The EAT-Lancet Commission on Healthy Diets from Sustainable Food Systems

Dr. Brent Loken
Director of Science Translation
THE PROBLEM
THE HUMAN POPULATION IS HEALTHIER THAN EVER BEFORE

LIFE EXPECTANCY
Mean global life expectancy at birth (years)

POVERTY
Population of world in poverty (%)

CHILD MORTALITY
Recorded deaths of under-fives

1
BUT TO ACHIEVE THIS WE’VE EXPLOITED THE PLANET AT AN UNPRECEDENTED RATE

CARBON DIOXIDE EMISSIONS
Atmospheric concentration of CO₂ (ppm)

OCEAN ACIDIFICATION
Global ocean acidification (mean hydrogen ion concentration, nmol/kg)

ENERGY USE
World primary energy use (EJ)

TROPICAL FOREST LOSS
Global tropical forest loss compared with 1700 baseline (%)

WATER USE
Water use (thousand km²)

FERTILISER USE
Global fertiliser use (nitrogen, phosphorus, and potassium; thousand tonnes)
Planetary Boundaries
A safe operating space for humanity
Unprecedented Scale and Pace of Global Change

Humanity has wiped out 60% of animal populations since 1970, report finds

The huge loss is a tragedy in itself but also threatens the survival of civilisation, say the world’s leading scientists
Unprecedented Scale and Pace of Global Change

Consequences of twenty-first-century policy for multi-millennial climate and sea-level change

Peter U. Clark*, Jeremy D. Shakun², Shaun A. Marcott³, Alan C. Mix¹, Michael Eby⁴, Scott Kulp⁵, Anders Levermann⁶,³, Glenn A. Milne⁷, Patrik L. Pfister⁸, Benjamin D. Santer⁹, Daniel P. Schrag¹⁰, Susan Solomon¹¹, Thomas F. Stocker¹², Benjamin H. Strauss¹³, Andrew J. Weaver¹⁴, Ricarda Winkelmann¹⁵, David Archer¹⁶, Edouard Bard¹⁷, Aaron Goldner¹⁸, Kurt Lambeck¹⁹,²⁰, Raymond T. Pierrehumbert²¹ and Gian-Kasper Plattner²²

![Graph showing temperature anomaly over time with key points labeled: 2280-2300, 2080-2100, Paris, BAU.](image)
So what does **food** have to do with this?
25% GHG EMISSIONS COMES FROM AGRICULTURE
40% OF LAND SURFACE USED FOR FOOD
80% OF BIODIVERSITY LOSS FROM AGRICULTURE
Dead Zones from Fertilizer Use
Future Impact with Business As Usual
60% GLOBAL DEATHS FROM NON COMMUNICABLE DISEASES (NCDS)
Malnutrition Persists

1) 820 million people remain undernourished
2) 151 million children are stunted
3) 51 million children are wasted
4) More than 2 billion people are micro-nutrient deficient
5) 2.1 billion adults overweight or obese
'People just have less time now': is the Mediterranean diet dying out?

Parents and experts in southern Europe digest the WHO's warning this week on fast food
THE SOLUTION
The EAT-Lancet Commission on Food Planet Health

How to feed nearly 10 billion people a healthy and sustainable diet within planetary boundaries

WALTER WILLET AND JOHAN ROCKSTRÖM – CO CHAIRS
SCIENTIFIC TARGETS FOR HUMAN HEALTH AND ENVIRONMENTALLY SUSTAINABLE FOOD PRODUCTION
Goal 1 – Achieving the SDGs by 2030

1. No Poverty
2. No Hunger
3. Good Health
4. Quality Education
5. Gender Equality
6. Clean Water and Sanitation
7. Renewable Energy
8. Good Jobs and Economic Growth
9. Innovation and Infrastructure
10. Reduced Inequalities
11. Sustainable Cities and Communities
12. Responsible Consumption
13. Climate Action
14. Life Below Water
15. Life on Land
16. Peace and Justice
17. Partnerships for the Goals
Goal 2 – Achieving Paris Agreement by 2050
Two Ends of the Food System
Scientific Targets Key to Paris

A global carbon law and roadmap to make Paris goals a reality

Decarbonization pathway consistent with the Paris agreement

Annual global CO₂ emissions (GtCO₂/yr)

Cumulative global anthropogenic CO₂ emissions from 2017 onward (GtCO₂)

Limiting warming below 2°C with 66% probability

Limiting warming below 1.5°C with 50% probability

Human carbon sinks

Biosphere carbon sinks
Scientific Targets for Healthy Diets

Human boundaries for:

1) Whole grains
2) Vegetables
3) Fruits
4) Proteins
5) Dairy
6) Added Fat
Scientific Targets for Sustainable Food Systems

Planetary boundaries for:

1) GHG emissions
2) Water used
3) Nitrogen flows
4) Phosphorus flows
5) Biodiversity lost
6) Land converted
A Safe Operating Space for Food Systems
Achieving “Win-Win” Diets
Options for keeping the food system within environmental limits

Marco Springmann, Michael Clark, Daniel Mason-D’Croz, Keith Wiebe, Benjamin Leon Bodirsky, Luis Lassaletta, Wim de Vries, Sonja J. Vermeulen, Mario Herrero, Kimberly M. Carlson, Malin Jonell, Max Troell, Fabrice DeClerck, Line J. Gordon, Rami Zurayk, Peter Scarborough, Mike Rayner, Brent Loken, Jess Fanzo, H. Charles J. Godfray, David Tilman, Johan Rockström, & Walter Willett

The food system is a major driver of climate change, changes in land use, depletion of freshwater resources, and pollution of aquatic and terrestrial ecosystems through excessive nitrogen and phosphorus inputs. Here we show that between 2010 and 2050, as a result of expected changes in population and income levels, the environmental effects of the food system could increase by 50–90%. In the absence of technological changes and dedicated mitigation measures, reaching levels that are beyond the planetary boundaries that define a safe operating space for humanity. We analyse several options for reducing the environmental effects of the food system, including dietary changes towards healthier, more plant-based diets, improvements in technologies and management, and reductions in food loss and waste. We find that no single measure is enough to keep these effects within all planetary boundaries simultaneously, and that a synergistic combination of measures will be needed to sufficiently mitigate the projected increase in environmental pressures.
Strategy 1 - Dietary Shift

Guidelines – Dietary shifts toward global dietary guidelines, including max red meat intake of 300 g/week and sugar (5% of energy intake) and minimum intakes of fruits and vegetables (five servings per day).

Flexitarian – Dietary shifts towards more plant-based dietary patterns based on recent evidence of healthy eating. This includes approximately 100 g/week of red meat, limits for white meat (29 g/day) and greater amounts of legumes, nuts, and vegetables.

Springmann et al. 2018
<table>
<thead>
<tr>
<th>Food item</th>
<th>minimum level</th>
<th>maximum level</th>
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<tbody>
<tr>
<td></td>
<td>g/d</td>
<td>serving</td>
</tr>
<tr>
<td>wheat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>rice</td>
<td></td>
<td></td>
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<tr>
<td>maize</td>
<td></td>
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<tr>
<td>other grains roots</td>
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<td></td>
</tr>
<tr>
<td>legumes</td>
<td>50</td>
<td>1/2</td>
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<tr>
<td>soybeans</td>
<td>25</td>
<td>1/4</td>
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<tr>
<td>nuts &amp; seeds</td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>vegetables</td>
<td>300</td>
<td>3-4</td>
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<tr>
<td>fruits</td>
<td>200</td>
<td>2-3</td>
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<tr>
<td>sugar</td>
<td>31</td>
<td>5% of energy</td>
</tr>
<tr>
<td>palm oil</td>
<td>6.8</td>
<td>1</td>
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<tr>
<td>vegetable oil</td>
<td>80</td>
<td>1/3 of energy</td>
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<tr>
<td>beef</td>
<td></td>
<td>A total of 14 g/d for all red meat</td>
</tr>
<tr>
<td>lamb</td>
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<td>1/7</td>
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<tr>
<td>pork</td>
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<td></td>
</tr>
<tr>
<td>poultry</td>
<td>29</td>
<td>1/2</td>
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<tr>
<td>eggs</td>
<td>13</td>
<td>1/5</td>
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<tr>
<td>milk</td>
<td>250</td>
<td>1</td>
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<tr>
<td>shellfish</td>
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</tr>
<tr>
<td>fish (freshwater)</td>
<td></td>
<td>A total of 28 g/d for all fish and seafood</td>
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<tr>
<td>fish (demersal)</td>
<td></td>
<td>1/2</td>
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<tr>
<td>fish (pelagic)</td>
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Strategy 2 – Improved Production of Food

**Tech** – Closing yield gaps, rebalancing nitrogen and phosphorus use, improving water management, and implementing mitigation strategies that are economic at the projected social cost of carbon.

**Tech +** – Additional measures on top of Tech measures.
Strategy 3 – Reduce Food Loss and Waste

Reduced by half – In line with pledges as part of SDGs.

Reduced by three quarters – Close to maximum value of that can be theoretically achieved.
How to Achieve “Win-Win” Diets
How to Achieve “Win-Win” Diets

Legend:
- Baseline
- Waste/2
- Waste/4
- Tech
- Tech+
- Guidelines
- Flexitarian
- Combination (medium)
- Combination (high)
- Boundary
How to Achieve “Win-Win” Diets

Springmann et al. 2018
Health Impacts of Flexitarian Diet

Springmann et al. 2018

Reduction in premature mortality
Planetary Health

“health of human civilization and the state of the natural systems on which it depends”
Mostly Plants
Real Food
Just Enough – Waste None