FOOD AND SUSTAINABILITY:

What we can learn from Earth's 'planetary boundaries'

Isaac Emery, PhD

Founder, Informed Sustainability Consulting

Vegetarian Nutrition
a dietetic practice group of the Academy of Nutrition and Dietetics
Experts in Plant-Based Nutrition

Hunger and Environmental Nutrition
a dietetic practice group of the Academy of Nutrition and Dietetics

WELCOME

Elizabeth Osorno, MD, MS, RDN

Webinar Chair

Vegetarian Nutrition
Dietetic Practice Group

Naima Sullivan, MS, RD, LDN

Webinar Chair

Hunger and Environmental Nutrition
Dietetic Practice Group

HUNGER AND ENVIRONMENTAL NUTRITION DIETETIC PRACTICE GROUP

HEN VISION

Optimize the nation's health by promoting access to nutritious food and clean water from a secure and sustainable food system.

HEN MISSION

Empower members to be leaders in sustainable and accessible food and water systems.

SUSTAINABILITY

HEN defines sustainability as: "A sustainable and resilient food system [that] conserves and renews natural resources, advances social justice and animal welfare, builds community wealth, and fulfills the food and nutrition needs of all eaters now and in the future."

(Harmon A. & Tagtow A., 2008)

VEGETARIAN NUTRITION DIETETIC PRACTICE GROUP

VN VISION

Promote global health and well being by developing influential policy, comprehensive education, and supporting cutting edge research.

VN MISSION

Serve as the leading authority on evidence-based vegetarian nutrition for health professionals and the public.

SUSTAINABILITY

VN defines sustainability based on The Food and Agriculture Organization of the United Nations: Sustainable Diets are those diets with low environmental impacts that contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources. **According to AND's Veg Position Paper:** *"Plant-based diets are more environmentally sustainable than diets rich in animal products because they use fewer natural resources and are associated with much less environmental damage."*

LEARNING OBJECTIVES

At the end of this webinar, attendees will be able to describe:

1. What are the “planetary boundaries” and how can we use them to define ‘sustainability’ and sustainable diets?
2. How does our food system contribute to the planetary boundaries?
3. What are the biggest differences between food groups from an environmental perspective?

PRESENTER

Isaac Emery PhD

Founder

Informed Sustainability Consulting

ISAAC EMERY

HEN + VN WEBINAR SERIES

10/29/2020

Food and Sustainability

What we can learn from Earth's 'planetary boundaries'?

Isaac Emery, PhD

Informed Sustainability Consulting

Discover your ecological advantage

Metrics-based sustainability

- Environmental footprint of products
- Identify opportunities to reduce impact
- Accurately communicate benefits

Topics

- What are Earth's *planetary boundaries*?
- What are the environmental impacts of foods?
- From food to diet: how can we eat sustainably?

On Sustainability

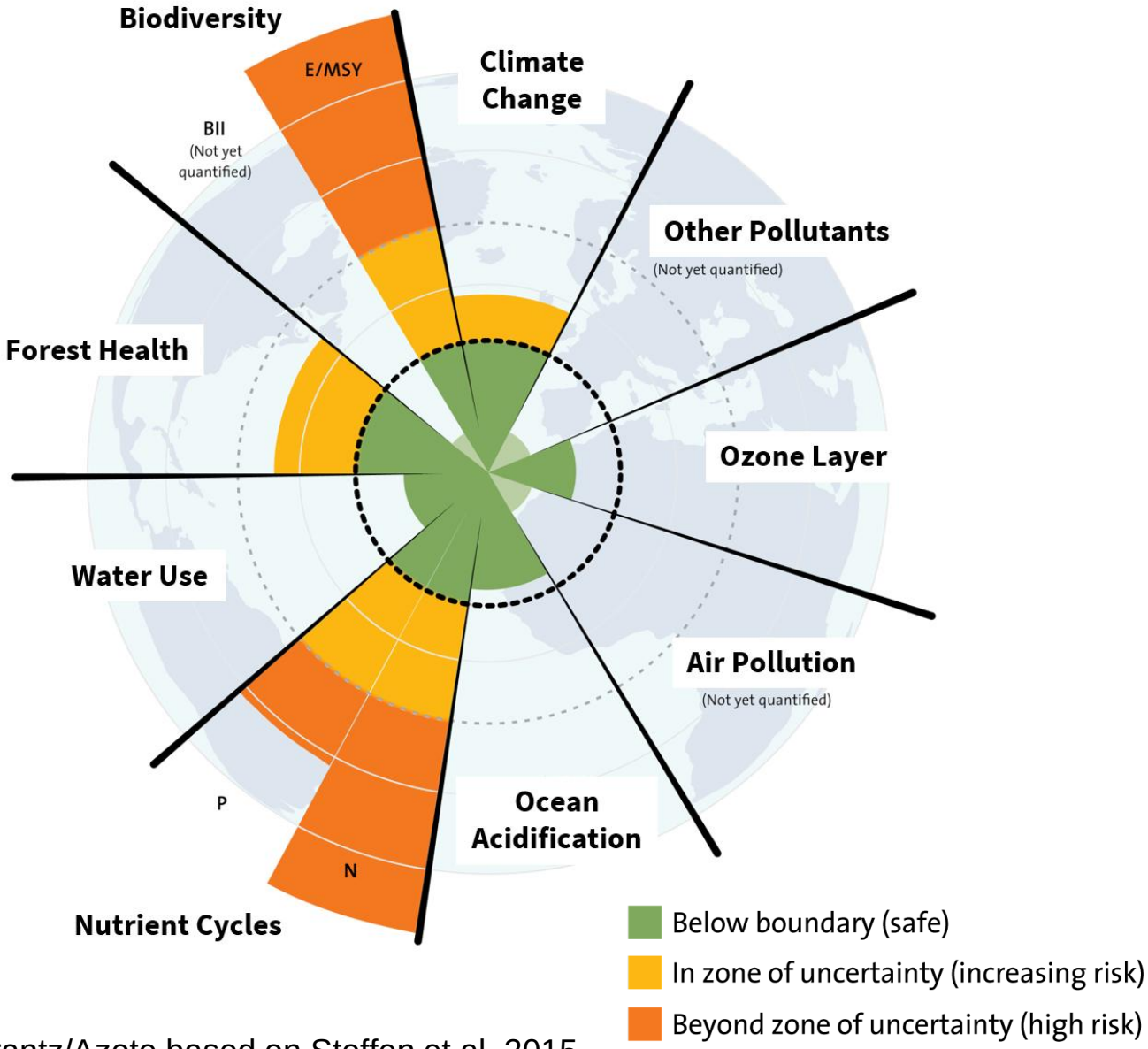
“Sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs.”

- Our Common Future (Brundtland Commission, 1987)

- Whose needs? Which needs? And how do we prioritize them?
- How are we limited by the environment? By the state of technology?

Environmental Boundaries: Earth’s Limits

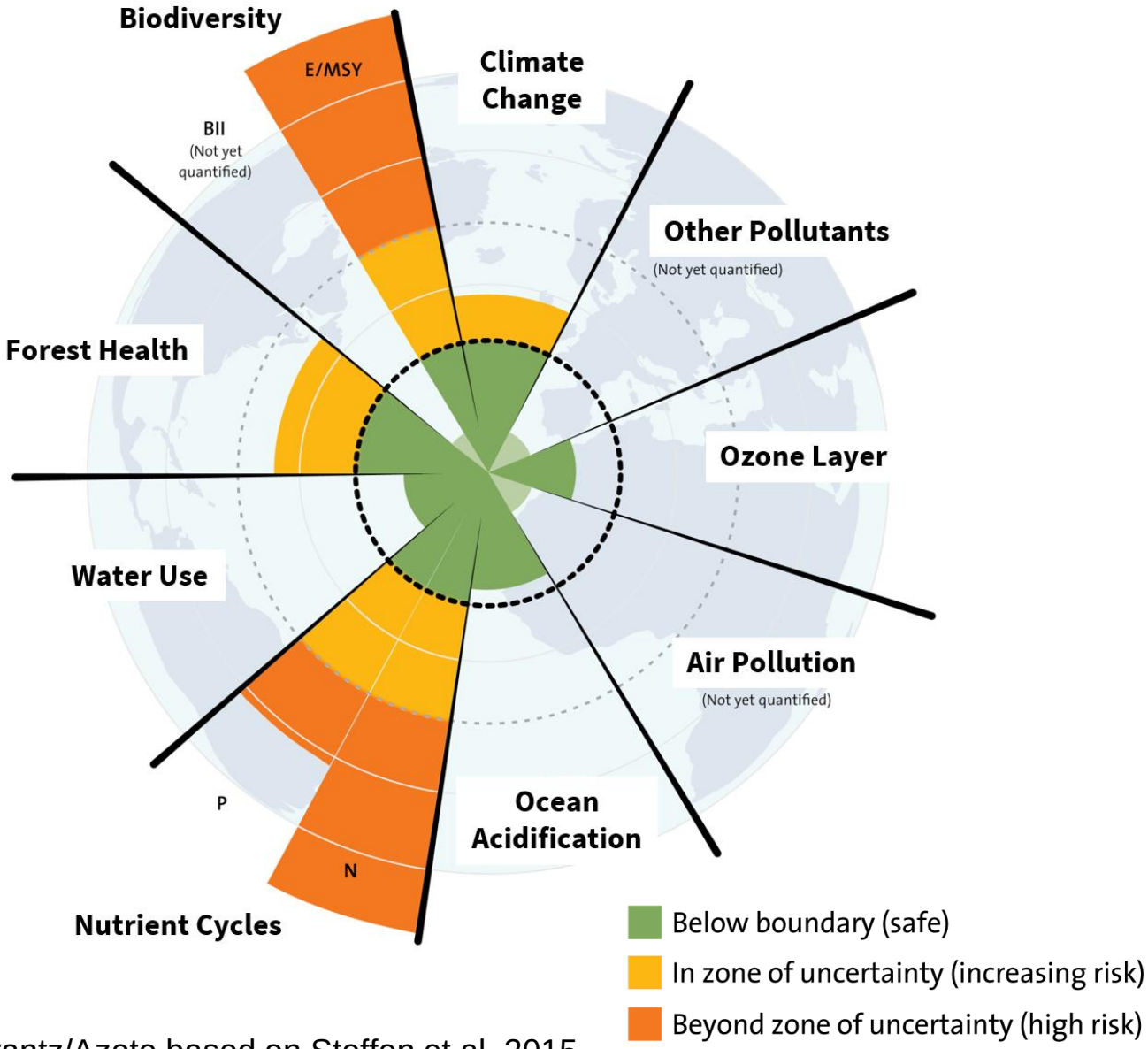
Planetary Boundaries



Credit: J. Lokrantz/Azote based on Steffen et al. 2015
https://www.stockholmresilience.org/research/planetary-boundaries.html

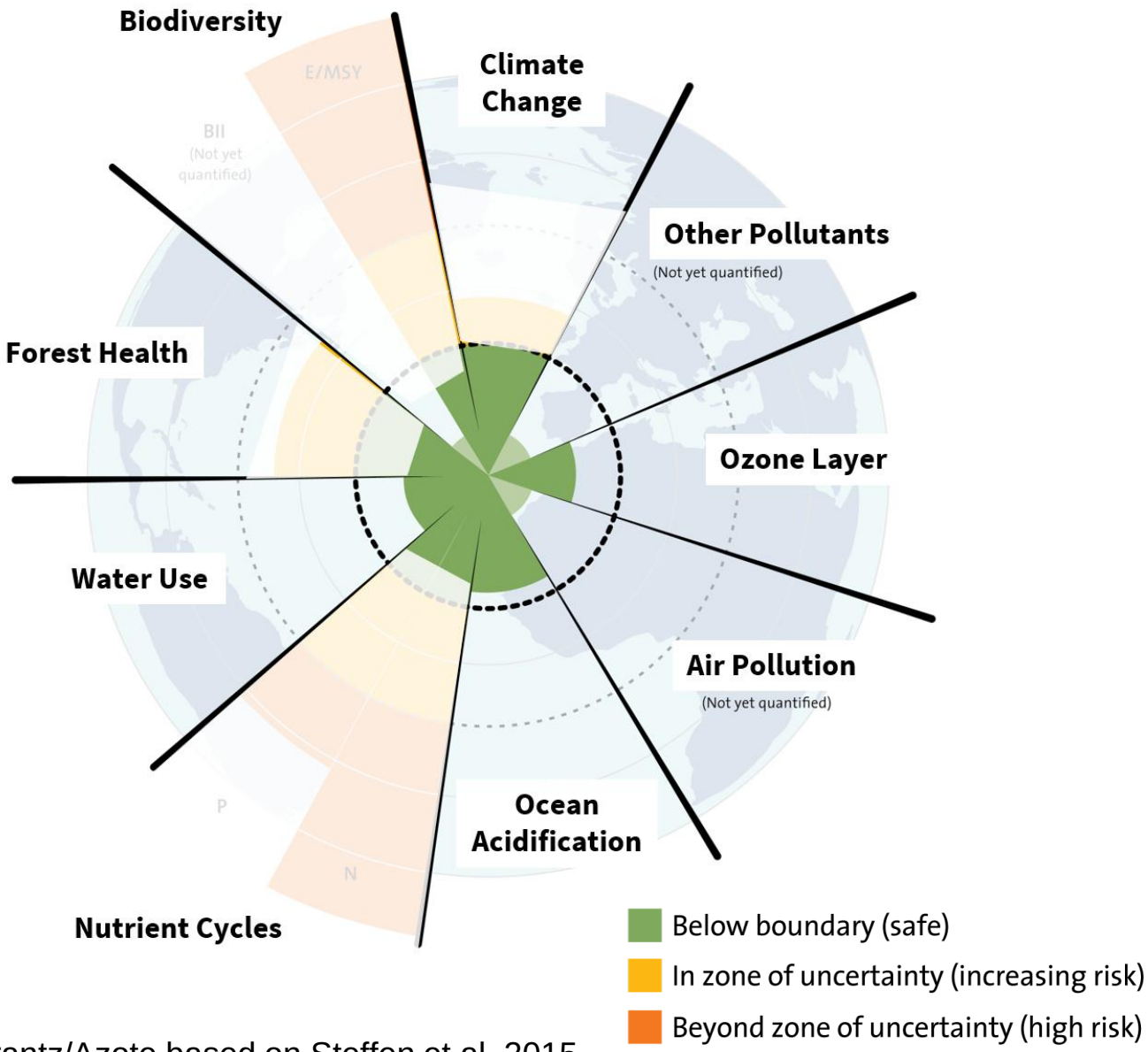
Food’s Environmental Impact

Planetary Boundaries



Credit: J. Lokrantz/Azote based on Steffen et al. 2015
https://www.stockholmresilience.org/research/planetary-boundaries.html

Planetary Boundaries



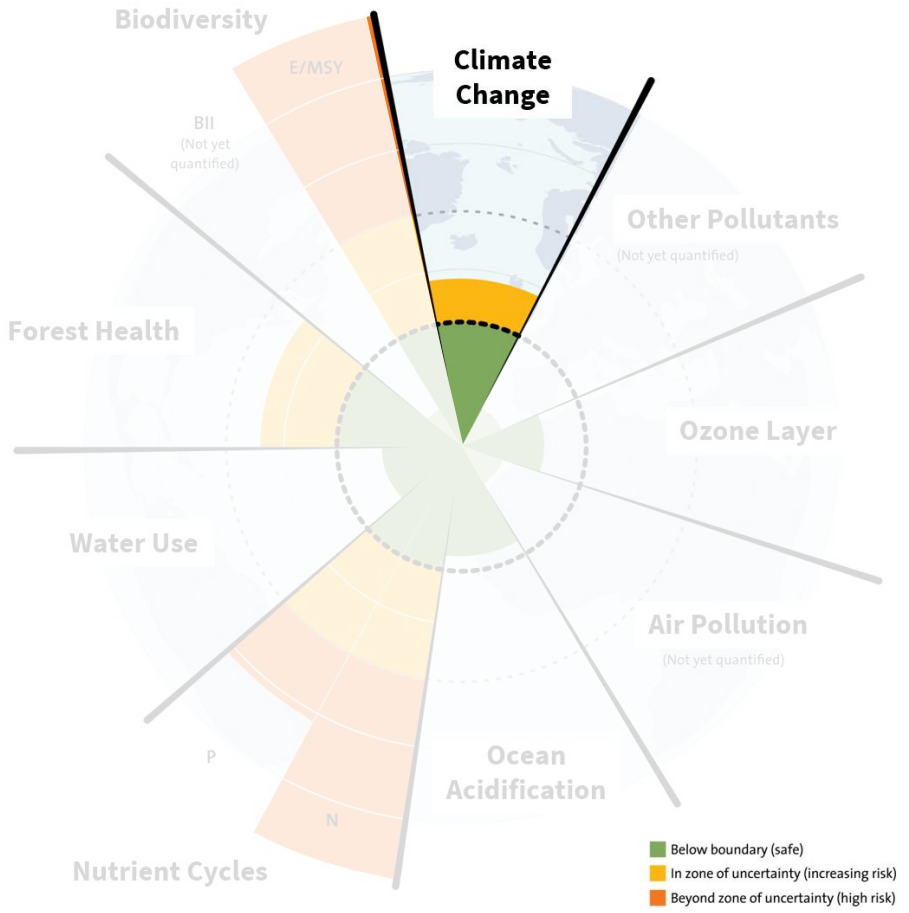
Credit: J. Lokrantz/Azote based on Steffen et al. 2015
https://www.stockholmresilience.org/research/planetary-boundaries.html

Climate Change

"About 21–37% of total greenhouse gas (GHG) emissions are attributable to the food system.

These are from agriculture and land use, storage, transport, packaging, processing, retail, and consumption..."

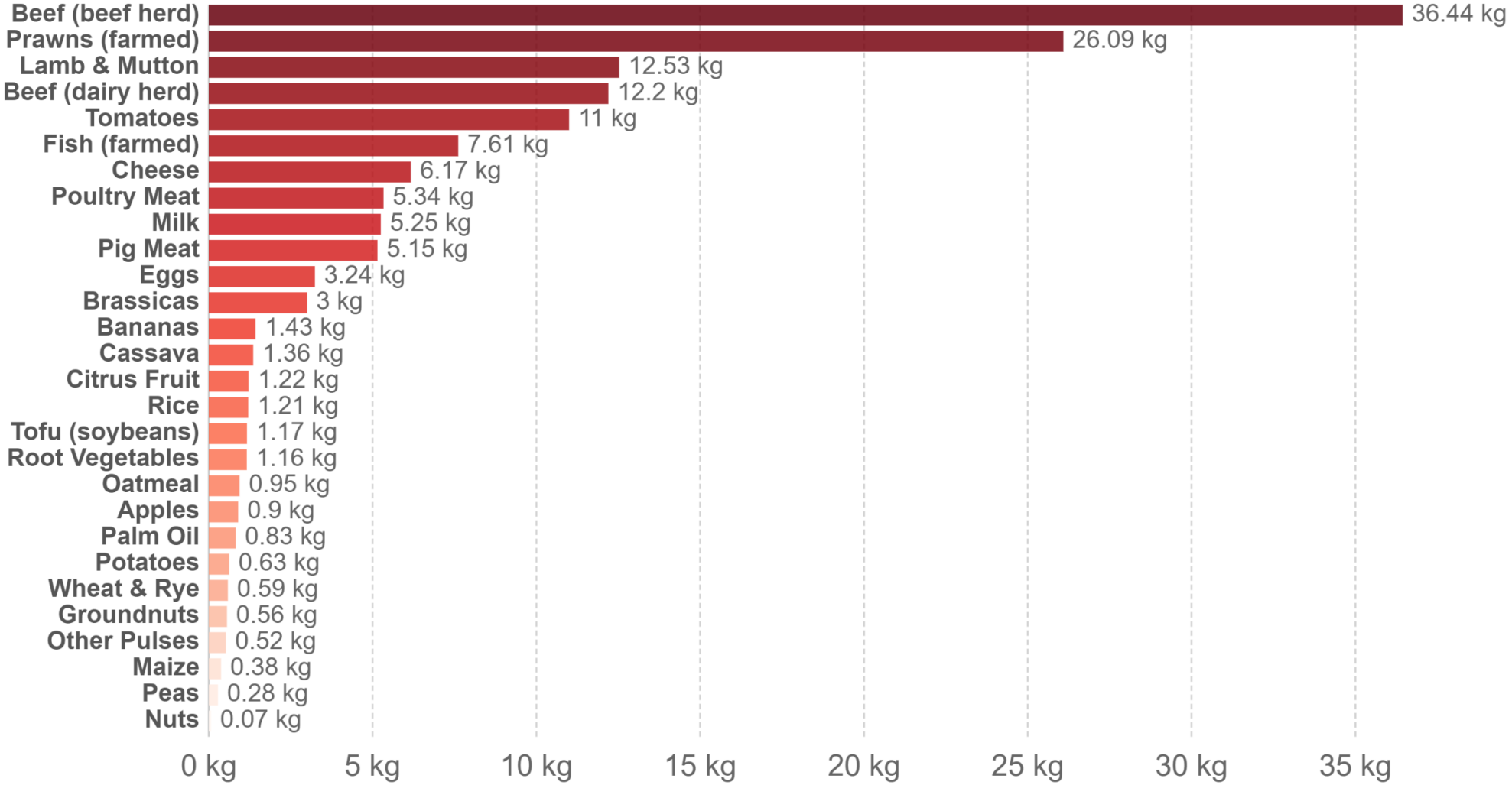
- IPCC Special Report on Climate Change and Land



Greenhouse gas emissions per 1000 kilocalories

Greenhouse gas emissions are measured in kilograms of carbon dioxide equivalents ($kgCO_2eq$) per 1000 kilocalories. This means non-CO_2 greenhouse gases are included and weighted by their relative warming impact.

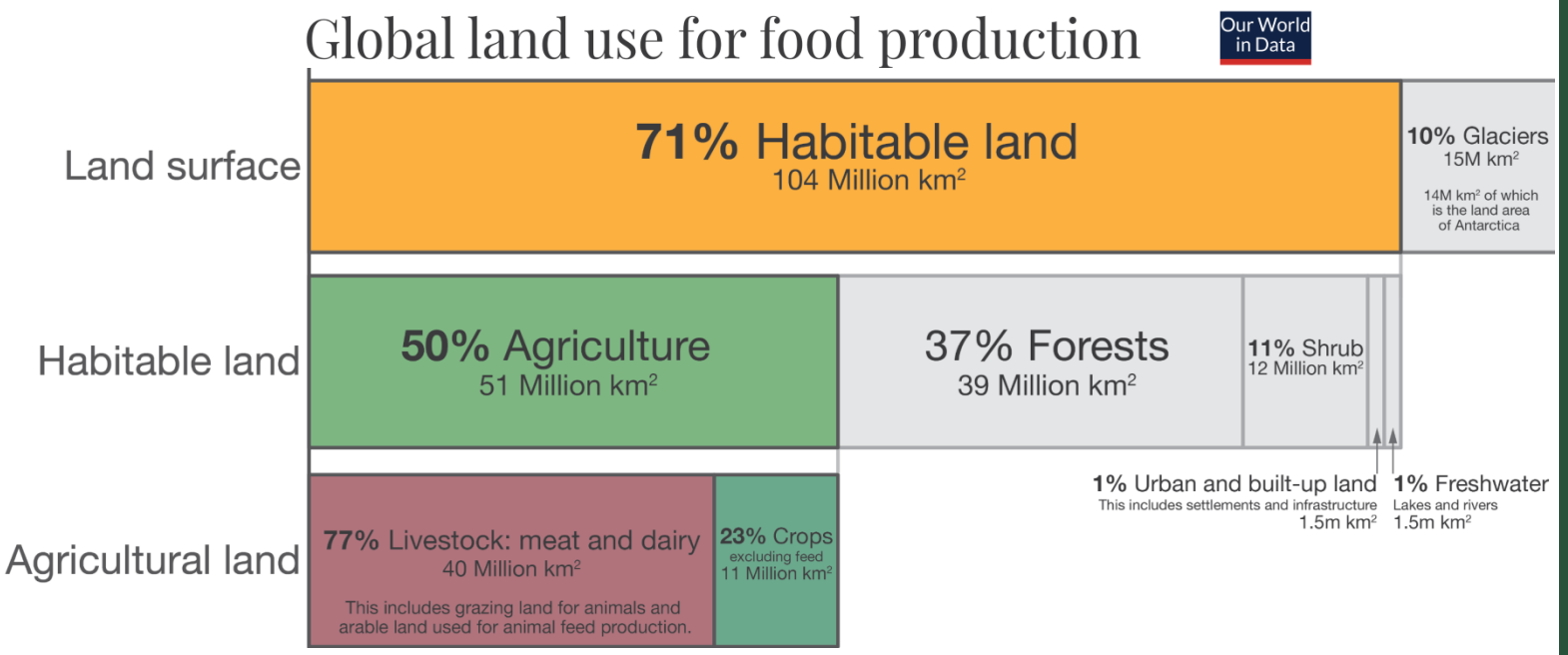
Our World in Data

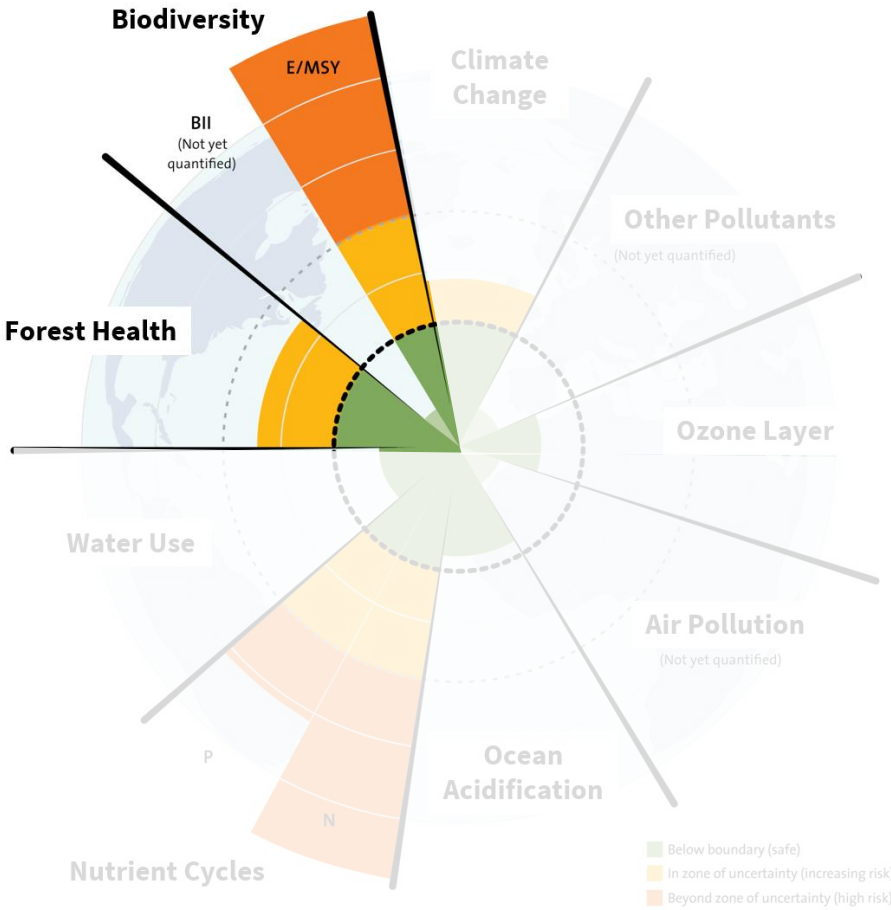


Source: Poore, J., & Nemecek, T. (2018). Additional calculations by Our World in Data.

Note: Data represents the global average greenhouse gas emissions of food products based on a large meta-analysis of food production covering 38,700 commercially viable farms in 119 countries.

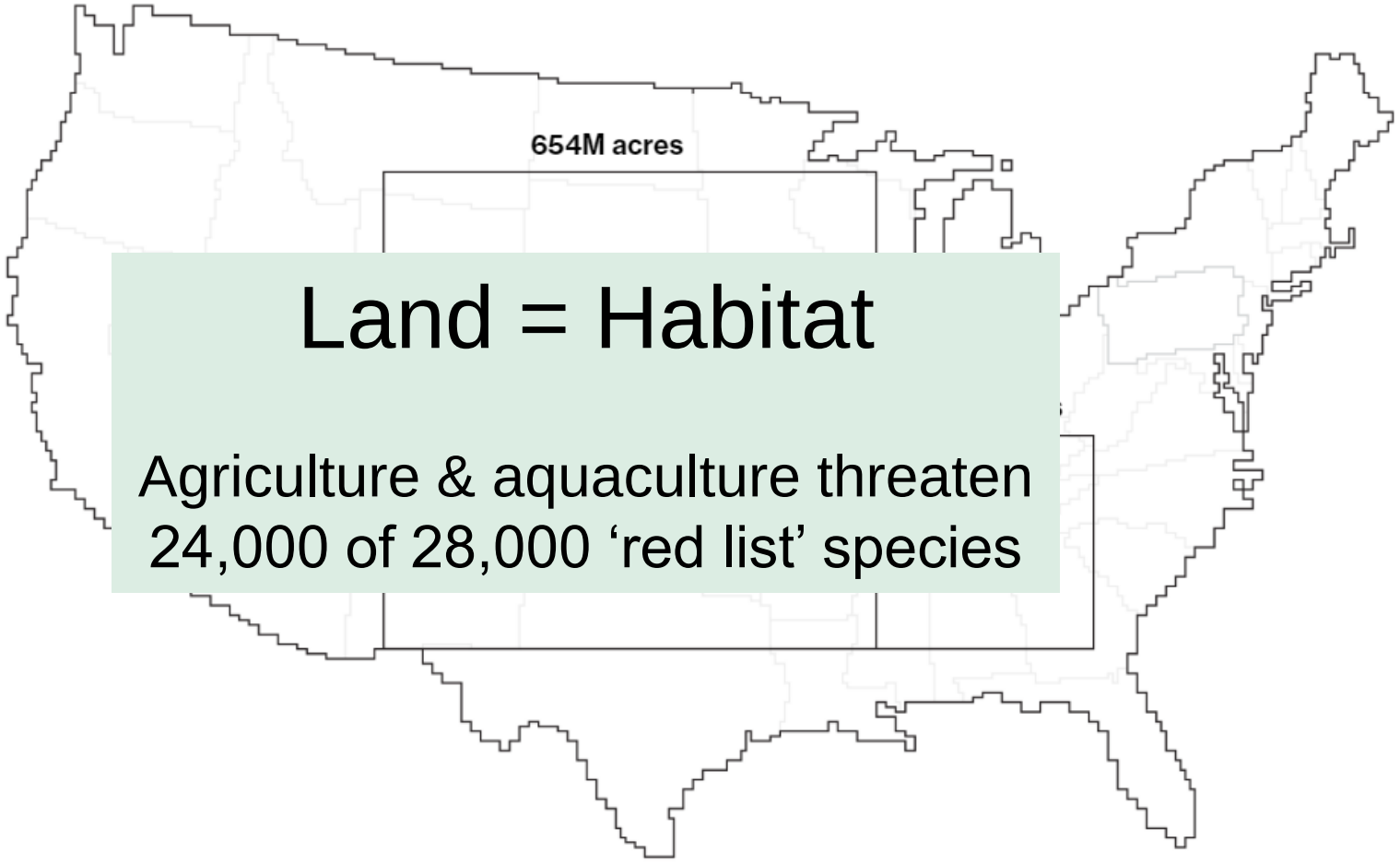
Land Use





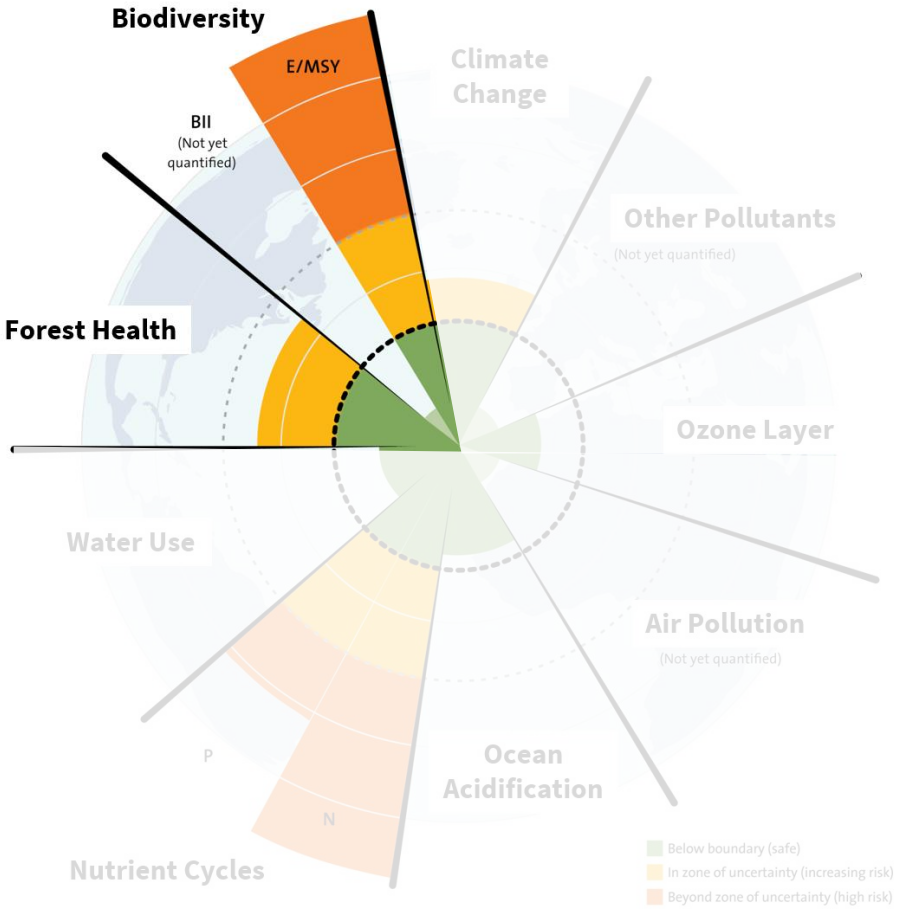
Data source: UN Food and Agriculture Organization (FAO)
OurWorldinData.org – Research and data to make progress against the world's largest problems.

Land Use



Land = Habitat

Agriculture & aquaculture threaten 24,000 of 28,000 ‘red list’ species

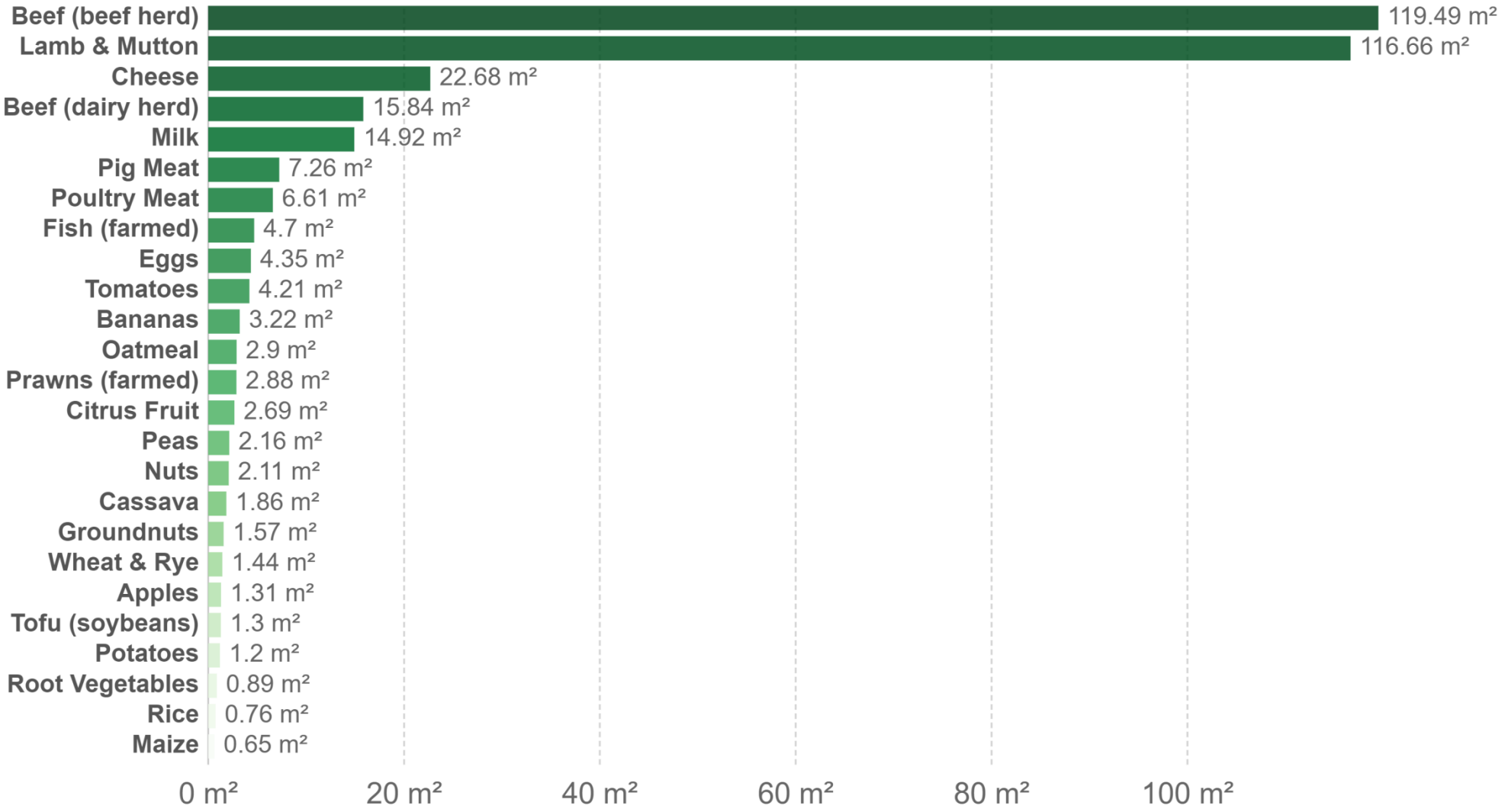


https://www.bloomberg.com/graphics/2018-us-land-use/

Land use of foods per 1000 kilocalories

Land use is measured in meters squared (m²) required to produce 1000 kilocalories of a given food product.

Our World in Data

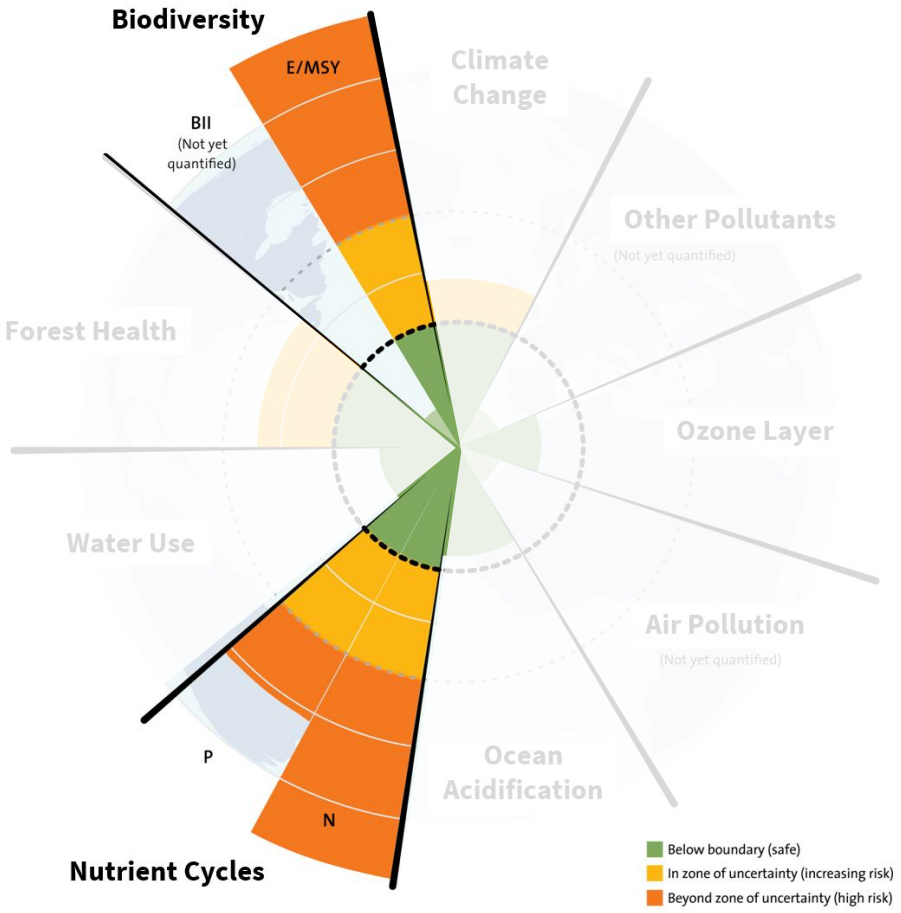


Source: Poore, J., & Nemecek, T. (2018). Additional calculations by Our World in Data.
Note: Data represents the global average land use of food products based on a large meta-analysis of food production covering 38,700 commercially viable farms in 119 countries.

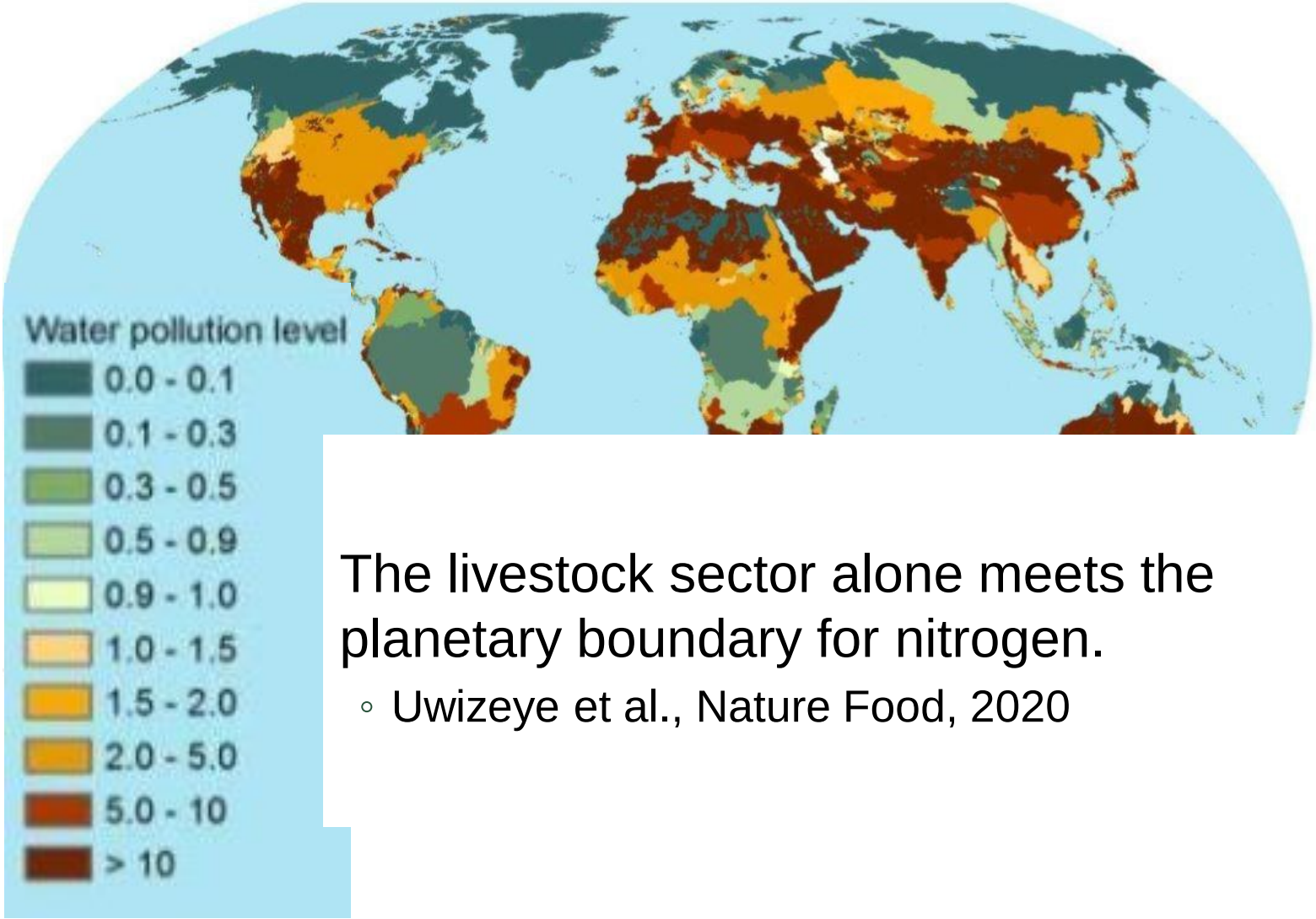
Water = Habitat

Nutrient pollution affects ~90% of U.S. waterways

Nutrient Cycles



Dodds et al. 2008, https://doi.org/10.1021/es801217q

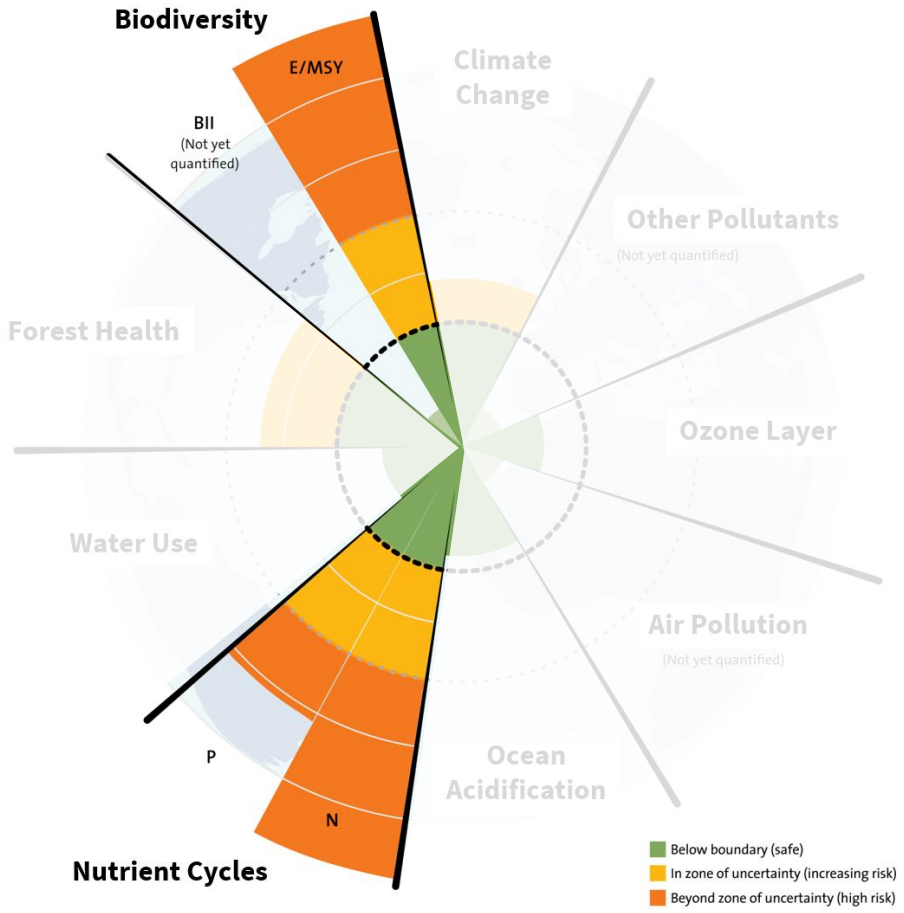


The livestock sector alone meets the planetary boundary for nitrogen.

- Uwizeye et al., Nature Food, 2020

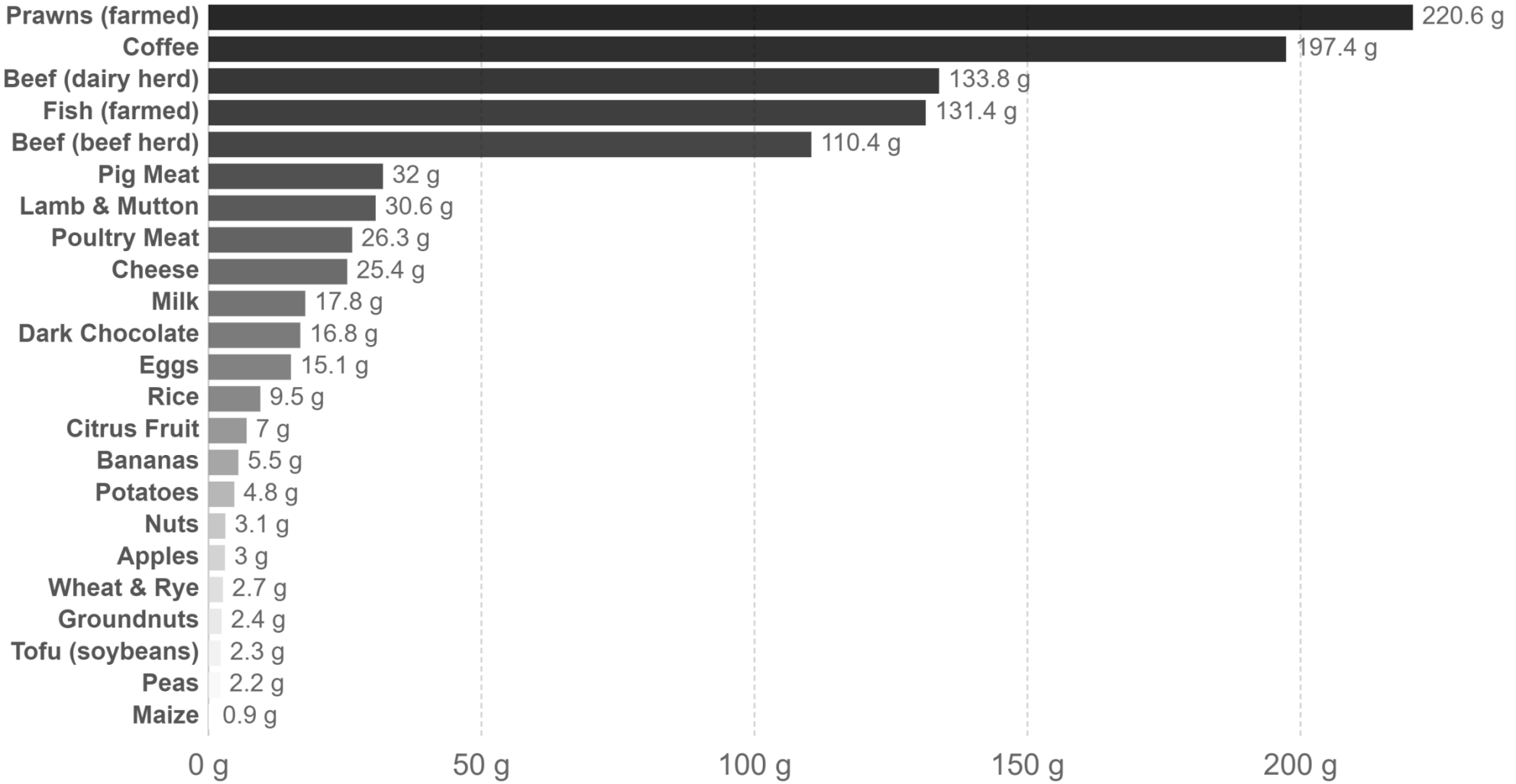
Basins with a WPL above one received more phosphorus than they could assimilate. Credit: Mekonnen et al./WRR/AGU.

Nutrient Cycles



Eutrophying emissions per 1000 kilocalories

Eutrophying emissions represent runoff of excess nutrients into the surrounding environment and waterways, which affect and pollute ecosystems. They are measured in grams of phosphate equivalents (PO_4eq).



Source: Poore, J., & Nemecek, T. (2018). Additional calculations by Our World in Data.
Note: Data represents the global average eutrophying emissions from food products based on a large meta-analysis of food production covering 38,700 commercially viable farms in 119 countries.

Meat consumption is responsible for the top 2 drivers of zoonotic disease.

- UN Environment Program, 2020

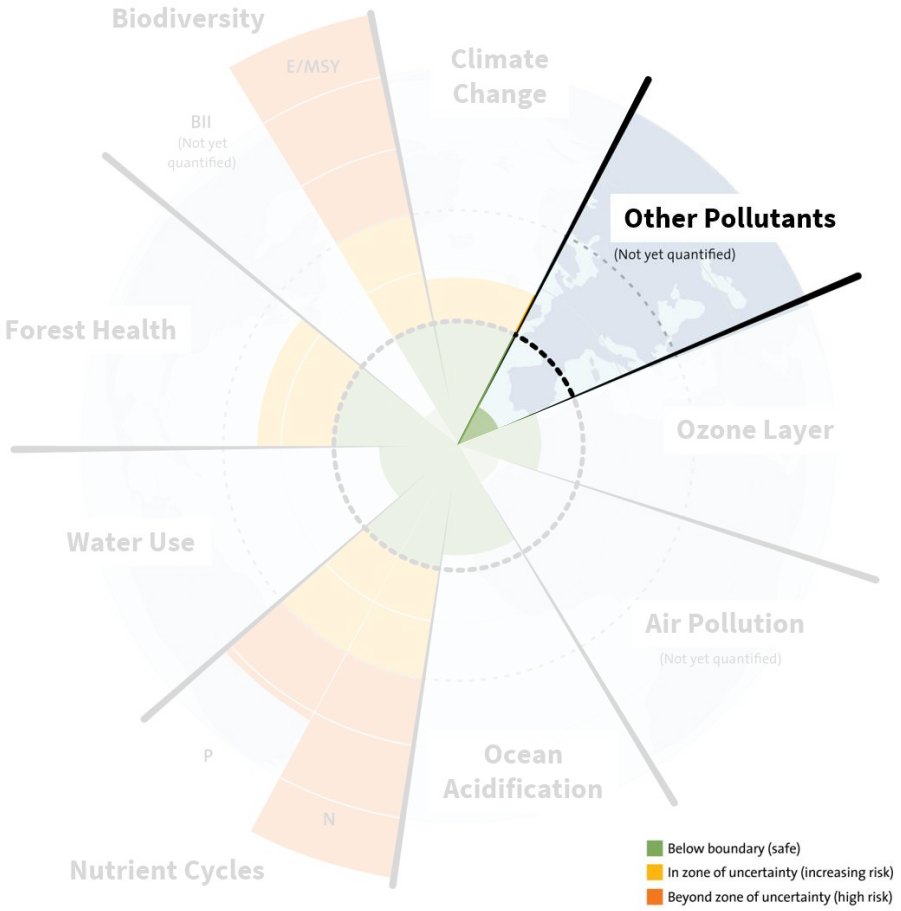
“In the US, for example, of the antibiotics defined as medically important for humans by the FDA, over 70 percent… are sold for use in animals.”

- O’Niell, The Review on Antimicrobial Resistance, 2016

“Without effective antibiotics, even minor surgery and routine operations could become high risk procedures…”

- UK Government

Other Pollutants



Food → Diet

How can we eat sustainably?


HOW YOUR SANDWICH
CHANGED THE WORLD

From Food to Diet

- Footprint (carbon, water, land, nutrient…) of a meal?
  - Add all the ingredients (Bread + lettuce + tomato + mayo + bacon)
- Footprint of one person's diet?
  - That's a lot of ingredients…
- Footprint of a community's diet?
  - TOO MUCH MATH
  - TOO MANY QUESTIONS

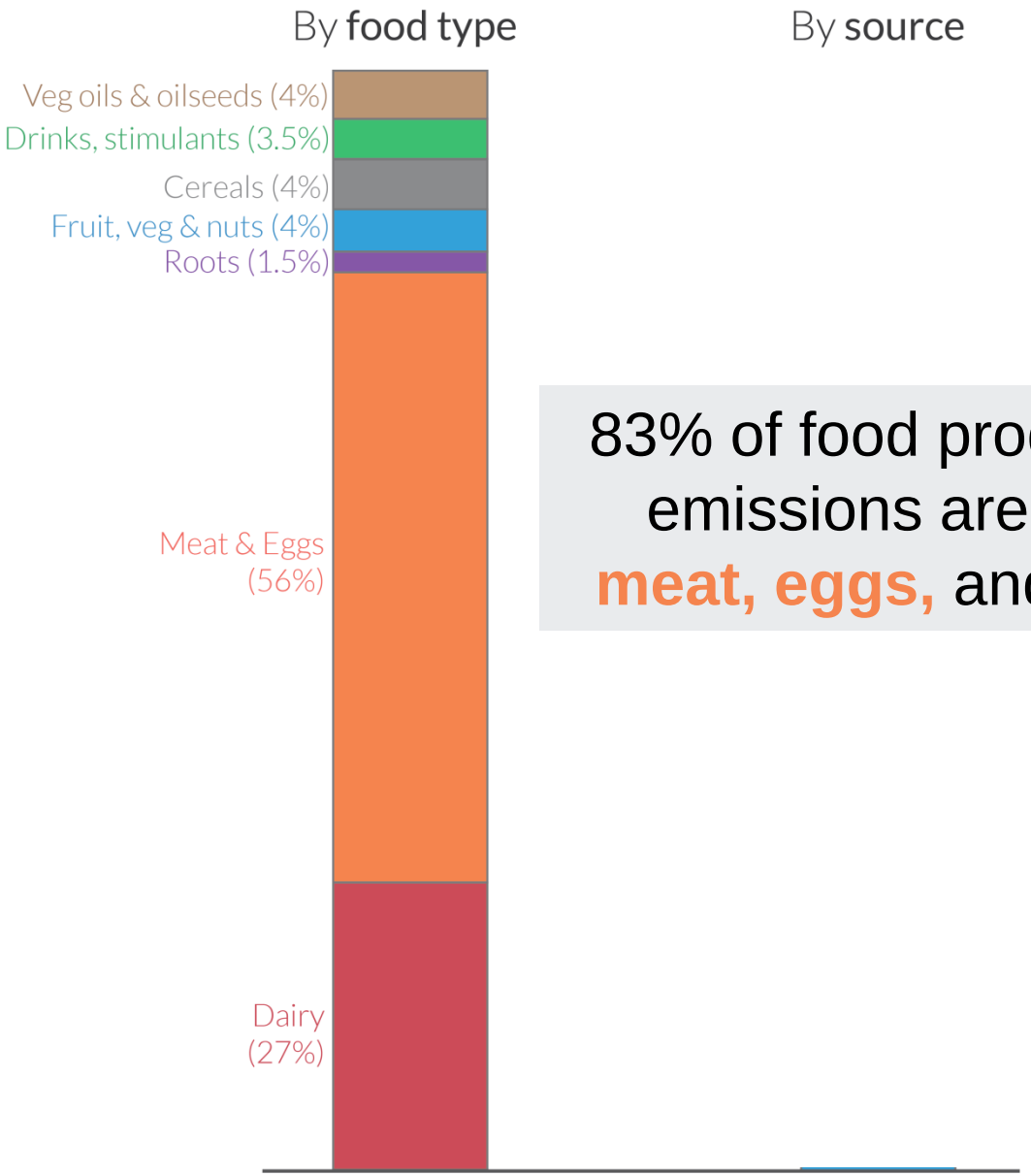
From Food to Diet

- Footprint (carbon, water, land, nutrient…) of a meal?
  - Add all the ingredients (Bread + lettuce + tomato + mayo + bacon)

- Footprint of a community's diet?
  - What do people eat ON AVERAGE?
    - NHANES survey data
    - National consumption estimates
  - What are the eco-impacts of those FOOD TYPES?
    - "Vegetables" "Nuts & seeds" "Dairy products" etc.

Carbon footprint of diets across the European Union: by food type and source

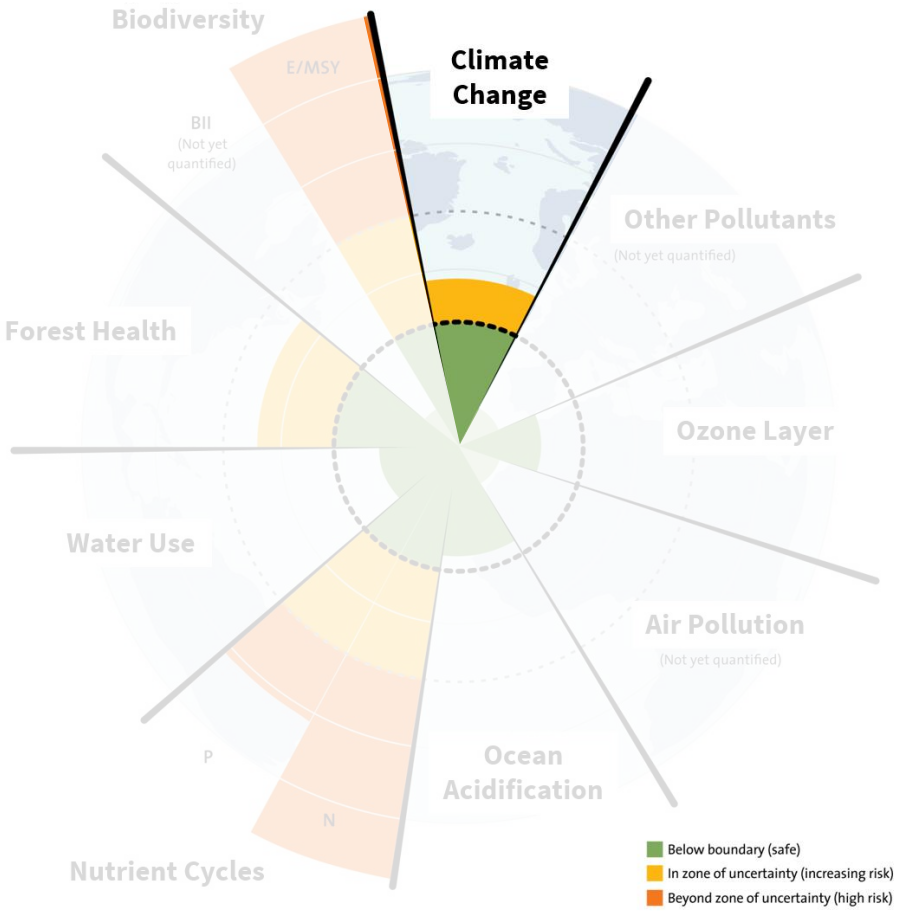
Our World in Data



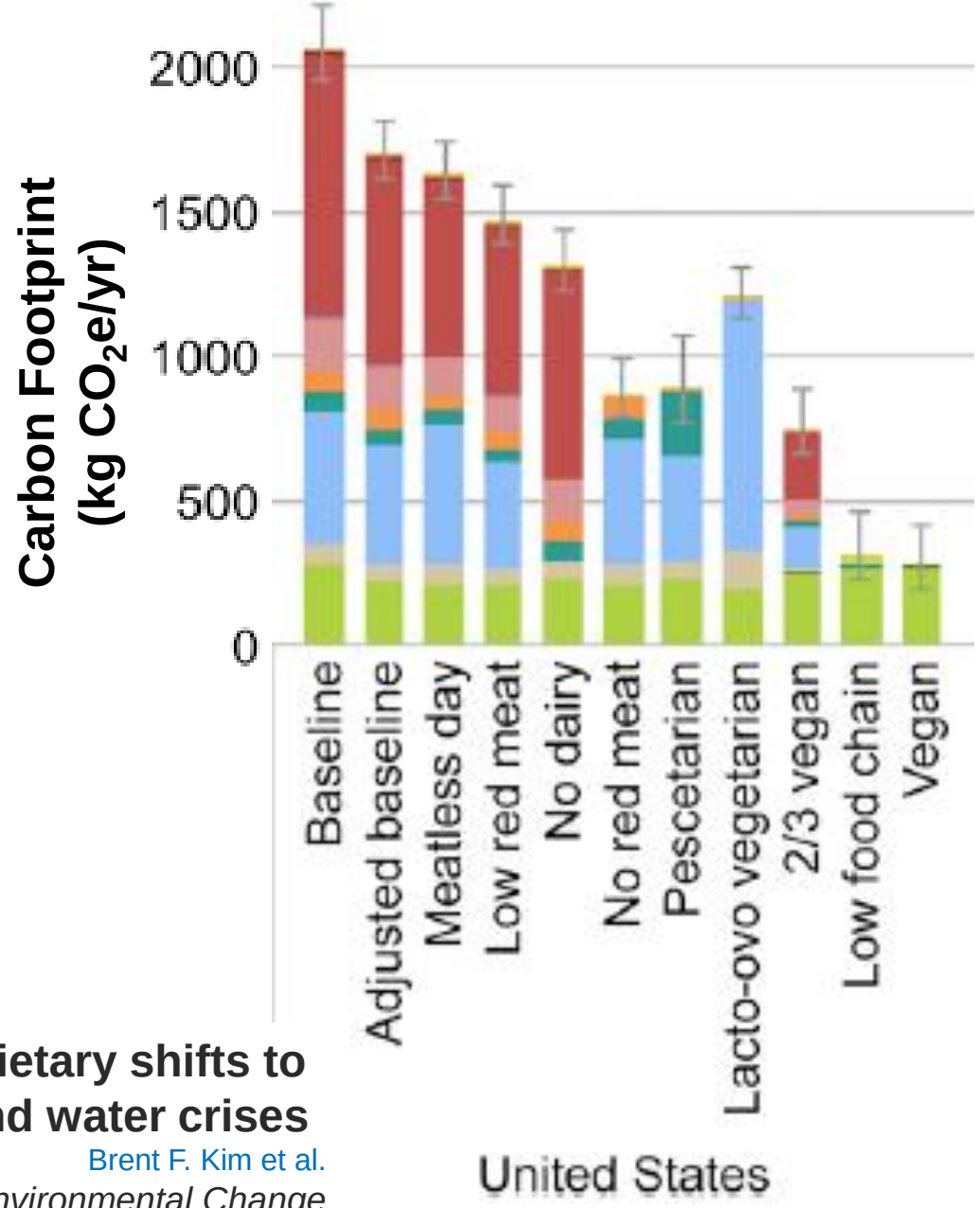
83% of food production emissions are from **meat, eggs,** and **dairy**

Data source: Sandström et al. (2018). The role of trade in the greenhouse gas footprints of EU diets.
OurWorldinData.org – Research and data to make progress against the world's largest problems.

Climate Change



Climate Change

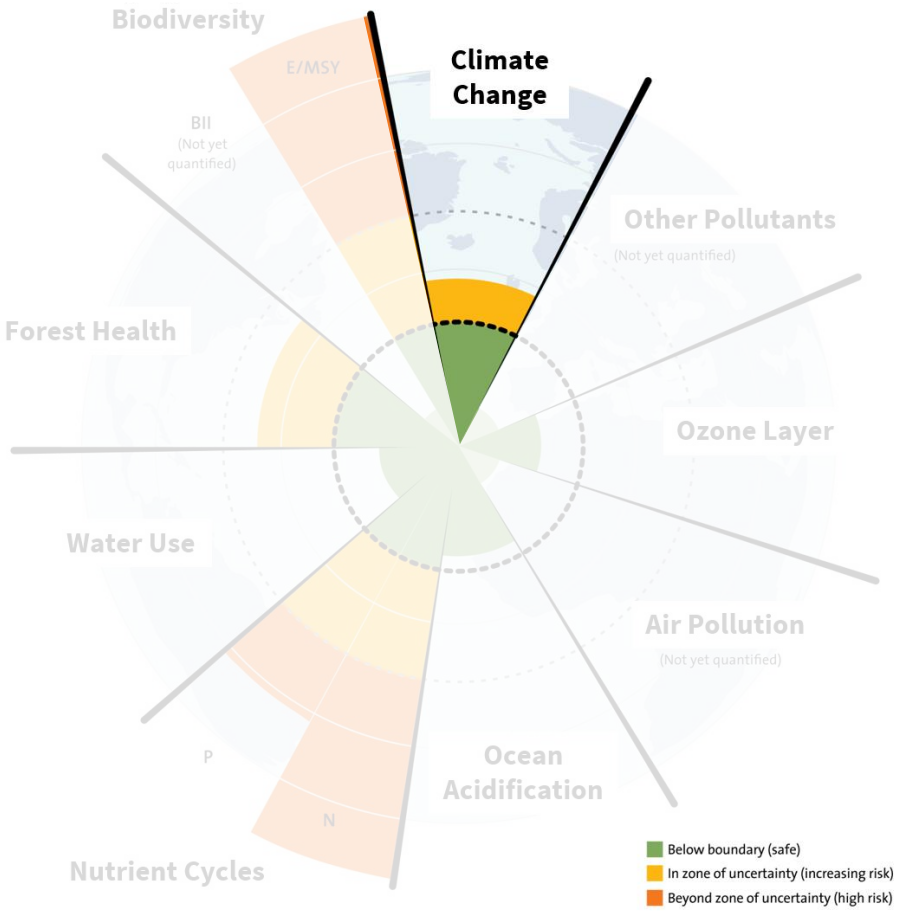


Country-specific dietary shifts to mitigate climate and water crises

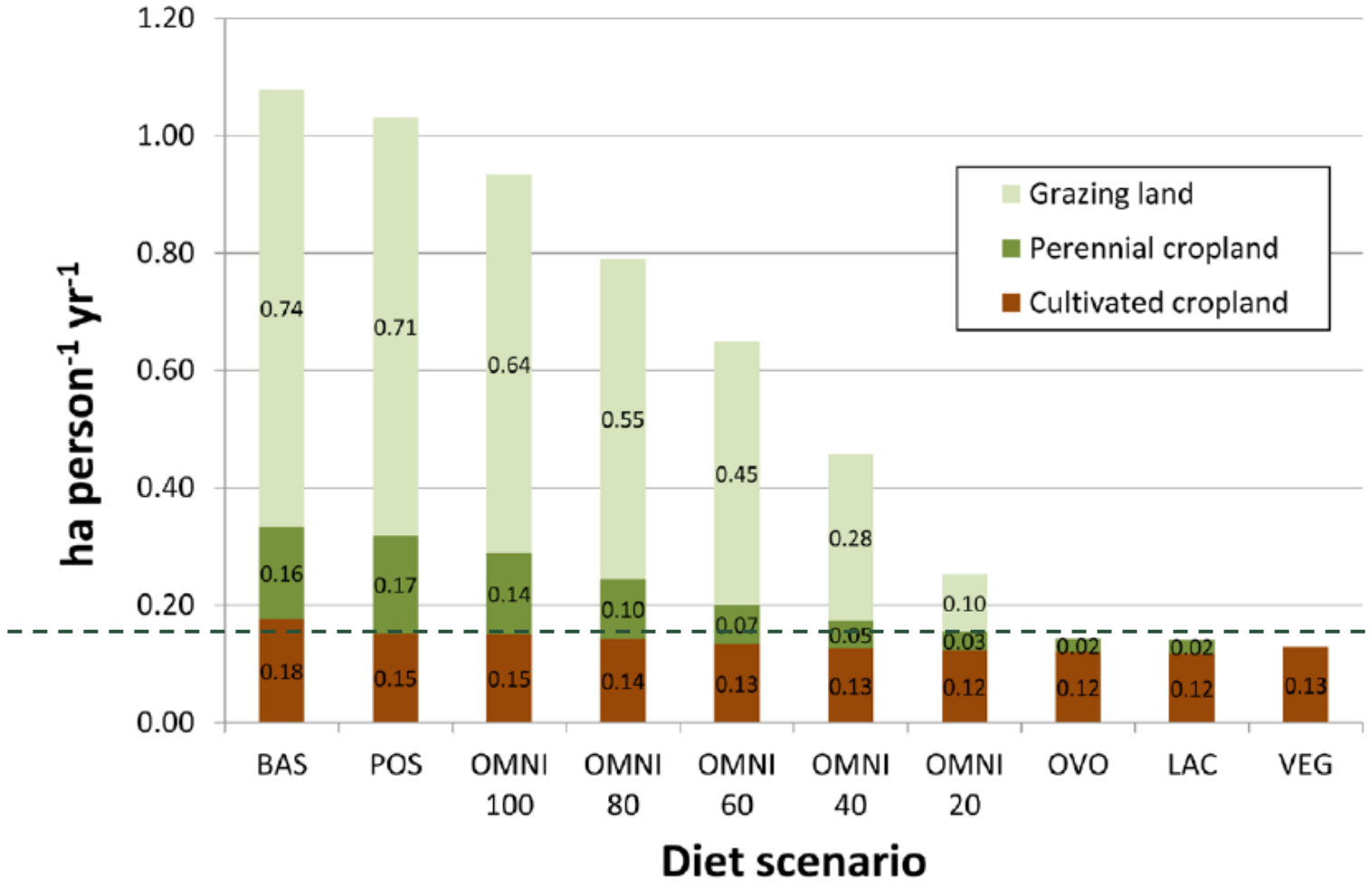
Brent F. Kim et al.

Global Environmental Change

https://doi.org/10.1016/j.gloenvcha.2019.05.0

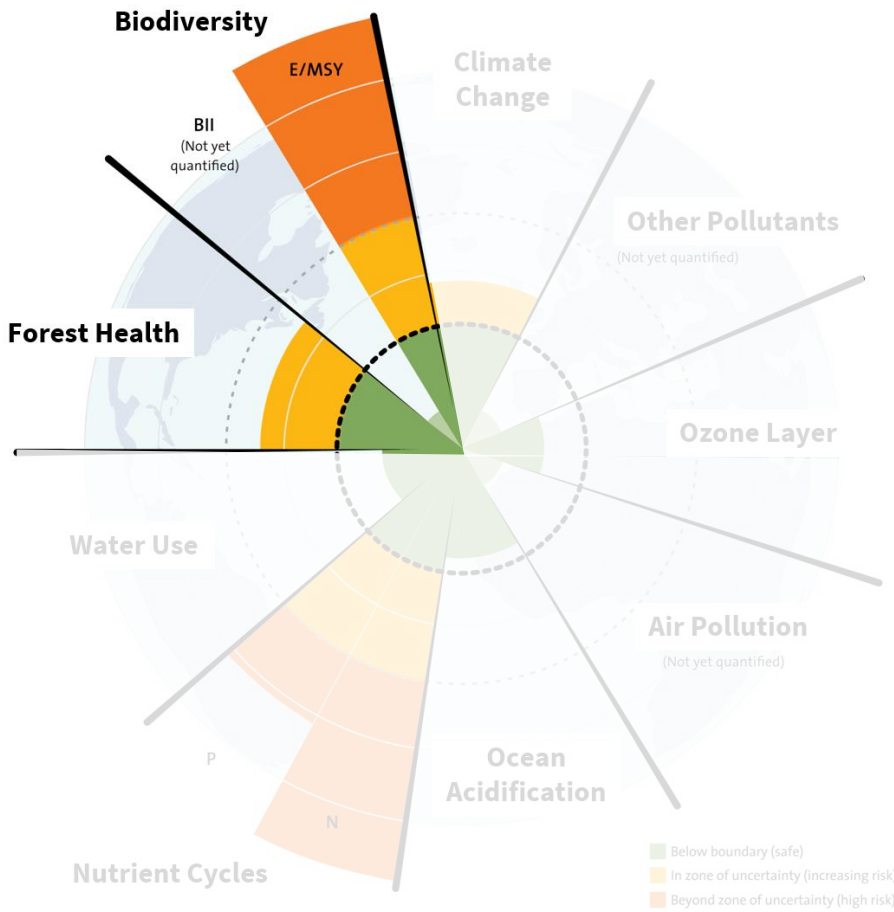


Land Use

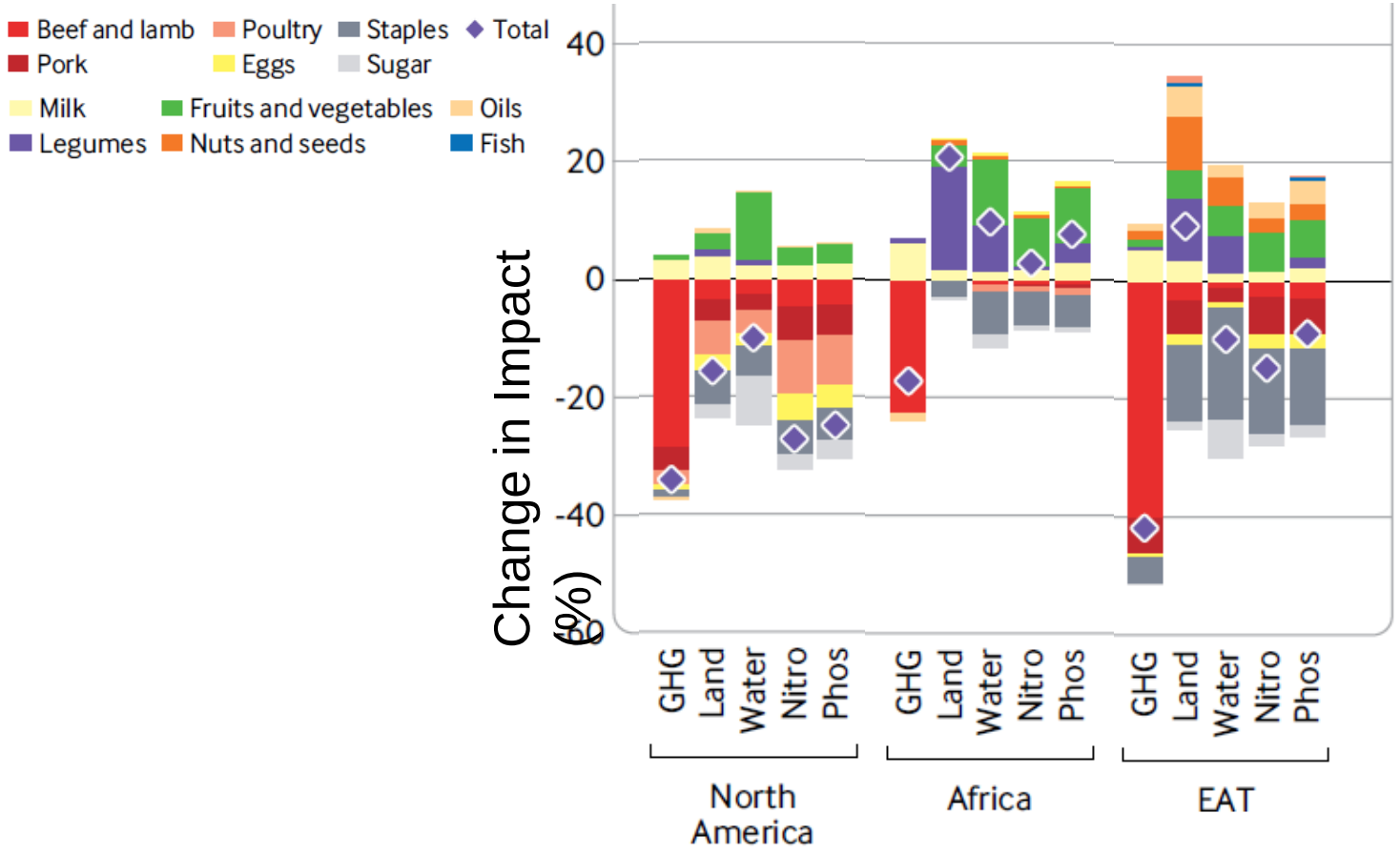


Carrying capacity of U.S. agricultural land: Ten diet scenarios

Christian J. Peters et al.
Elementa



Pulling it all together…

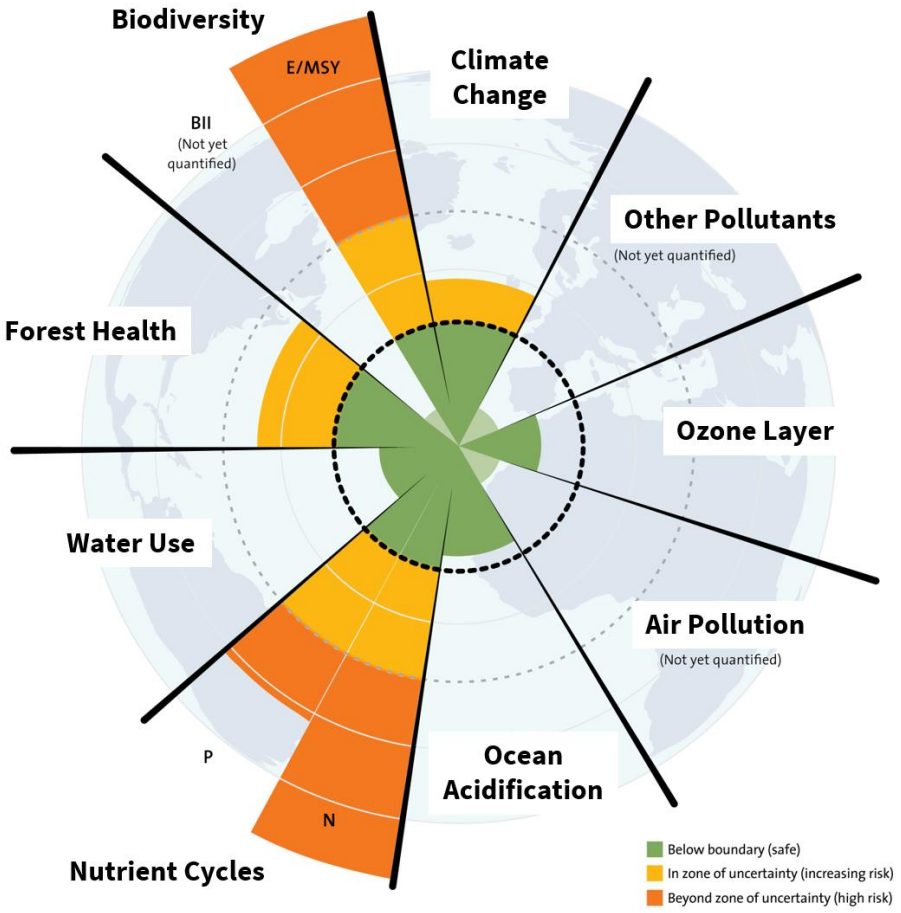


The healthiness and sustainability of national and global food based dietary guidelines: modelling study

Marco Springmann et al.

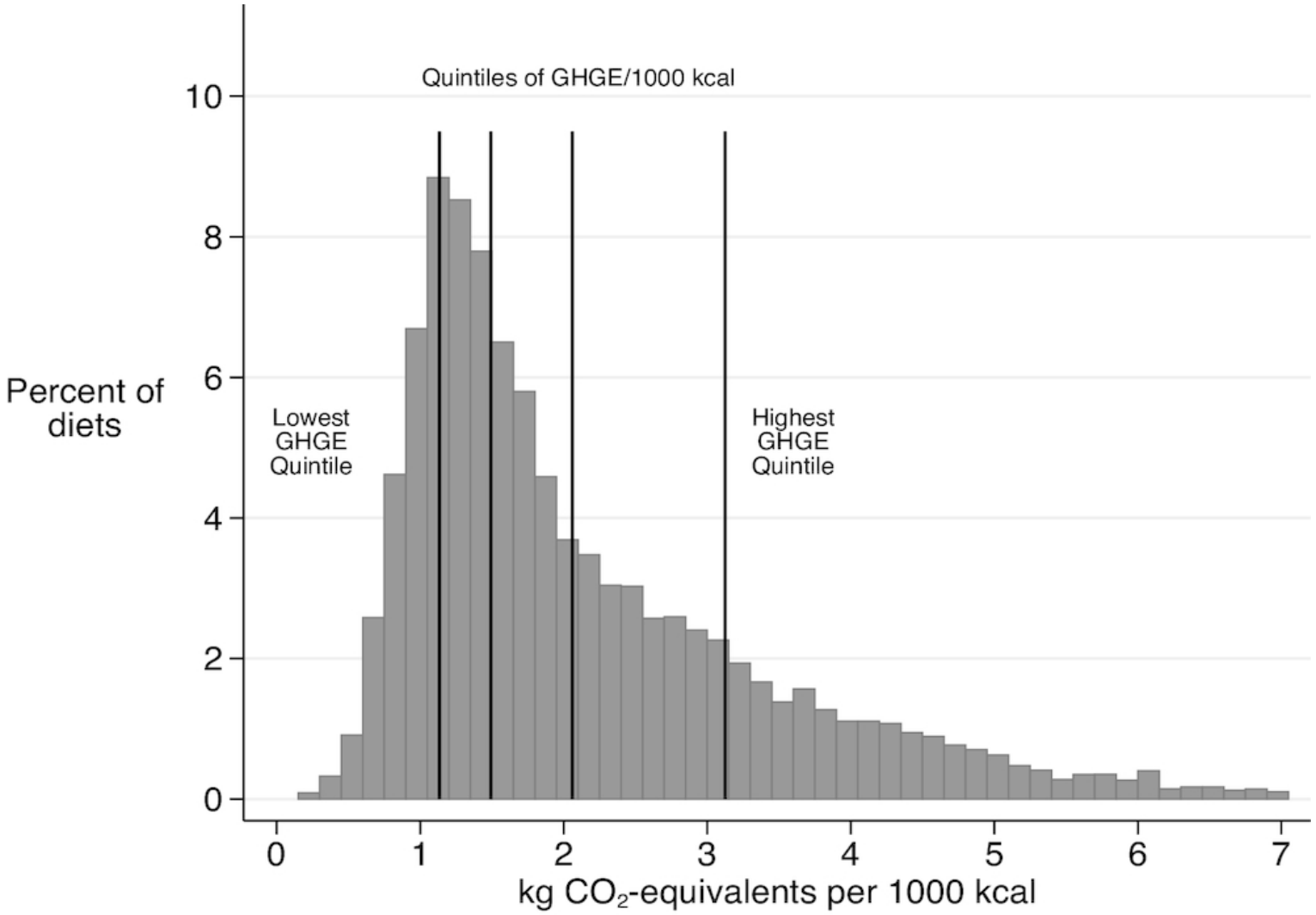
BMJ

Planetary Boundaries



Questions

Please type your questions into the chat box

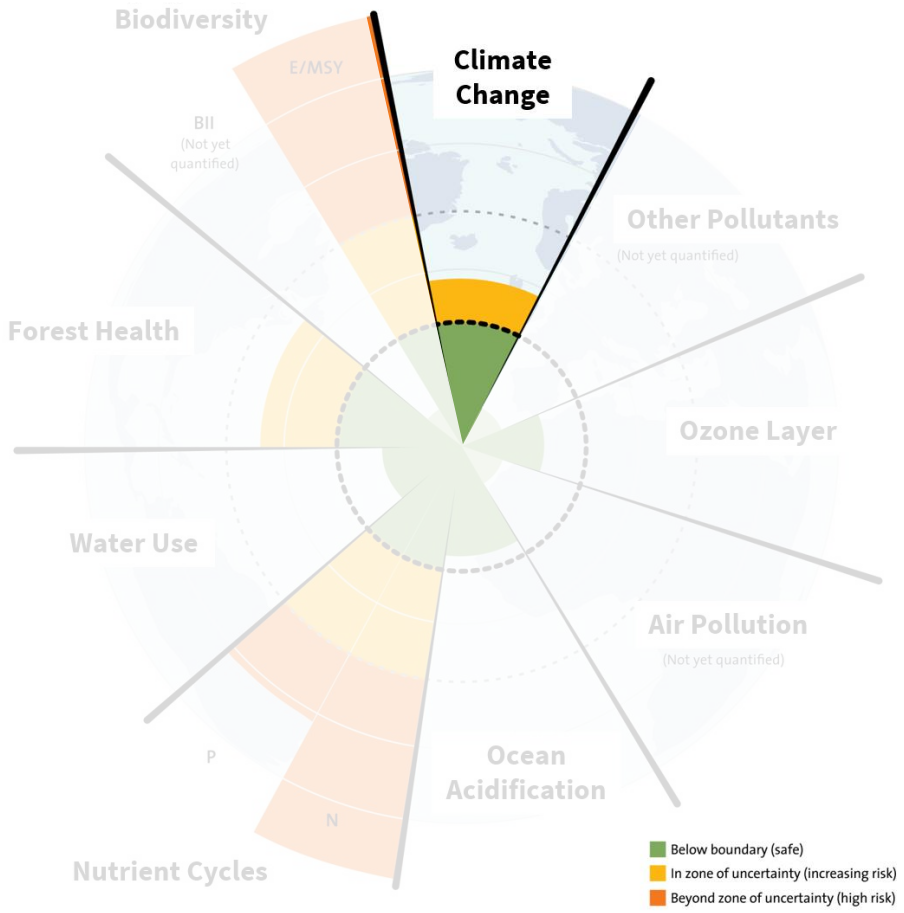


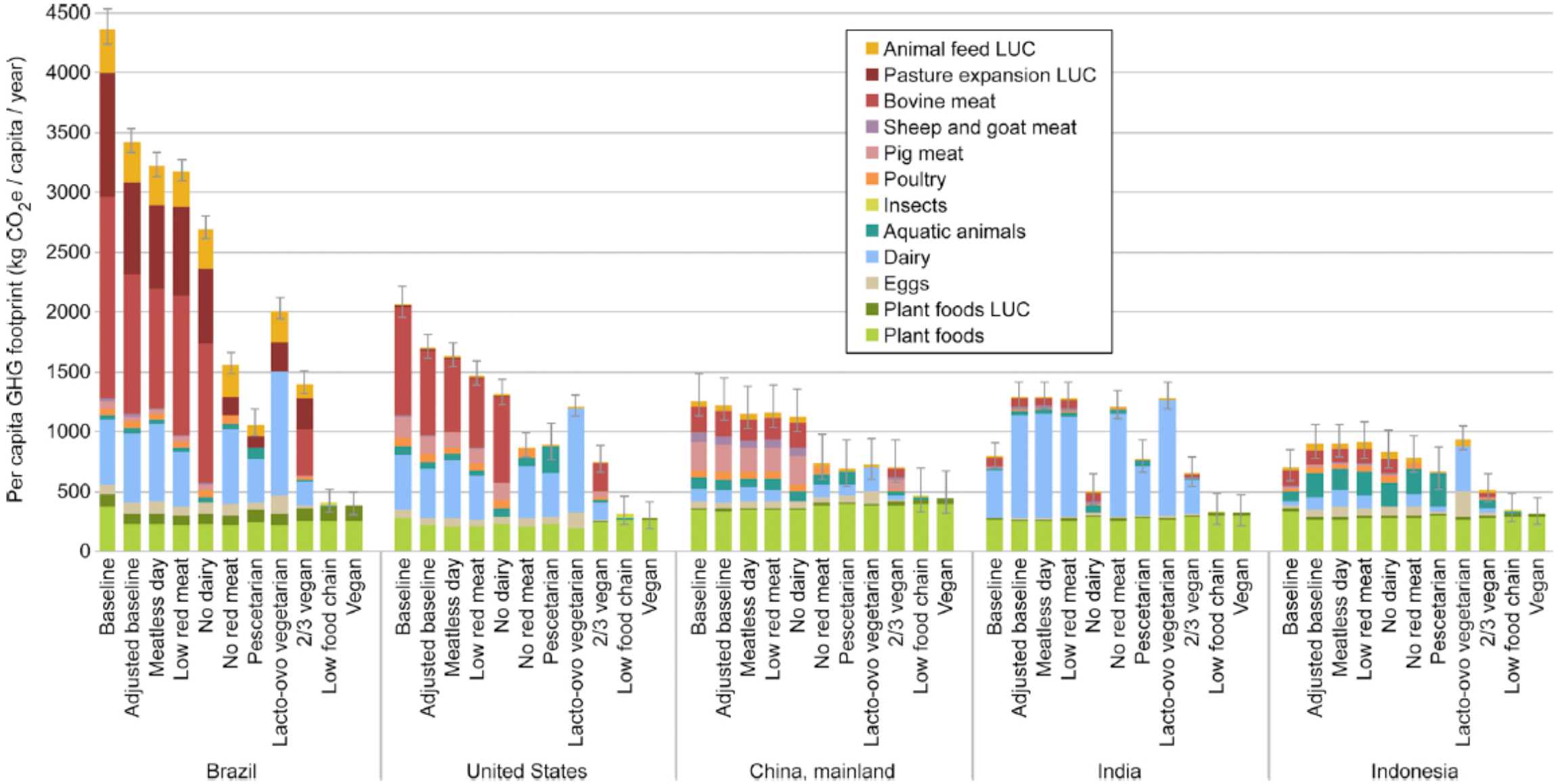
Carbon footprint of self-selected US diets: nutritional, demographic, and behavioral correlates

Donald Rose, Martin C Heller, Amelia M Willits-Smith, Robert J Meyer

The American Journal of Clinical Nutrition

Climate Change




Per capita GHG footprint (kg CO_2e / capita / year)
4500
4000
3500
3000
2500
2000
1500
1000
500
0
Animal feed LUC
Pasture expansion LUC
Bovine meat
Sheep and goat meat
Pig meat
Poultry
Insects
Aquatic animals
Dairy
Eggs
Plant foods LUC
Plant foods
Baseline
Adjusted baseline
Meatless day
Low red meat
No dairy
No red meat
Pescetarian
Lacto-ovo vegetarian
2/3 vegan
Low food chain
Vegan
Brazil
United States
China, mainland
India
Indonesia

THANK YOU

Slides, recording, and CEU certificate will be sent after the webinar

Please take a minute to complete the webinar evaluation form, linked in the chat box

Informed Sustainability Consulting

Discover your ecological advantage

Isaac Emery, PhD
isaace@informedsustainability.com