

Nourishing the Future: Sustainable Food Systems for Nutrition and Dietetic Students



JOHNS HOPKINS
CENTER *for* A LIVABLE FUTURE

FOOD + PLANET

Presented by:
Johns Hopkins Center for a Livable Future
Food + Planet

Introduction to Sustainable Food Systems

Module 1



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Four Modules



Module 1

**Introduction to
Sustainable Food
Systems**

Module 2

Food Systems
for All

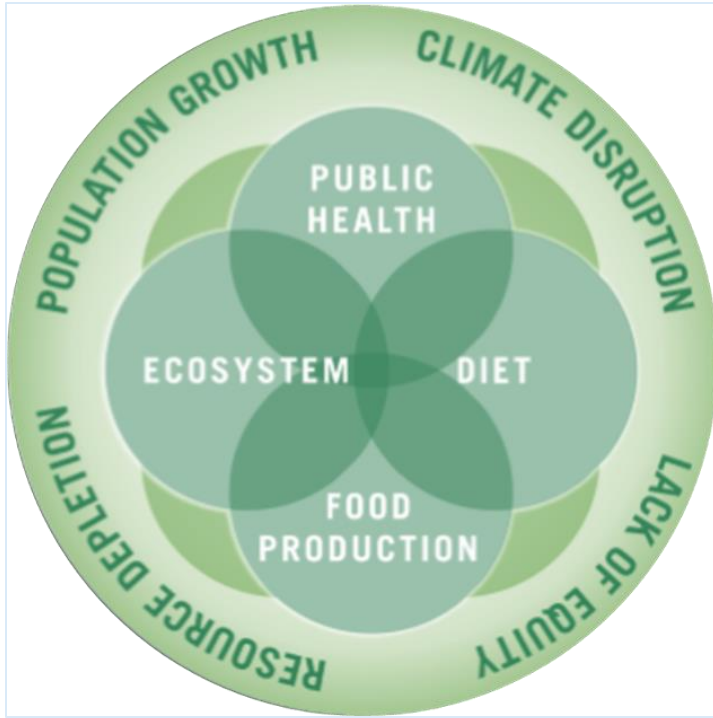
Module 3

Food and
our Climate

Module 4

Aquatic Foods,
Nutrition, and
Sustainability

The Johns Hopkins Center for a Livable Future



- ▶ Interdisciplinary academic center at the Johns Hopkins Bloomberg School of Public Health
- ▶ Education, research, policy, and practice
- ▶ Vision: a healthier, sustainable and resilient food system for all

Food + Planet

- A collective, visionary 501c3 founded by four registered dietitians with varied experience in the food system
- Aim: empower health care professionals to be leaders in sustainable food systems

Vision: a science and practice of nutrition that honors nature as the foundation of health through the four dimensions of sustainability



Image source: Vogliano, C., Geagan, K., Chou, S., Palmer, S. (2021). Empowering nutrition professionals to advance sustainable food systems [White Paper]. *Food and Planet*. Figure 1. The 4 dimensions of sustainable diets. [Infographic]. Retrieved September 14, 2025, from <https://7157e75ac0509b6a8f5c5b19c577d01b9ccfe75d2f9e4b17ab55.ssl.cf1.rackcdn.com/GVJSUTJL-PDF-1-675987-4519061561.pdf>

Learning Objectives

- ▶ Describe food systems and their impact on human and planetary health
- ▶ Discuss the various dimensions of sustainable food systems
- ▶ Explain three strategies to make our food systems more sustainable
- ▶ State the role of RDNs as leaders in food system change and how it aligns with the RDN Scope of Practice



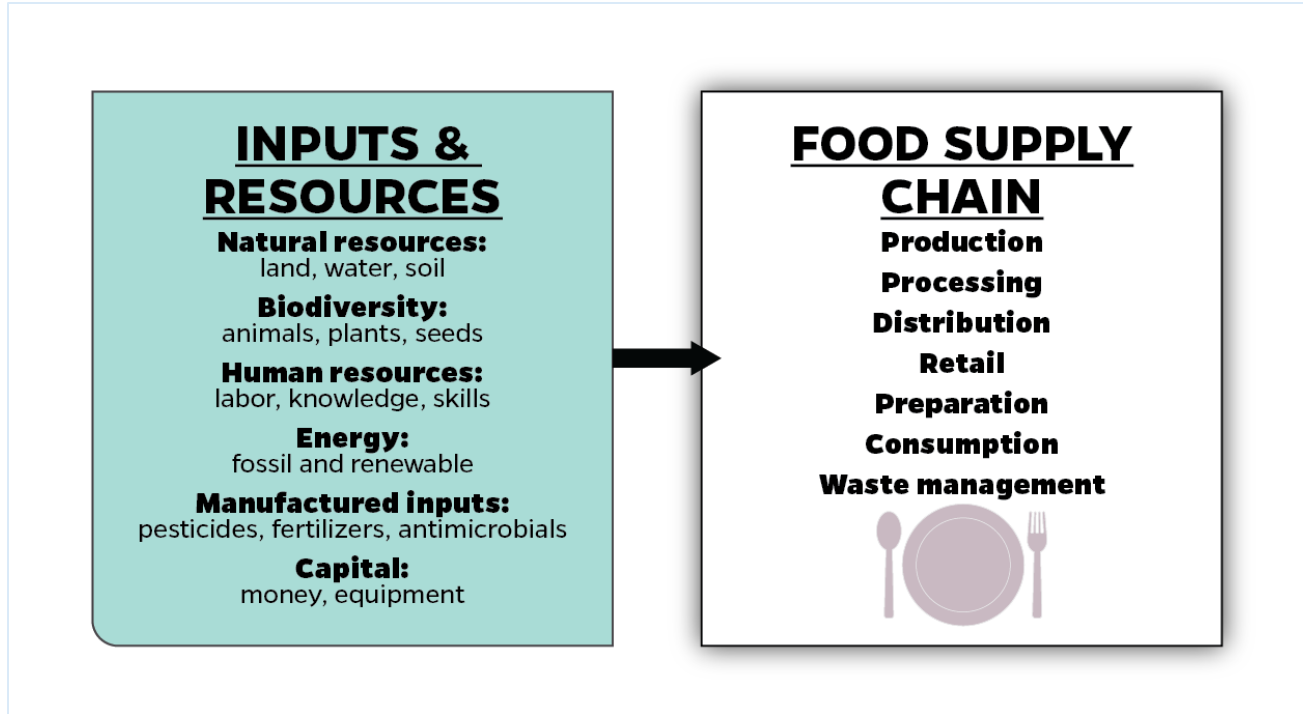
Section A: What Are Food Systems?



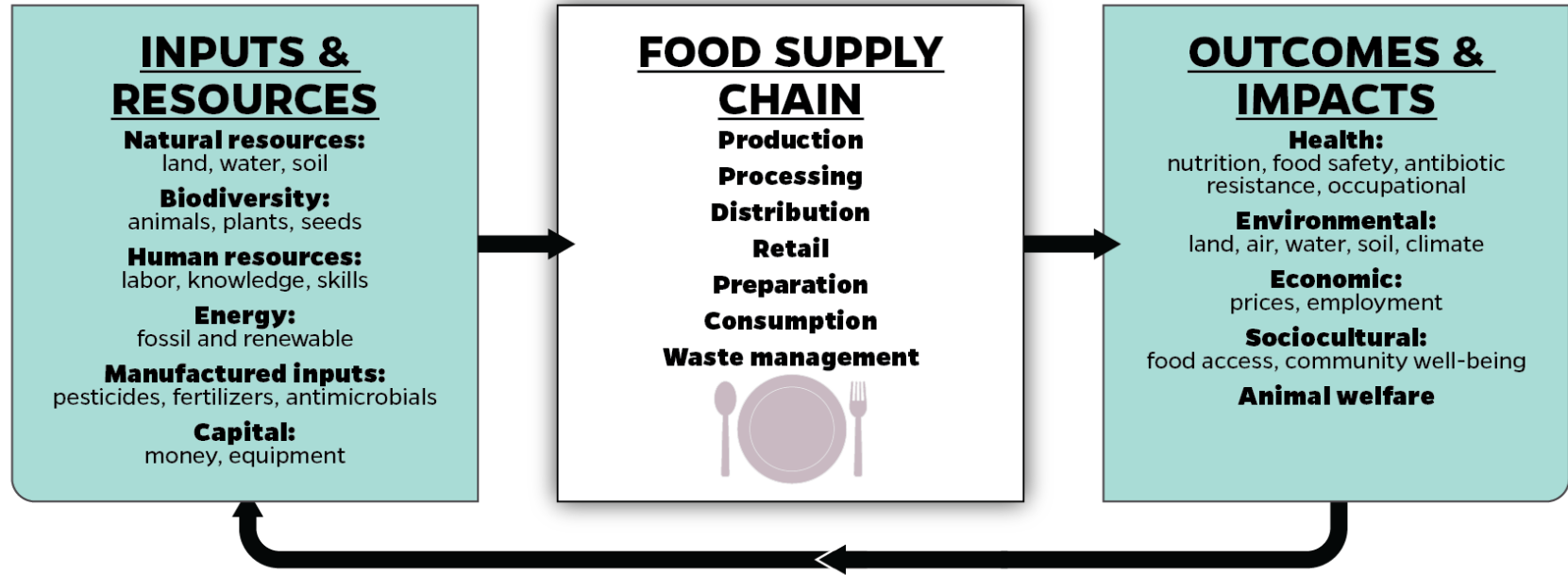
Food Systems—1



Food Systems—2



Food Systems—3



INFLUENCES & EXTERNAL DRIVERS

Ecological: climate, biodiversity, resource availability

Sociocultural: racism, culture, worldviews, population dynamics

Economic: poverty, income, trade, marketing, education

Technological: innovation, intensification, traditional knowledge

Political: policy, governance, conflict



INPUTS & RESOURCES

Natural resources:

land, water, soil

Biodiversity:

animals, plants, seeds

Human resources:

labor, knowledge, skills

Energy:

fossil and renewable

Manufactured inputs:

pesticides, fertilizers, antimicrobials

Capital:

money, equipment

FOOD SUPPLY CHAIN

Production

Processing

Distribution

Retail

Preparation

Consumption

Waste management



OUTCOMES & IMPACTS

Health:

nutrition, food safety, antibiotic resistance, occupational

Environmental:

land, air, water, soil, climate

Economic:

prices, employment

Sociocultural:

food access, community well-being

Animal welfare

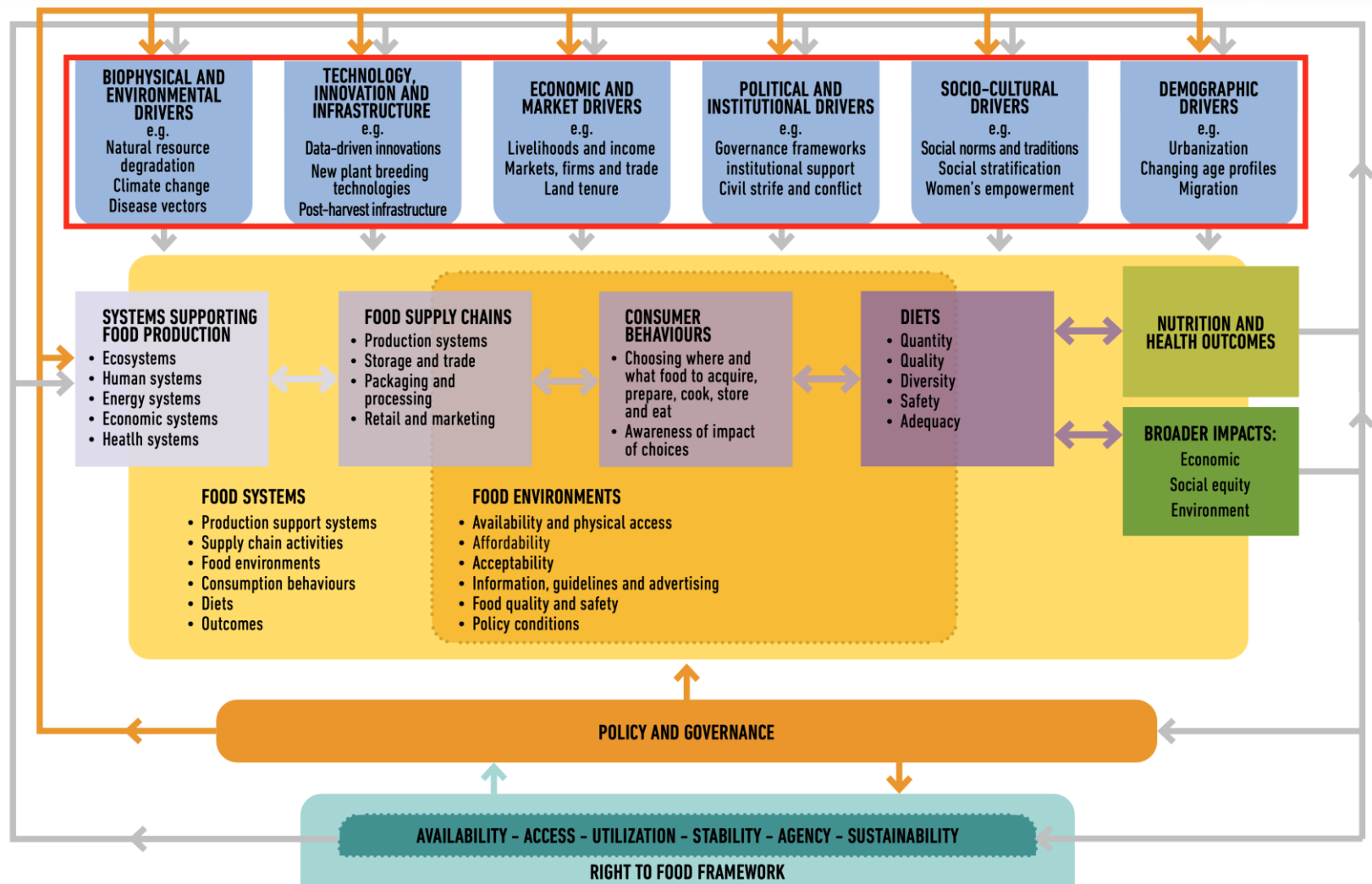


Image source:
HLPE. (2020).
Food security
and nutrition:
building a
global narrative
towards 2030. A
report by the
High Level
Panel. Figure 2,
Sustainable
Food System
Framework.
[Chart].
<https://openknowledge.fao.org/server/api/core/bitstreams/8357b6eb-8010-4254-814a-1493faaf4a93/content>

Systems Thinking

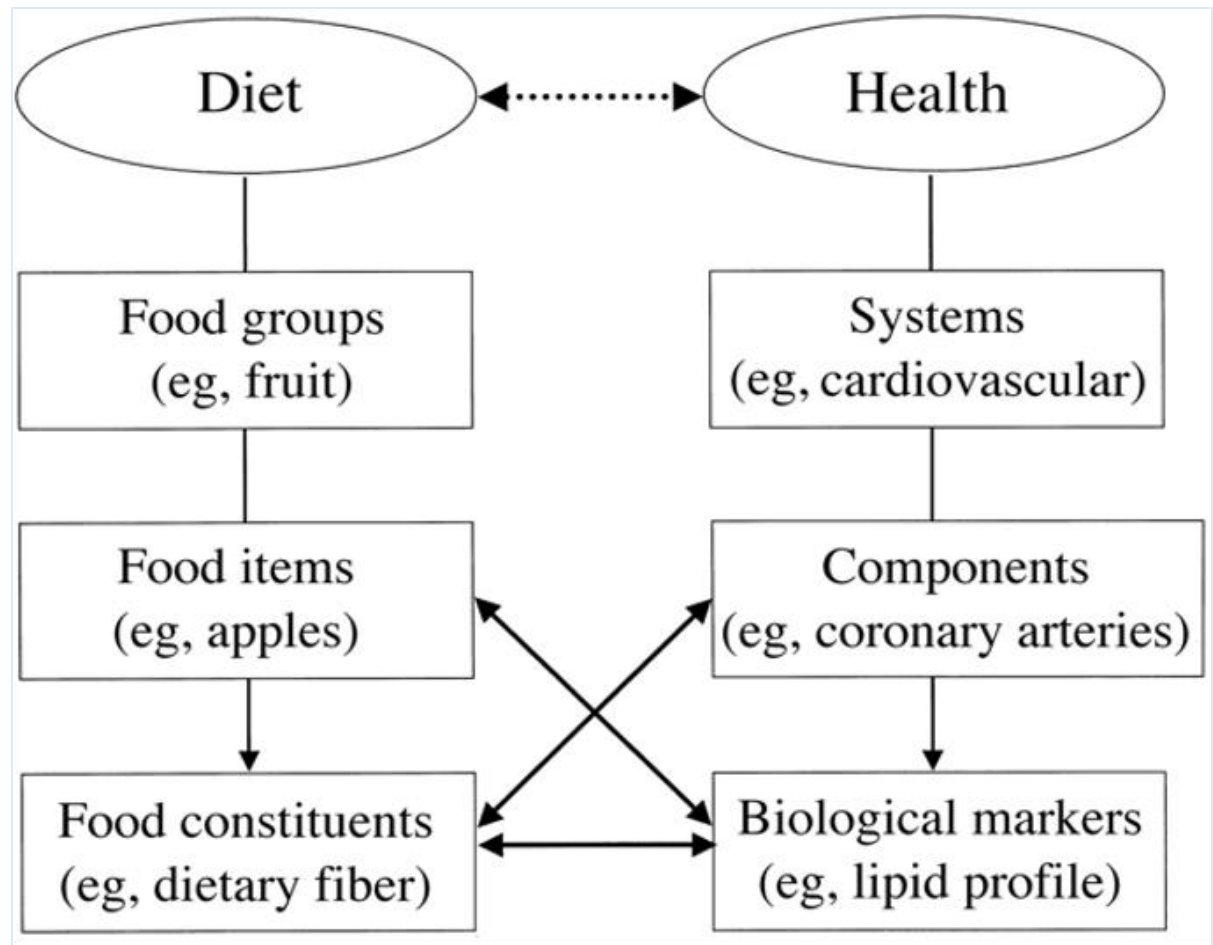


Systems thinking is a discipline for seeing wholes. It is a framework for seeing interrelationships rather than things, for seeing ‘patterns of change’ rather than static ‘snapshots.’

—Peter Senge



Examples of Reductionism in Nutrition Research

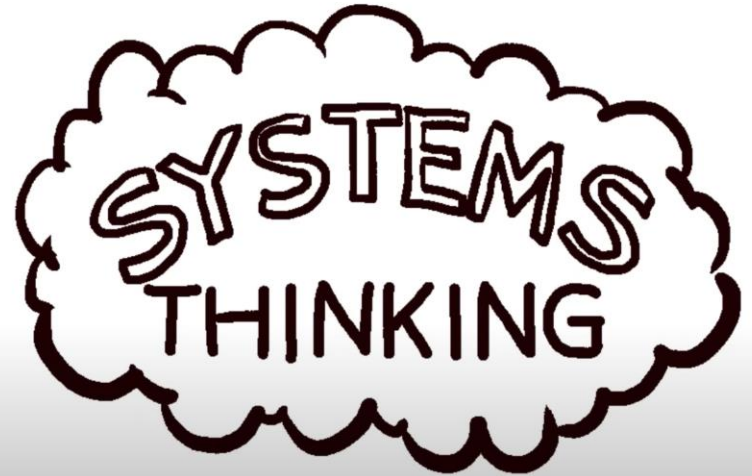


Watch This Five-Minute Video from ...



Systems thinking applied to an obesity program

[*Systems Thinking: A Way to Maximize Program Effectiveness*](#)



A WAY TO MAXIMIZE PROGRAM EFFECTIVENESS

Discussion: Reductionism v. Systems Thinking



- ▶ What are the benefits of reductionist thinking in nutrition research and practice?
- ▶ What connections and relationships might be missed in reductionist thinking?
- ▶ How could a systems approach fill these gaps and contribute to improved perspectives and solutions?
- ▶ Have you ever experienced a situation where systems thinking may have led to a better outcome?



Section B: Why Do Food Systems Matter?

Watch This Video from the World Health Organization



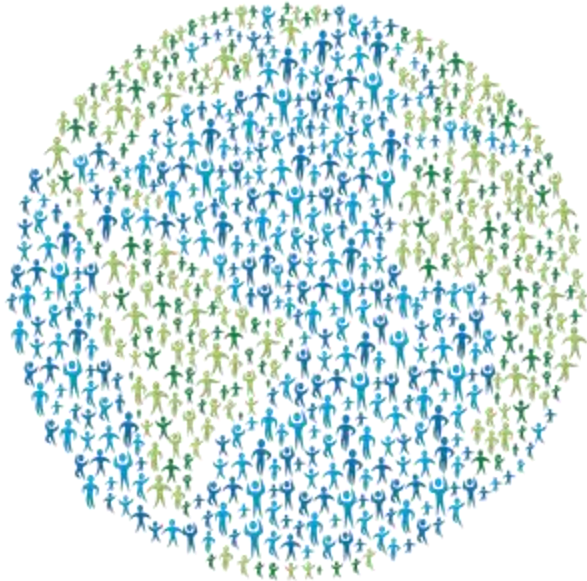
More About Food Systems

*Food Systems: Our food, our
health, our future*

A graphic where the words "FOOD" and "SYSTEMS" are formed by various fruits and vegetables. "FOOD" is on the top line, with "F" as two bananas, "O" as a lime slice, "O" as a dragon fruit slice, and "D" as a pineapple slice. "SYSTEMS" is on the bottom line, with "S" as a coconut half, "Y" as basil leaves, "S" as an orange slice, "T" as a purple eggplant, "E" as a string of cherry tomatoes, "M" as a yellow pepper, "S" as a yellow pepper, and "S" as a red chili pepper. Below the words, the text "ARE ABOUT MORE THAN WHAT WE EAT" is written in a bold, sans-serif font.

ARE ABOUT MORE THAN WHAT WE EAT

8.7 Trillion Meals Each Year



**8.7 TRILLION
MEALS
EACH YEAR**

Suboptimal Diets Are a Top Risk Factor of Mortality

*Global number of deaths
attributable to level 2 risk
factors, by cause
(females, 2019)*

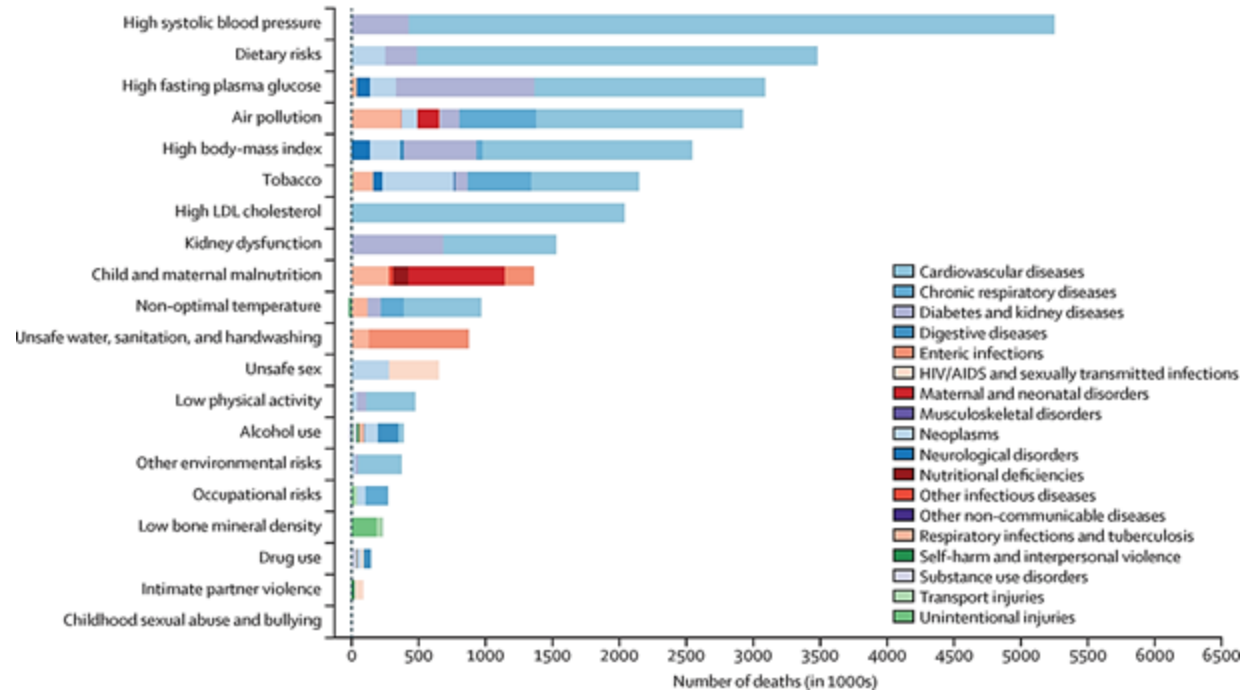


Image source: GBD 2019 Risk Factors Collaborators (2020). Global burden of 87 risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. Figure 3, Global number of deaths and percentage of DALYs attributable to level 2 risk factors, by cause and sex, 2019. [Chart]. *Lancet* (London, England), 396(10258), 1223–1249. [https://doi.org/10.1016/S0140-6736\(20\)30752-2](https://doi.org/10.1016/S0140-6736(20)30752-2)

Planetary Health

The health of human civilization and the state of natural systems on which it depends



Source: EAT-Lancet Commission. (2025). Food, planet, health: A sustainable and healthy dietary pattern for all. Figure 1. [Graphic]. EAT. https://eatforum.org/wp-content/uploads/2025/09/EAT-Lancet_Commission_Summary_Report.pdf

Agriculture Has an Outsized Impact on Planetary Health

Greenhouse Gases

26% of global greenhouse gas emissions

Non-Food

38.7 billion tonnes CO₂eq
74% global emissions

Food

13.7 billion tonnes CO₂eq
26% global emissions

Land Use

50% of global habitable (ice and desert free) land

Forest, urban area, shrubs, freshwater

51 billion km²
50% global habitable land

Agriculture

51 billion km²
50% global habitable land

Freshwater Use

70% of global freshwater withdrawals

Industry (19%) & Households (11%)

Agriculture
70% global Freshwater withdrawals

Eutrophication

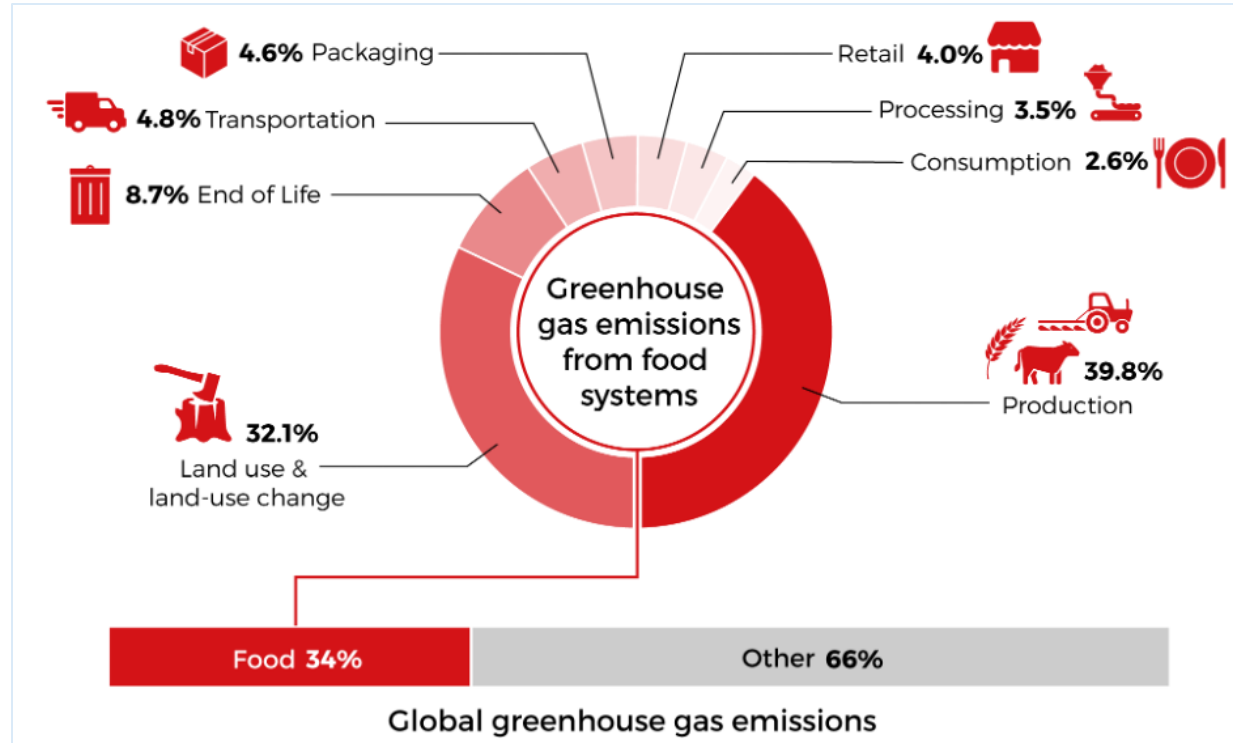
78% of global ocean & freshwater pollution

Other sources

22% global eutrophication

Agriculture
78% global eutrophication

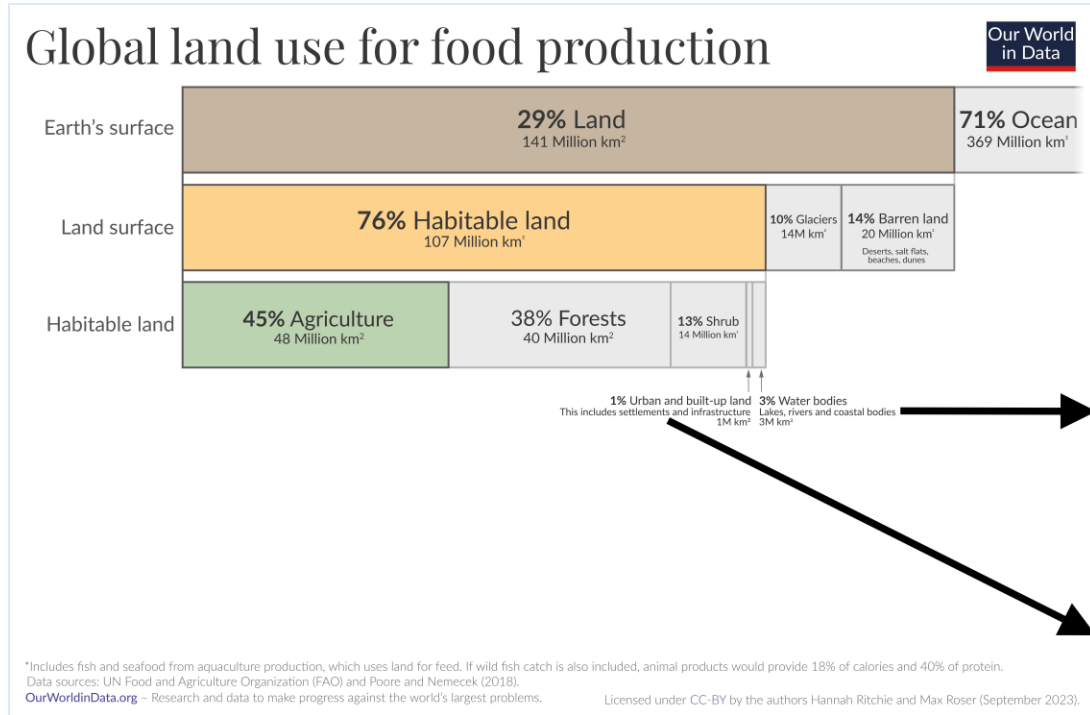
Food System Greenhouse Gas Emissions



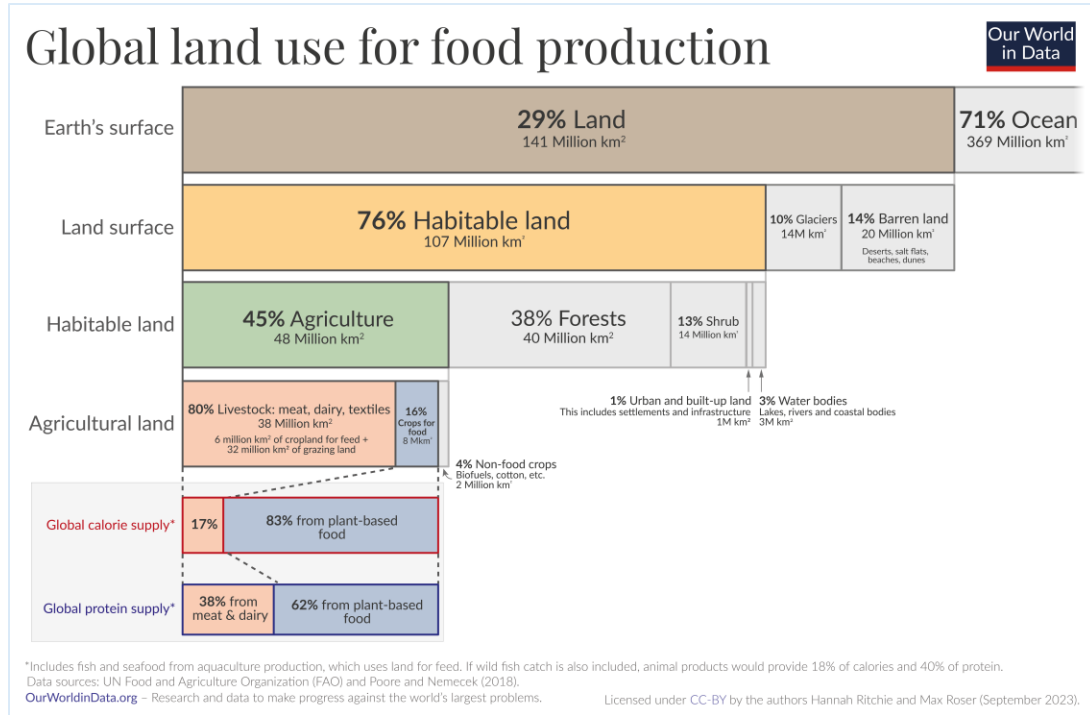
Global Land Use for Food Production—1



Global Land Use for Food Production—2

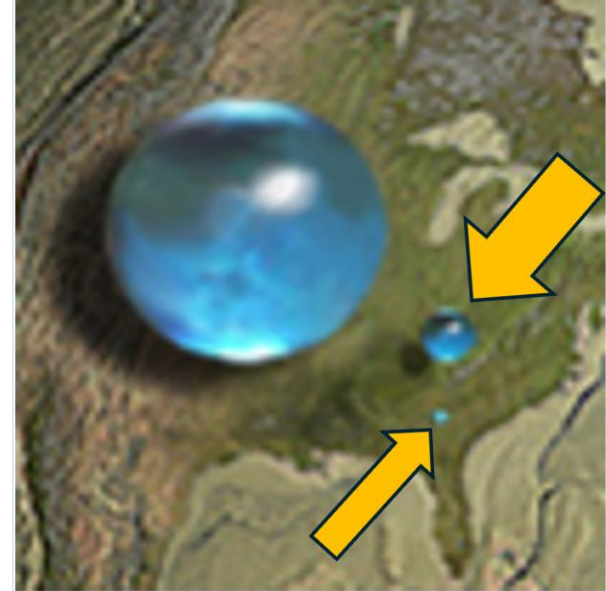
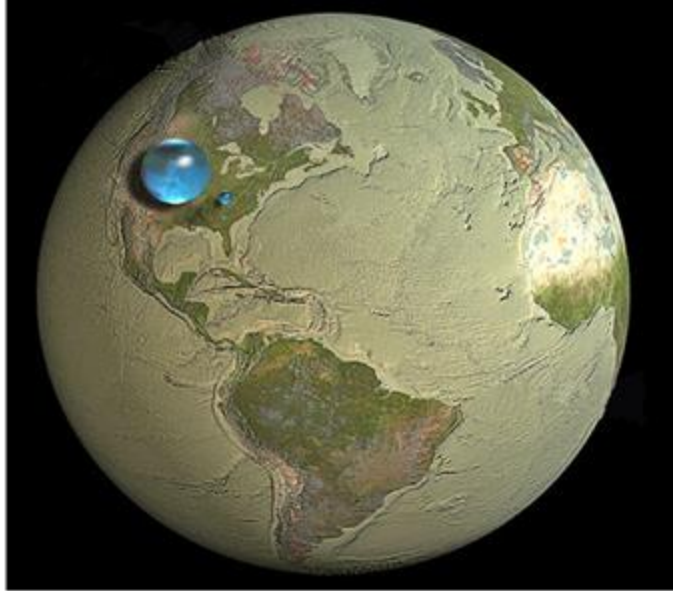


Global Land Use for Food Production—3



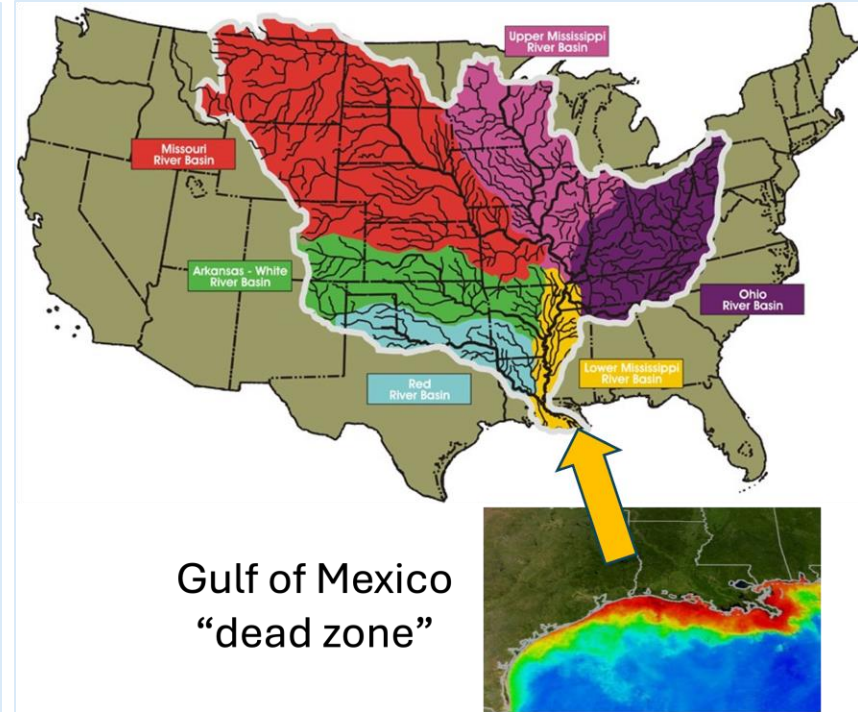
Freshwater Use

- ▶ Only 0.5% of all water on Earth is freshwater available for drinking and other uses
- ▶ About 70% of all freshwater we withdraw is for agriculture



Eutrophication

- ▶ Excess nitrogen and phosphorus fuels an overgrowth of algae, which deplete oxygen in water, killing aquatic life
- ▶ Agriculture in the primary source:
 - ▶ Animal waste
 - ▶ Chemical fertilizers
 - ▶ Pesticides





“
The variability among living organisms from all sources including terrestrial and aquatic ecosystems and the ecological complexes of which they are a part.

—[Convention on Biodiversity](#)”

- ▶ Supports ecosystems services essential to food production (soil, pollination, etc.)
- ▶ Protects food systems from climate change, extreme weather, pests, and diseases
- ▶ The global food system is the primary driver of biodiversity loss

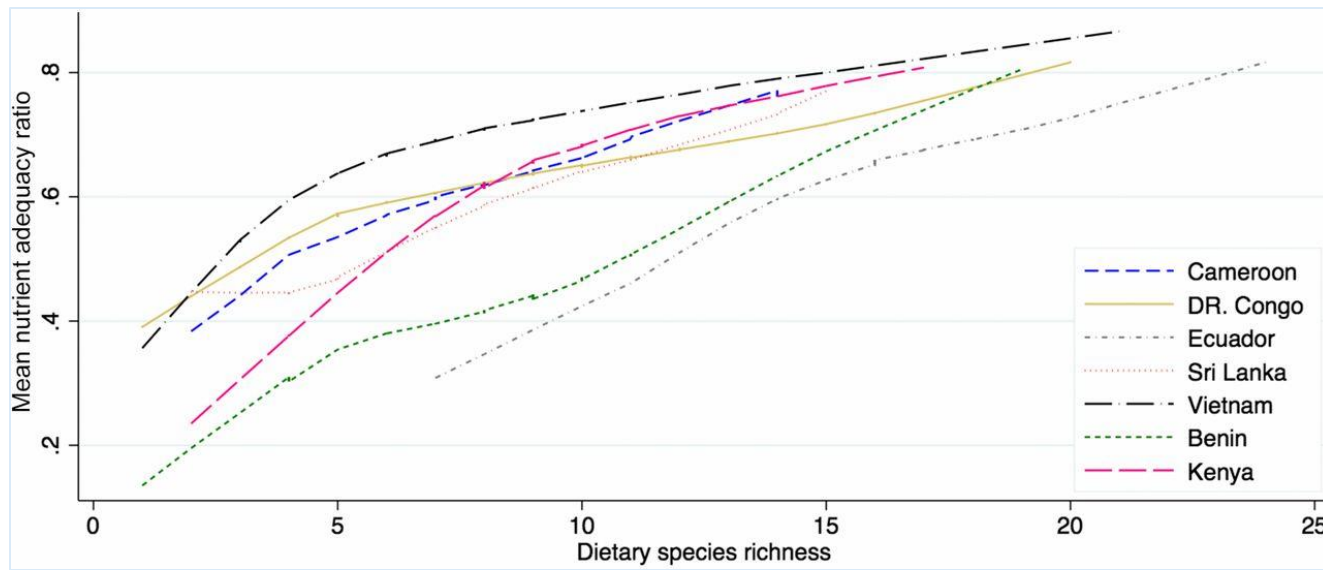
Diverse Diets are Healthy Diets

- ▶ Of the 300,000 known edible plant species, only 150–200 are used by humans
- ▶ Only three of these crops provide more than half of calorie needs
- ▶ Today, 75% of the world's food is generated from only 12 plants and five animal species



Association: Nutritional Quality, Number of Plant Species Eaten

Association of mean adequacy ratio (MAR) with species richness (SR) for 6,226 women and children in seven countries (wet and dry season combined)



Wasted Food = Wasted Resources

- ▶ Globally: 31–40%
- ▶ United States: approximately 38%
- ▶ Environmental impacts (US data)
 - ▶ 22% of freshwater consumption
 - ▶ 16% of cropland
 - ▶ 6% of greenhouse gas (GHG) emissions
 - ▶ Largest component of municipal solid waste
- ▶ Increased 50% in the US since the 1970s



Impacts of Wasted Food on Nutrition in the United States



Image source: Adapted by the Johns Hopkins Center for a Livable Future from data in Spiker, M. L., Hiza, H. A. B., Siddiqi, S. M., & Neff, R. A. (2017). Wasted food, wasted nutrients: nutrient loss from wasted food in the United States and comparison to gaps in dietary intake. *Journal of the Academy of Nutrition and Dietetics*, 117(7), 1031–1040.e22. <https://doi.org/10.1016/j.jand.2017.03.015>

State of the World's Fisheries

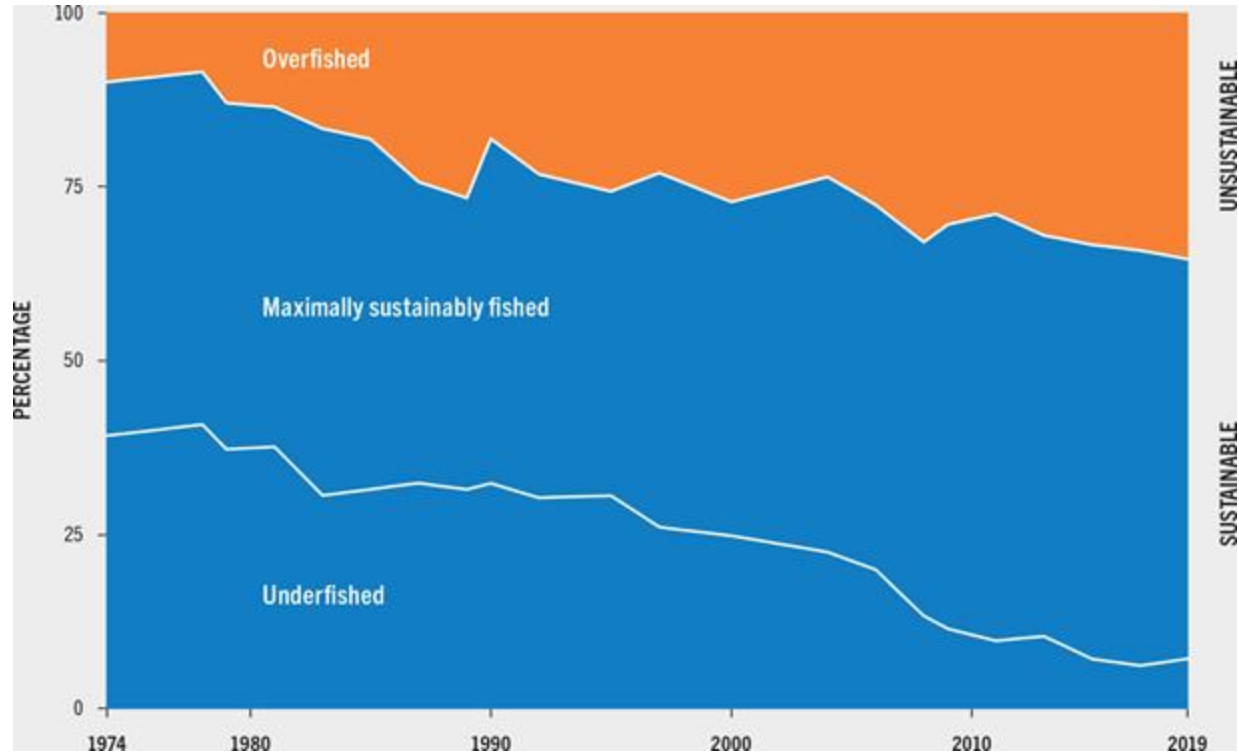


Image source: Food and Agriculture Organization of the United Nations. (2022). The State of World Fisheries and Aquaculture 2022. Towards Blue Transformation. Figure 23, Global trends in the state of the world's marine fishery stocks, 1974–2019. [Chart]. Rome, FAO. <https://doi.org/10.4060/cc0461en>

Health and Environmental Impacts of Foods—1

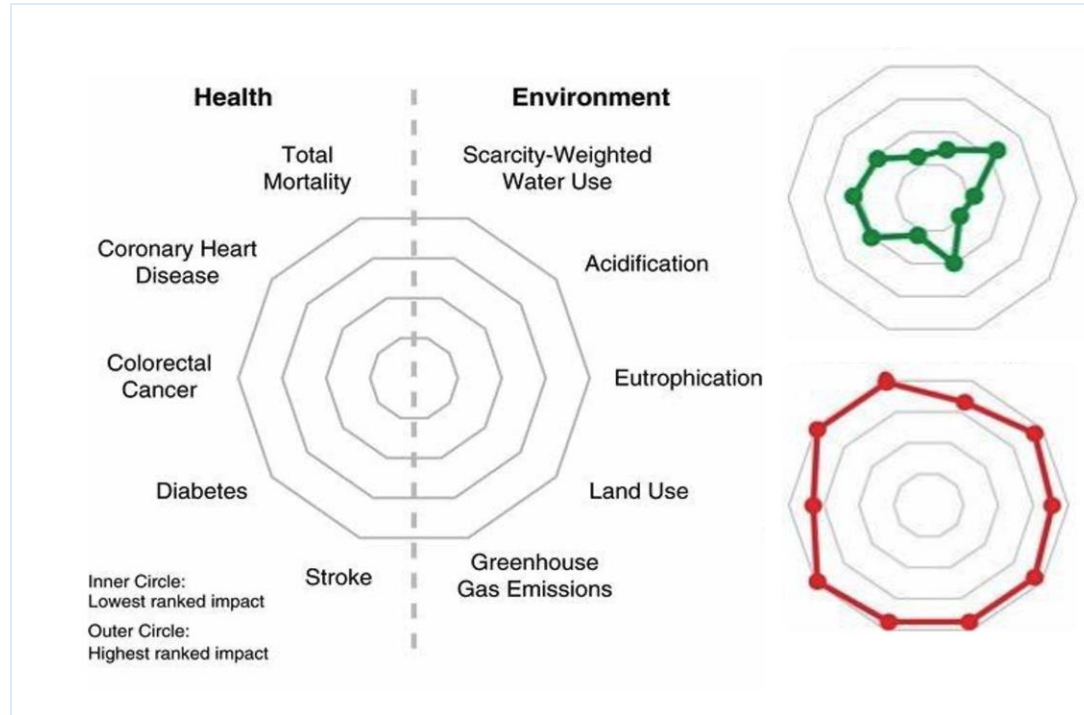
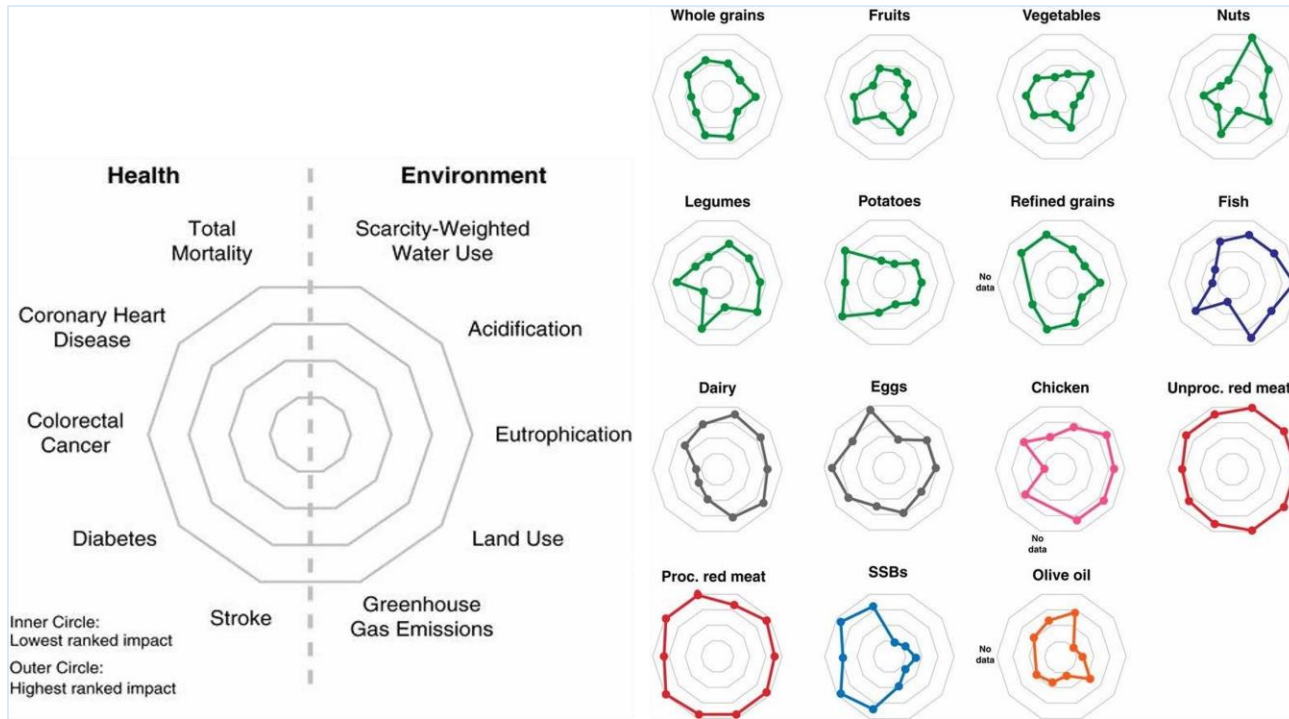


Image source: Clark, M., Springmann, M., Hill, J., & Tilman, D. (2019). Multiple health and environmental impacts of foods. *Figure 2, Radar plots of rank-ordered health and environmental impacts per serving of food consumed per day.* [Chart]. *PNAS*, 116(46), 23357–23362. <https://doi.org/10.1073/pnas.1906908116>

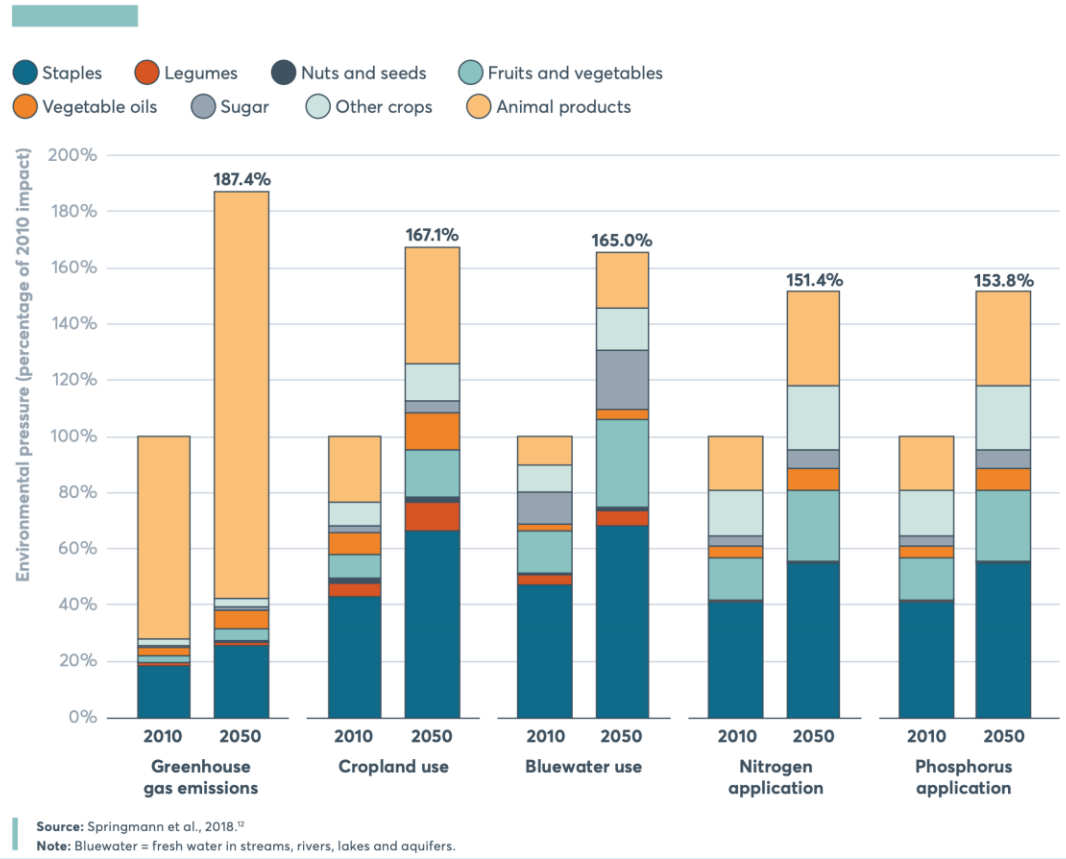
Health and Environmental Impacts of Foods—2



2050 Scenario

FIGURE 4.3

Impacts of different food groups on the environment

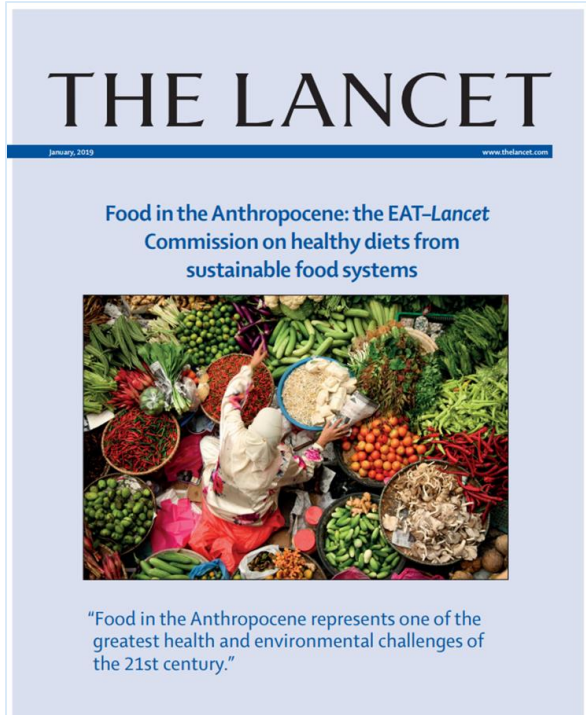


Source: 2020 Global Nutrition Report: Action on equity to end malnutrition. Figure 4.3, Impacts of different food groups on the environment. [Chart]. Bristol, UK: Development Initiatives.
https://media.globalnutritionreport.org/documents/2020_Global_Nutrition_Report_2hrsKo.pdf



Section C: What Is a Sustainable Food System?

EAT-Lancet Commission



Food is the single strongest lever to optimize human health and environmental sustainability on Earth. However, food is currently threatening both people and the planet. An immense challenge facing humanity is to provide a growing world population with healthy diets from sustainable food systems.

What Is a Sustainable Food System?



A sustainable food system ... delivers food security and nutrition for all in such a way that the economic, social and environmental bases to generate food security and nutrition for future generations are not compromised.

—United Nations, 2015



17 Sustainable Development Goals



Sustainable food systems don't just help to end hunger. They can help the world achieve critical progress on all 17 Sustainable Development Goals.

Principles for Sustainable Diets and Food Systems for Planetary Health—1

Human health

- ▶ Nutritious and healthy
- ▶ Balanced and diverse
- ▶ Appealing and acceptable
- ▶ Safe to consume



Principles for Sustainable Diets and Food Systems for Planetary Health—2

Ecological health

- ▶ Adaptive and agroecological
- ▶ Resilient and regenerative
- ▶ Protects/restores biodiversity
- ▶ Humane, supports OneHealth



Principles for Sustainable Diets and Food Systems for Planetary Health—3

Social equity

- ▶ Equitable and fair
- ▶ Ethical and inclusive
- ▶ Democratic, participatory
- ▶ Rights-based approach



Principles for Sustainable Diets and Food Systems for Planetary Health—4

Economic prosperity

- ▶ Profitable and sufficient
- ▶ Distributive and shared
- ▶ Livable wages
- ▶ Accessible and affordable
- ▶ Clean and green innovation



Principles for Sustainable Diets and Food Systems for Planetary Health—5



Human hands were purposefully incorporated into the images for each domain because humans have agency to facilitate or hinder actions toward sustainable diets.

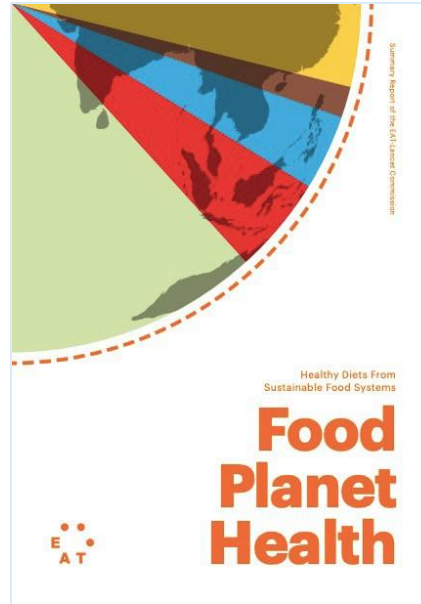


Section D: How Can RDNs Promote Sustainable Diets and Food Systems for Planetary Health?

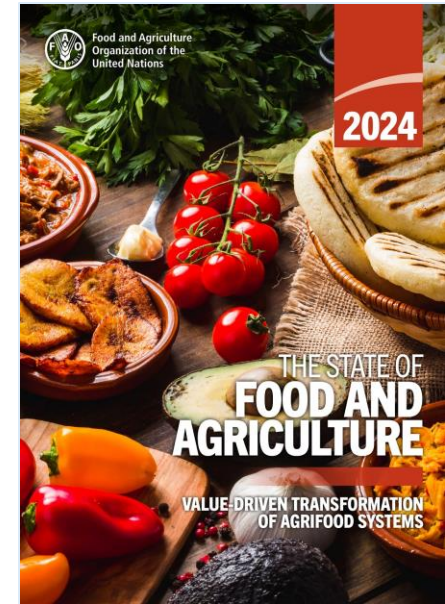
A New Way of Thinking About Healthy Diets



Nutritious diets

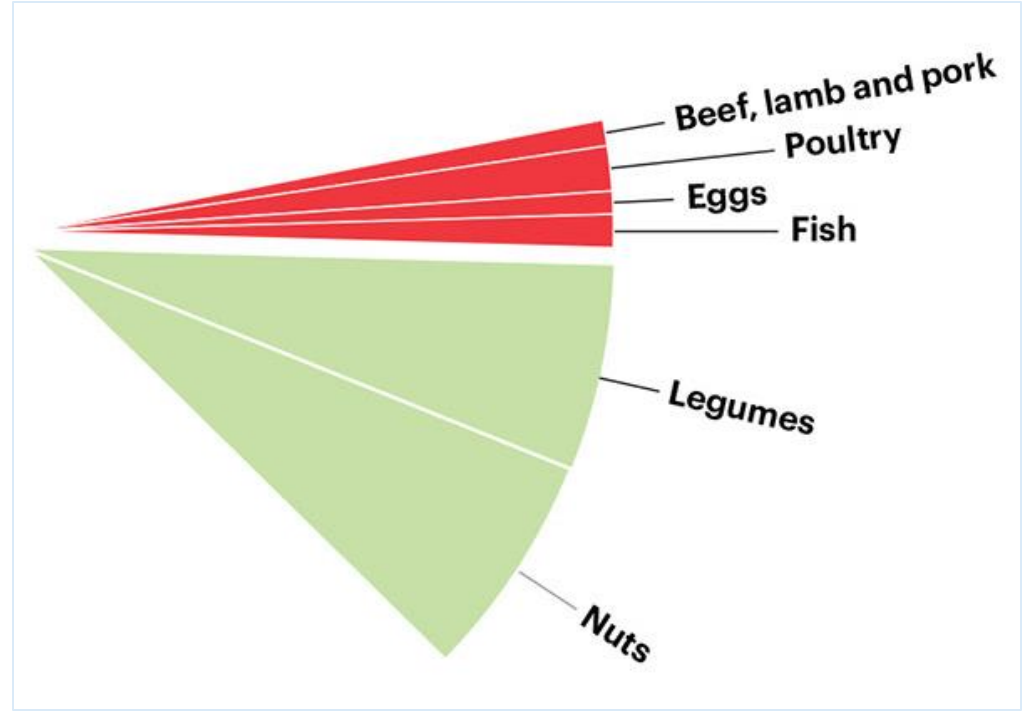


Diet + planetary health



Diet + planet + cost

Planetary Health Diet



Key Strategies for Food System Sustainability

1. Significantly reduce wasted food
2. Shift diets towards plant-based
3. Improve food production practices without expanding agriculture onto new land



Recommendation 1: Reduce Wasted Food

- ▶ Strategies for dieticians
 - ▶ Promote meal planning and appropriate portion sizes
 - ▶ Understand and educate about food safety and date labels
 - ▶ Encourage creativity with leftovers
 - ▶ Reduce waste in food service and encourage composting
 - ▶ Support local food recovery initiatives

Recommendation 2: Shift Towards Plant-Based Diets



- ▶ Strategies for dieticians
 - ▶ Provide guidance on healthy food choices that are plant-forward and culturally appropriate, affordable, available, and tasty
 - ▶ Use the planetary health diet as a framework
 - ▶ Support initiatives that introduce consumers to tasty, appealing plant-forward meals
 - For example, Meatless Monday
 - ▶ Balance plant-forward diets with life cycle nutrition needs

Recommendation 3: Improve Agricultural Practices

- ▶ Strategies for dieticians
 - ▶ Make the case for co-benefits (health, cost, sustainability, social)
 - ▶ Bridge consumers to food from producers who integrate sustainable practices
 - ▶ Provide guidance on making food choices that reflect best practices through labels, etc.
 - ▶ Support diversification of our food system by promoting diverse diets

Consumer Survey about Climate and Food

*2023 International Food
and Information Center
(IFIC) Climate Change
Perceptions and Purchase
Impact Survey*

- ▶ Three in four Americans are concerned about climate change
 - ▶ Over 70% are concerned about food-related issues

- ▶ Climate concern impacts foods and beverage choice in only 25%
 - ▶ Health and cost play a larger role

- ▶ Half of Americans heard about food and climate change from the media

- ▶ Labels that indicate recyclable or reusable packaging are perceived as very meaningful when looking for climate-friendly food and beverage options

Nutrition Professionals Interest in Sustainability



In a 2024 Sustainability Insights survey, RDNs shared gaps in knowledge, practice, and confidence

Over half had
no formal
training in
sustainability



Lowest
confidence
expressed in
domains of
food equity,
production,
and sourcing



Confidence is
higher
in issues of
food safety



Over 60 %
highlighted
consumer
demand and
awareness as
challenge for
integrating
sustainability



56% lacking
tools and
educational
resources for
sustainability
conversations

Opportunities for RDNs to Impact Food Systems

1

Leverage consumers' growing interest in food systems and sustainability as an opportunity **to guide individuals toward nutritious, sustainable choices**

2

Amplify the effectiveness of individual level interventions (e.g., education and behavior change) that **complement** actions at policy, systems and environmental levels

3

Identify **multi-level actions** (institutions, policy) and food choices that generate positive changes in the food system (equitable access to culturally appropriate, affordable, tasty foods)

Core Skills of Nutrition and Dietetics Professionals



Helping people navigate dietary choices amid complexity and uncertainty



Fulfilling multiple goals through food: not just nutritious, but also safe, delicious, affordable



Critically evaluating and translating research from a variety of scientific disciplines



Collaborating as part of interprofessional teams and engaging with other sectors

Discussion 3: Strategies for Action



What are some strategies for RDNs to ...

1. ... significantly reduce food waste?
2. ... shift diets towards plant-based?
3. ... improve food production practices without expanding agriculture onto new land?

Thank You!



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