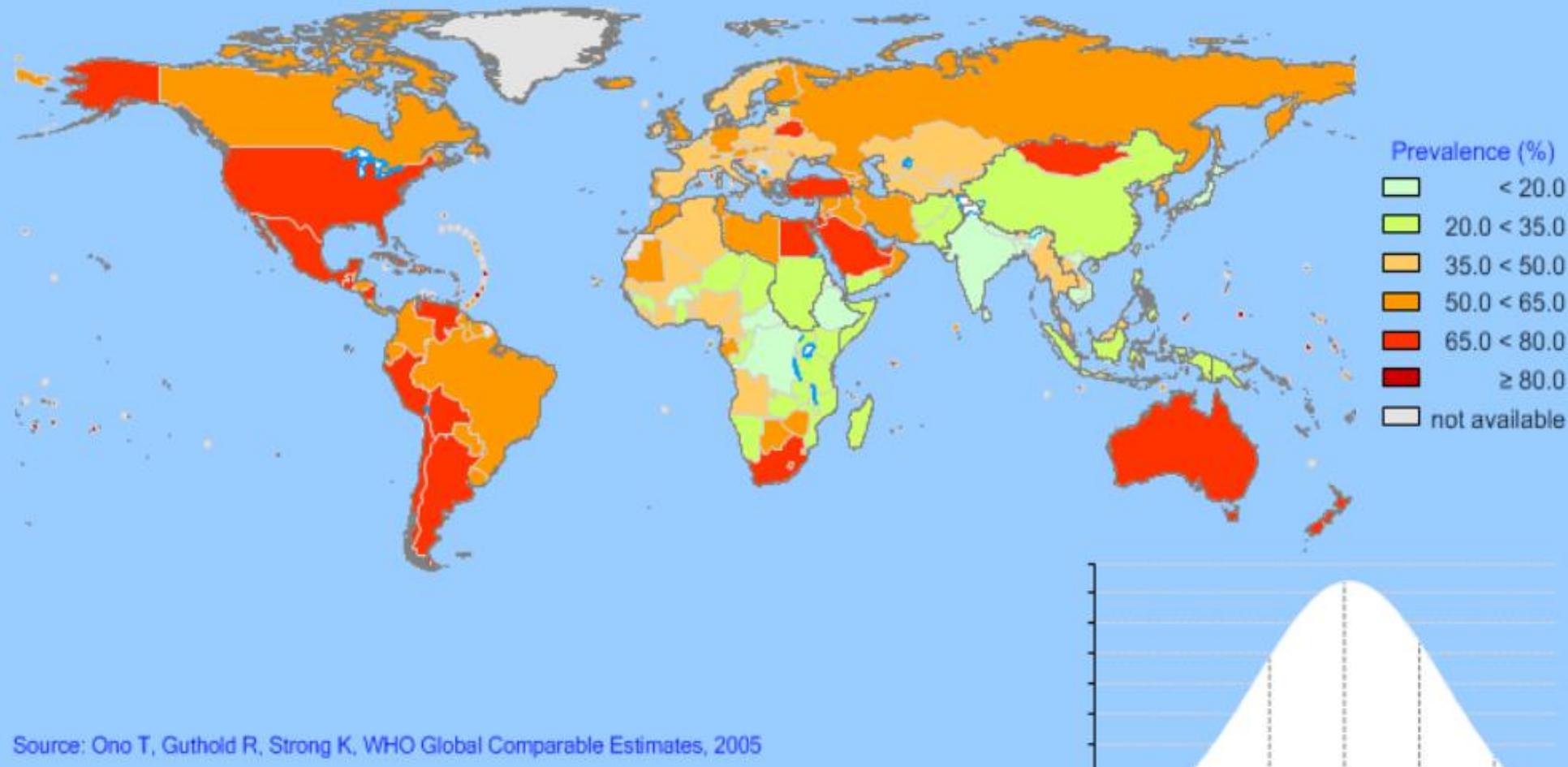
- Malnutrition
- Antibiotics resistance

# 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

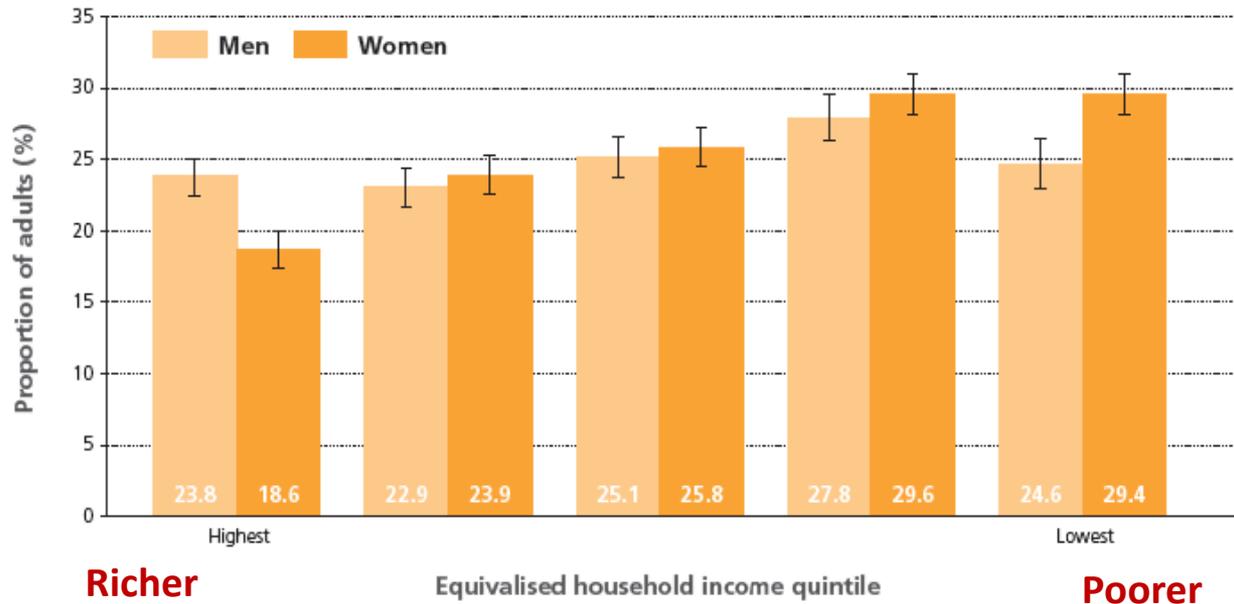
Estimated Overweight & Obesity (BMI  $\geq 25$  kg/m<sup>2</sup>) Prevalence, Females, Aged 15+, 2010



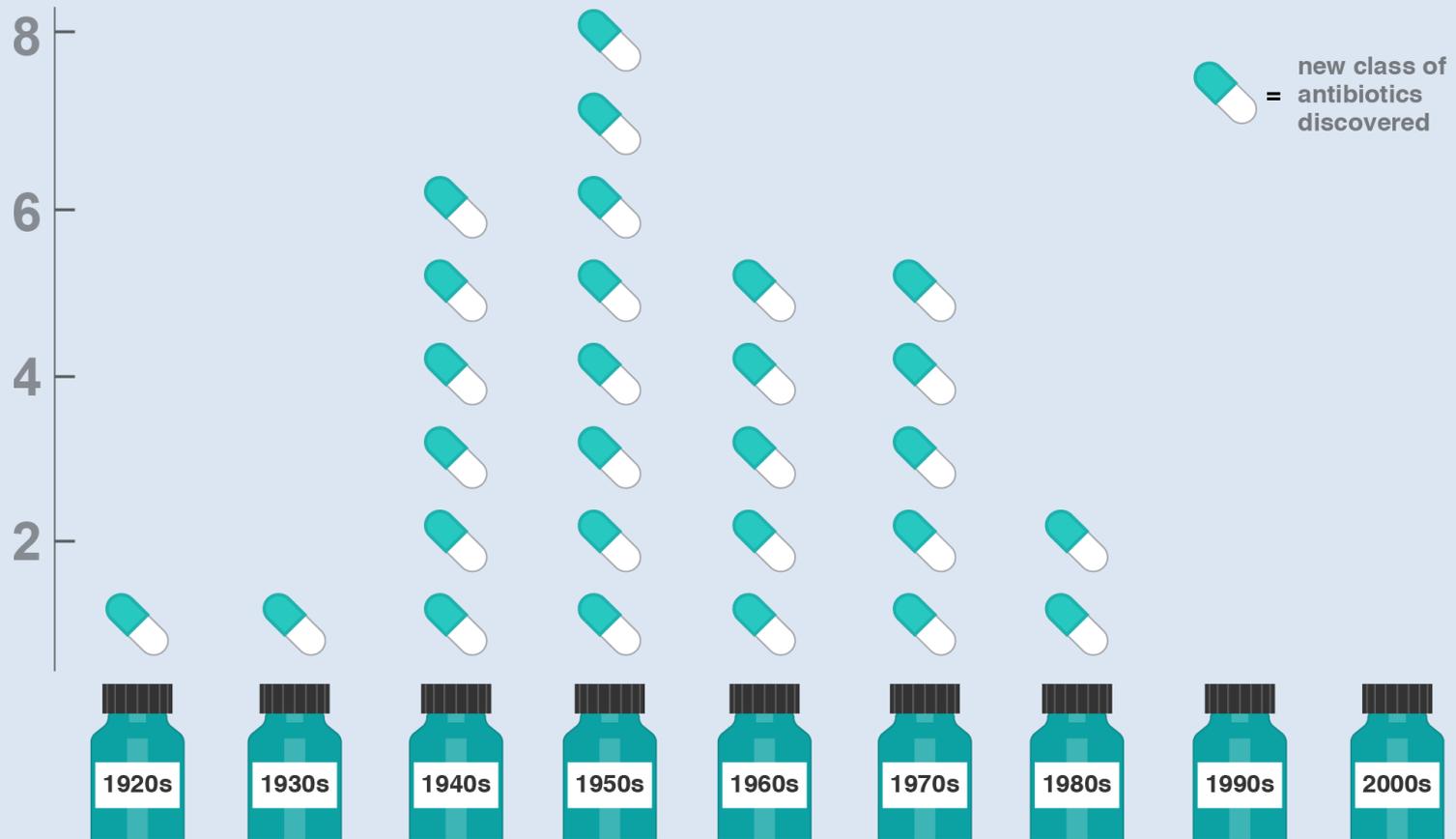
But the poor are now getting fat & the rich are getting thin...



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

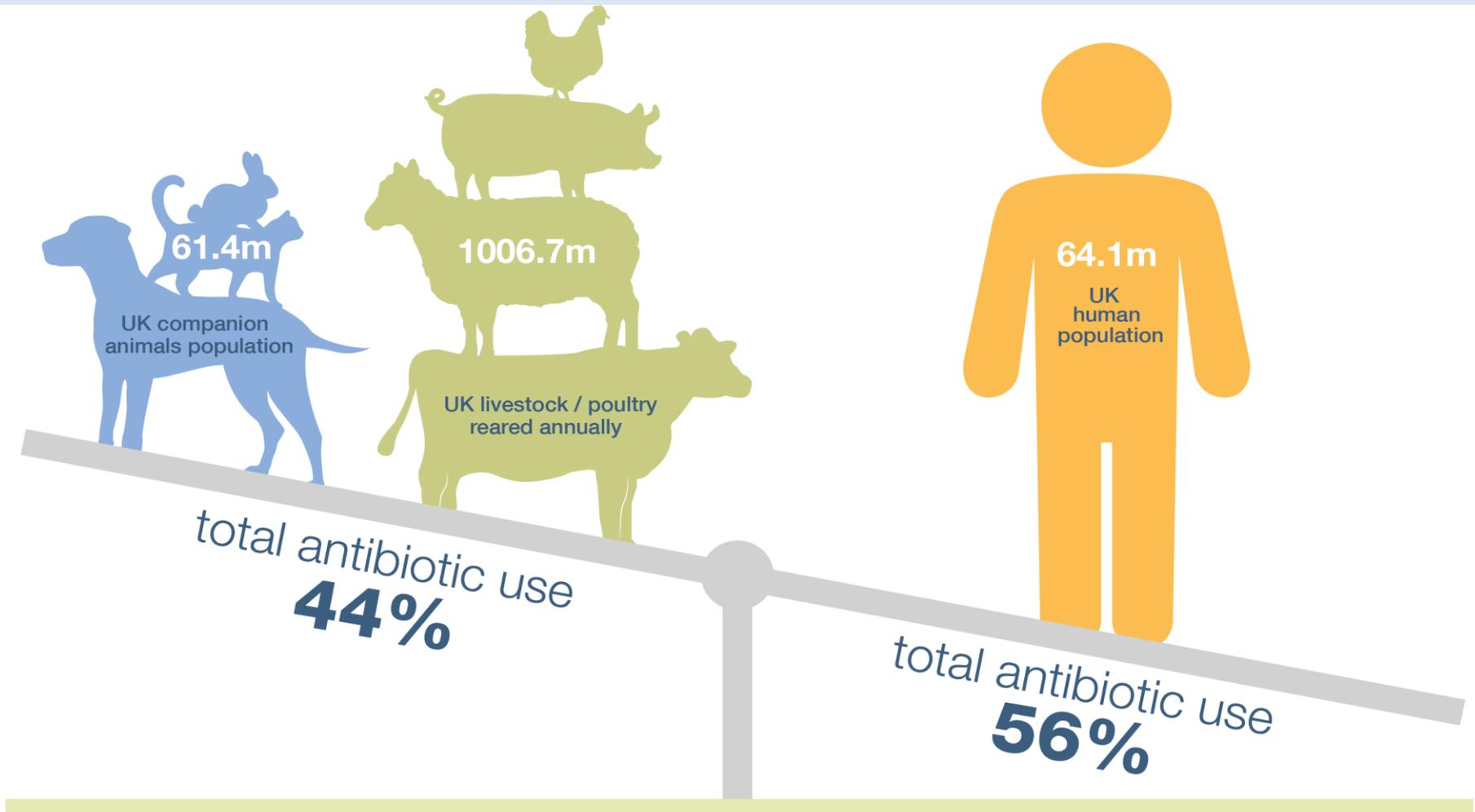


# Antibiotic resistance is growing



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

# Antibiotics are used in farming



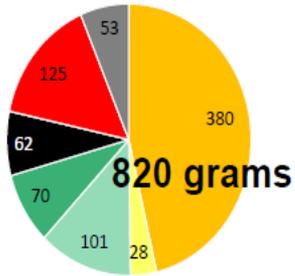
Population, in billions

# Things get harder... more people



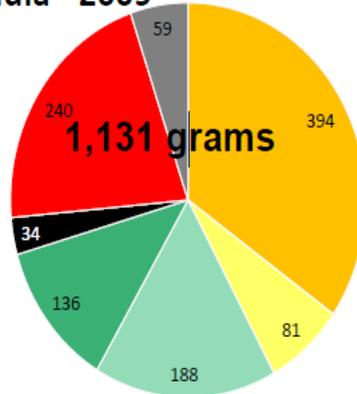
# Eating more – esp. more high impact foods

India - 1961



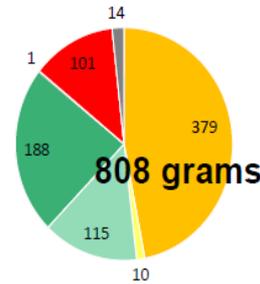
- Cereals
- Starchy roots
- Vegetables
- Fruits
- Pulses
- Animal products
- Sugar

India - 2009



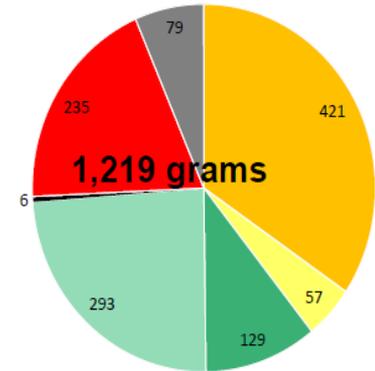
(The red sections are animal products)

Thailand - 1961

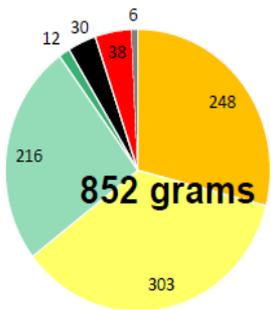


- Cereals
- Starchy roots
- Vegetables
- Fruits
- Pulses
- Animal products
- Sugar

Thailand - 2009

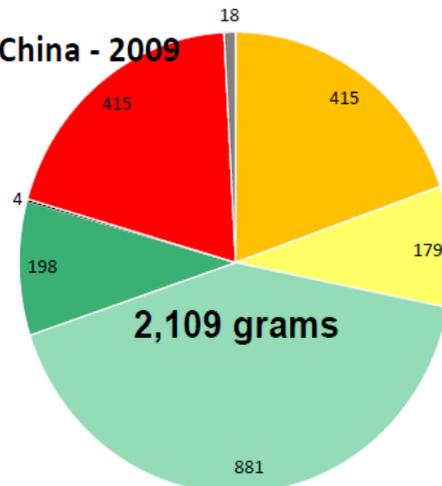


China - 1961



- Cereals
- Starchy roots
- Vegetables
- Fruits
- Pulses
- Animal products
- Sugar

China - 2009



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

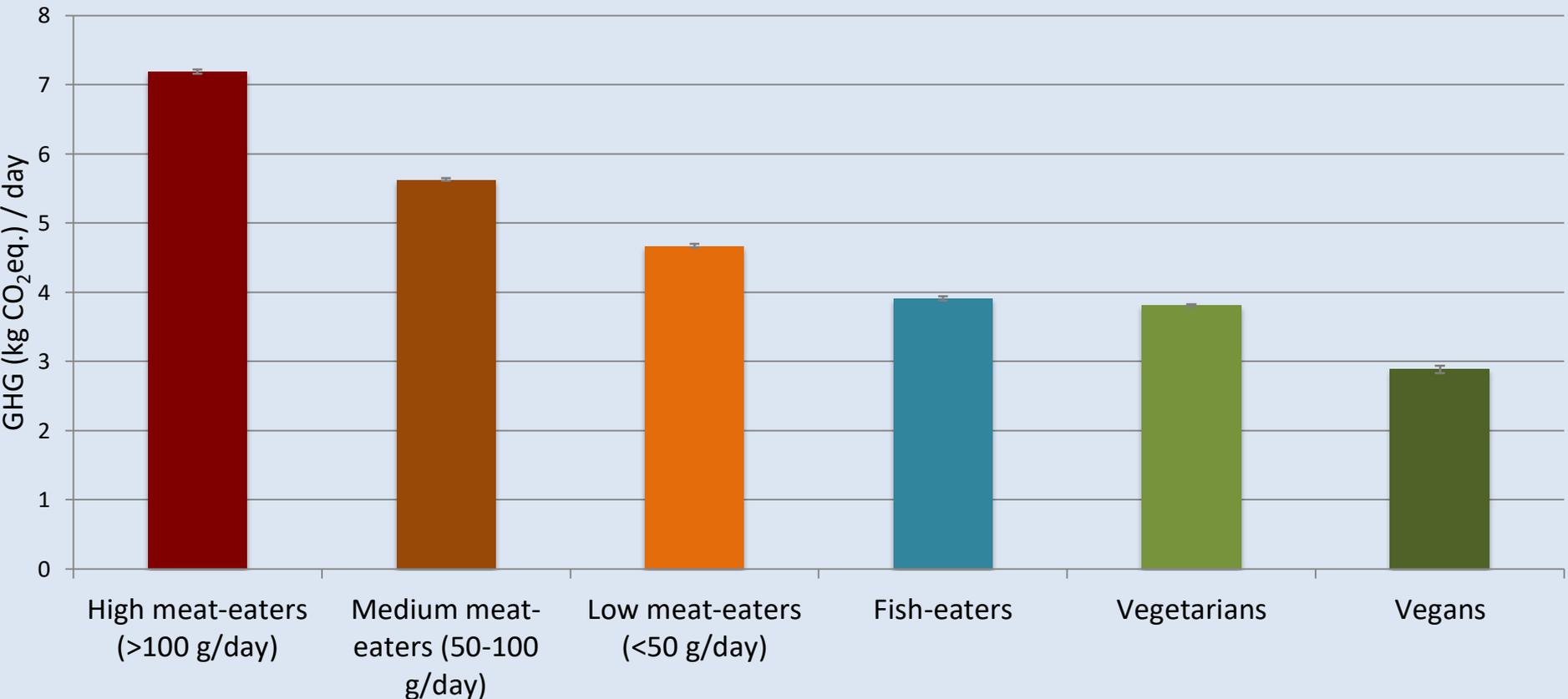
- **Between health and the environment:**
  - Eating omega 3 fatty acids from fish is good for cardiovascular and brain health, but puts pressure on fish stocks in our oceans.
  - Food processing can improve resource efficiency (e.g. sausages) but at a cost to health (e.g. due to the addition of salt 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

## Latest Blog post: Using food waste as pig feed



## New FCRN forums



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 @FCRNnetwork

FCRN Retweeted



Professor Tim Lang

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



## 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

Visit our new learning resource

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

# FCRN

foodsource

A project of the FCRN, supported by  
the Daniel & Nina Carasso Foundation



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  
lifecycle assessment

3. Food systems & greenhouse gas emissions

Thank you

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