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

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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
Livelihoods & survival; 1.3bn livelihoods in agriculture
Power, trade, control, equity
Enjoyment & social life
Art & culture
Tradition & identity
Ideas about justice

Other health impacts

Climate change – 30% global emissions
Water use & pollution
Deforestation
Species loss

Land degradation & desertification

People

Progress (??)

Ideas about ‘good’

Ideas about justice
Religious beliefs & taboos
Animal ethics & welfare
Innovation and ingenuity
Mores and norms

Food connects us to everything
The Planetary Boundaries concept

(WWF, 2015)
The food system - GHGs

- Inputs eg. fertilisers, manure, pesticides
- Slaughtering, processing, manufacturing
- Packaging
- Supermarkets, shops, markets
- Waste disposal
- Restaurants, school canteens etc.
- Home: cooking, fridge, washing up

- Land use change
- Farming

- Arrows = transport

1.3 billion people involved in producing food

About 24%

About 6%

(Vermeulen et al., 2012)
This is the scale of the climate challenge – food has to play its part

Annual global GHG emissions

Food-related = 30%

If all other sectors reduced emissions to zero, current food-related GHGs would represent 100% of the emissions budget

If all other sectors reduced emissions to zero, current food-related GHGs would be over the emissions budget

(Vermeulen et al., 2012; Bajželj et al., 2015)
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

Agriculture today ~ 40% of global land

Protected areas ~ 13% of global land

(Ellis et al., 2010)

Source: UMN Global Landscapes Initiative

(Foley et al., 2011)

(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)

(Hosonuma et al., 2012; WWF-ZSL, 2016)
Populations of fish species used by humans have halved ~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)
Other problems - food is polluting

(Sutton et al., 2013)
Too many nutrients: US, EU, China

Ocean dead zones doubled each decade since 1960’s

Water quality
Air quality
GHG emissions
Ecosystems
Soil quality

(Ocean, 2015)

(NOAA, 2015)
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

(Bajželj et al., 2015)
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

CO₂ eq – reductions

(Vegan diet, Vegetarian diet, Ruminant meat replaced by pork and poultry, Meat partially replaced by plant-based food, Meat partially replaced by dairy, Meat partially replaced by mixed food, Balanced energy intake, Healthy diet)

(Hallström, 2015)
People eat differently – USA

$341.98
CHAD

$1.23
UK
$253.15
JAPAN

$317.25
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
But the poor are now getting fat & the rich are getting thin…
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, ONS, UK One Health Report, PFMA, BPC and Agriculture in the UK 2013 (estimated population numbers).
Things get harder... more people

Population, in billions

My father 2.9 bn
Me 5 bn
My child 7.5 bn

Less developed countries
More developed countries
Eating more – esp. more high impact foods

The red sections are animal products

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

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**FODDER: NOVEMBER**

**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

1. Overview of food system challenges

2. The environmental impacts of food products: introduction to lifecycle assessment

3. Food systems & greenhouse gas emissions
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