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Professional Education Series

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Sustainability & Eating – The Connection to Our Environment & Role of Health Practitioners

TODAY'S AGENDA:

- Introduction & Housekeeping
- Speaker Introduction
- Presentation
- Q&A
- Closing

WEBINAR HOST:

Keith Hine MS, RD
VP of Healthcare, Sports & Professional Education
Orgain, LLC

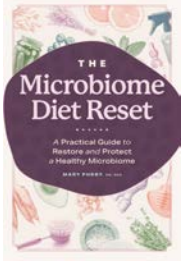
WEBINAR PRESENTER:

Mary Purdy, MS, RDN
Integrative Eco-Dietitian and Nutrition Educator

DISCLOSURES & AFFILIATIONS OF PRESENTER: MARY PURDY, MS, RDN, INTEGRATIVE "ECO-DIETITIAN"

Dietitians in Integrative and Functional Medicine
a dietetic practice group of the Academy of Nutrition and Dietetics

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



Bastyr University 1978 Vis Medicatrix Naturae

Planetary Health Collective

Integrative and Functional Nutrition Academy™

AIHM Academy of Integrative Health & Medicine

Orgain

Adjunct Faculty at Bastyr University

Faculty at IFNA "Integrative and Functional Nutrition Academy" & Academy of Integrative Health and Medicine

Board Member: Dietitians in Integrative and Functional Medicine & Hunger and Environmental Nutrition & Planetary Health Collective

Host of The Podcast "The Nutrition Show"

Host of "The Good Clean Nutrition Podcast" sponsored by Orgain

Consultant, Big Bold Health

Nutrition Director, Inner Circle Wellness Community with Kris Carr

LEARNING OBJECTIVES

Identify	Identify three ways the current industrial food and agricultural systems affect environmental and human health and contribute to climate change
Describe	Describe three ways that a more sustainable food system can better support both planetary and human health and help to mitigate climate change
Implement	Implement three sustainability strategies to help institutions/organizations or individuals reduce their carbon footprint or “food print" and support human health
Describe	Describe resources for further education on creating and promotting sustainable and resilientt food systems

ACKNOWLEDGING THE COMPLEXITY OF THIS TOPIC

CONNECTION TO FOOD IS PERSONAL AND EMOTIONAL

DIFFERING OPINIONS, ATTITUDES AND BELIEFS ABOUT CURRENT FOOD AND AGRICULTURE SYSTEM

ACCESS, AFFORDABILITY AND CULTURE

"SUSTAINABILITY" DIFFERENT DEFINITIONS. *SUSTAINABLE FOR WHOM?*

LESS ABOUT PERSONAL CHOICES AND MORE ABOUT **TRANSFORMING THE SYSTEM**

INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC) 2021 REPORT

- Global emissions at record levels
- Past seven years: hottest on record
- Sea levels rising & coral reefs dying,
- Air pollution, heatwaves, fires, floods
- Soil degradation

- Human influence and impact established and undeniable

- On course to exceed 1.5 degrees C (2.7 degrees F) of warming within just the next two decades.

1. Levin, K, Waskow, D, Gerholdt, R, "5 Big Findings from the IPCC's 2021 Climate Report," (2021).

UH…ARE WE IN TROUBLE?

"A code red for humanity."

*"The alarm bells are deafening, and the evidence is irrefutable: greenhouse gas emissions from **fossil fuel burning** and **deforestation** are choking our planet and putting billions of people at immediate risk."*[1]

- U.N. Secretary-General, António Gutierres described the report

1. "Secretary-General's Statement- ", (2021).

QUICK REALITY CHECK ON CLIMATE CHANGE

Impact is Disproportionate

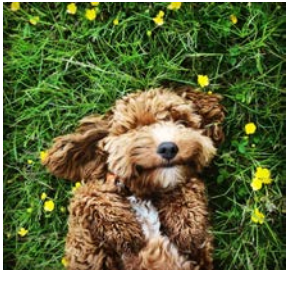
- Affecting lower income communities, elders, children, communities of color, Indigenous communities developing countries [2,3]
- Poverty reduces resilience and increases vulnerability [4]

The Goal

- **Limit global warming to 1.5°C = clear benefits to people and natural ecosystems** ensuring a more sustainable and equitable society [1 - IPCC]

1. *Climate Change and Land*. (2019).
2. Brown, S, "The Impact of Climate Change on Communities of Color", (2018).
3. "Fourth National Climate Assessment: Chapter 15- "
4. "The Disproportionate Consequences of Climate Change", (2016).

THERE'S HOPE!



"We'll need rapid, transformational change." - IPCC

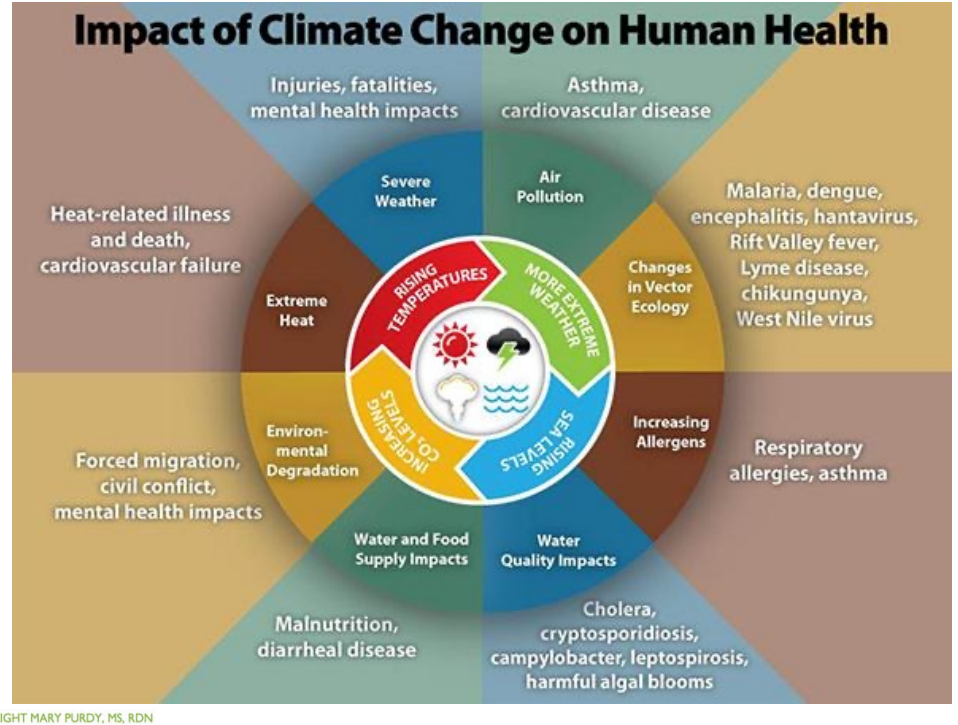
ENVIRONMENT?
SUSTAINABILITY?
CLIMATE CHANGE?

BUT WE'RE HEALTH CARE PROVIDERS

WHAT DOES THIS HAVE TO DO WITH US?

A LOT!

ESPECIALLY IF WE ARE TALKING FOOD & NUTRITION.



"Eco-anxiety": Millions of Americans struggle with mental health issues related to the climate crisis.

"Climate Effects on Health", (2019).

CLIMATE CHANGE THREATENS 1/3 OF GLOBAL FOOD PRODUCTION [1,2,3,4]

- **Extreme weather events** → Destroy land & → Crop Failure
- **High temperatures** can affect yields & water supply
- **Flooding & Drought** affect soil health

- **Soil degradation/erosion** = less nutritious food
  - 1/3 of our top soil has been lost

- **CO2 emissions** prevent oysters/mussels from building shells
- **CO2 levels are changing micronutrient** and protein content of grains

1. "The State of Food Security and Nutrition- ", (2018).
2. Mejía NV, Reyes RP, Martinez Y, Carrasco O, Cerritos R, "Implications of the Western- ", (2018).
3. Zhu C, Kobayashi K, Loladze I, et al., "Carbon dioxide (CO2) levels this century will- ", (2018).
4. Kummu, M, Heino M, Taka M, Varis O, Viviroli D, "Climate change risks pushing- ", (2021).

BEING IN NATURE/GREEN SPACES IMPROVES HEALTH[1]

- Reduces inflammation
- Supports immune function
- Regulates nervous system
- Supports healthy blood pressure
- Connects us to beauty, awe, spirit etc.

1. Tasnim N, Abulizi N, Pither J, Hart MM, Gibson DL, "Linking the Gut Microbial Ecosystem- ", (2017).
2. Roslund MI, Puhakka R, Grönroos M, et al., "Biodiversity intervention enhances- ", (2020).

THE BOTTOM LINE:
WHAT HARMS THE ENVIRONMENT HARMS HUMAN HEALTH

- Many foods from **industrial food complex** that are being grown in a way that is **detrimental to the environment** and **contributing to the climate crisis** are also foods that are found in many **ultra-processed, cheap, abundant foods** eaten in excess and contributing to **inequities** and the very **chronic diseases** we as health care practitioners are treating and working to prevent.

- Incorporating sustainability to protect the environment and mitigate the climate crisis by reimagining and transforming the food system = **"Feeding two birds with one scone"**

Swinburn BA, The Global Syndemic of Obesity, Undernutrition, and Climate Change: The Lancet Commission report.(2019)

SUMMARY: INDUSTRIAL FOOD AND AGRICULTURE SYSTEM IS RESPONSIBLE FOR

- 25-37 % of all greenhouse gas emissions'
  - Partly because of practices that inhibit the ability of soils to store carbon.
- 80% of deforestation (Leading cause)
- 34% of all land use on the planet,
- 70% of freshwater use
- 68% of total biodiversity loss (70% on land and 50% in freshwater)
- 32% of terrestrial acidification, (nutrients being applied to soil)
- 78% of eutrophication (extra nutrients →dead zones in oceans)
- Soil erosion – affecting global food production
- Leading cause soil and water pollution/contamination & large source of air pollution
- Impact worse in marginalized/BIPOC populations = Environmental Justice issue

1. Crippa M.,et al. Food systems are responsible- ", (2021).
2. Ritchie, "Food Production is Responsible for ¼- ", (2020).
3. Levin K et al.. 5 Big Findings from the IPCC's 2021 Climate Report **(2021)**
4. "Discussion Starter. Action Track 3", (2020).

SUMMARY:
OUR INDUSTRIAL FOOD AND AGRICULTURE SYSTEM

- Not equitable, built on systems of oppression and racism
- Often fails to tap into available resources & wisdom from indigenous communities and communities of color often sustainably farming
- One third of all food produced is never eaten, = huge waste in natural resources, human labor and financial capital.
- 690 million people go hungry each day
- Close to 2 billion people are obese or overweight (carrying metabolically unhealthy extra weight)

1. Levin K et al.. 5 Big Findings from the IPCC's 2021 Climate Report **(2021)**
2. "Discussion Starter. Action Track 3", (2020).

"Human wellbeing depends on reducing social inequity and protecting the environment."

All goals are essentially related to our food system.

A universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030.

1."Sustainable Development Goals", (2015).

THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC)

- "Consumption of healthy and sustainable diets presents major opportunities for reducing greenhouse gas emissions from food systems and improving health outcomes"[1]
- ***We* have the power to help create change!**

IPCC, "Climate Change and Land- ",: (2019)

WHAT IS THE FOOD SYSTEM?

HOW WE GROW/ PRODUCE

HARVEST/FISH/ SLAUGHTER

TRANSPORT/ DISTRIBUTE

STORE

PROCESS/PRODUCE/ PACKAGE PREPARE

PURCHASE/SELL/ MARKET (RETAIL)

CONSUME

DISCARD/WASTE FOOD

What resources that go into this FOOD system?

HOW DO THESE PROCESSES AFFECT THE ENVIRONMENT & CLIMATE?

LAND & SOIL
(40-50% OF LAND USE)

WATER
(70-80% OF WATER USE)

ENERGY
(16% OF ENERGY USE)

FUEL/GAS

CHEMICALS/INPUT

LABOR

PACKAGING/PLASTIC

GREENHOUSE GASES FROM FOOD SYSTEM?

Carbon Dioxide

- Deforestation, fossil fuels (Including plastic & agrochemical production like synthetic fertilizer)

Nitrous Oxide

- Fertilizer, Industrial livestock (from stored waste)

Methane

- Livestock, Landfills/Food waste (3rd largest source of methane) Fossil fuel combustion
- "Cutting methane is the biggest opportunity to slow warming between now and 2040."[1]

1. "Climate Change and Land", (2019).

WHAT MAKES A "SUSTAINABLE?" DIET

- **"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. - FAO

1. Dietary guidelines and sustainability, FAO 2012

WHAT DO SUSTAINABLE DIETS/FOOD SYSTEMS INCLUDE? THEY MUST SUPPORT, CONSIDER & INCLUDE ALL OF THE BELOW PILLARS:

Nutritional/Human Health

- Aim to reduce malnutrition
- Access to diverse foods
- Nutrient dense
- Safe food free from contaminates and chemicals
- Uncontaminated water and air
- Consider role in antibiotic resistance

Environmental and planetary health

- Fewer agrochemicals
- Supports biodiversity (supports wildlife)
- Supports soil health
- Supports Ocean
- Fewer Greenhouse Gases
- Protects resources
- Less food waste/loss

Economic benefit

- Profitable to all in the supply chain
- Fair wages
- Food = affordable
- *Is organic food "too expensive" or do we need to pay people a better living wage?*
- *What is the "true cost" of food?*

Socio-cultural Components

- Culturally appropriate/inclusive
- Honors Indigenous peoples/communities
- Support Food Sovereignty
- Animal Welfare
- Welfare of farmworkers
- Equity
  - Gender
  - Race
  - Effect on marginalized communities

4 AREAS WHERE WE CAN MAKE A BIG DIFFERENCE

REDUCING consumption of **industrially** raised animal protein and ultra processed foods **&** INCREASING intake of whole foods plant-based proteins

ADVOCATING for more Eco-Friendly growing practices

REDUCING Plastic food packaging

REDUCING Food Waste

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Graphic - https://www.nytimes.com/2022/02/01/opinion/climate-sustainability-agriculture-lobby.htm
https://www.sentienceinstitute.org/press/us-farmed-animals-live-on-factory-farms

IS **INDUSTRIAL** ANIMAL AGRICULTURE THE BEST WAY TO FEED THE MOST PEOPLE?

1/3 of all crops go to produce animal feed.

Uses > 80% of land but it produces just 18% of our calories

1 serving of lentils = 1.9 g of CO_2 Equivalent

1 serving Beef = 330 g of CO_2 equivalent

COPYRIGHT MARY PURDY, MS, RDN

1. "A Framework for Assessing- ", (2015).
2. "The Water Footprint of Beef- ", (2018).
3. Bastian GE, Buro D, Palmer-Keenan DM, "Recommendations for Integrating- ", (2021).

WHY ***INDUSTRIAL*** ANIMAL AGRICULTURE MAY BE PROBLEMATIC:

Global Livestock sector = 15% of Greenhouse gases = same amount generated by our global transportation system [1]

- Cattle: milk and meat = 65% of that
- **MOST is Methane gas** from cow emissions (~40%)
- **Manure Lagoons** from concentrated animal feeding operations (CAFOs) – pollution (~25%)
- **Growing Feed** (~25%)
- **Deforestation:** 70% of Amazon deforestation is to provide land for cattle ranches & to grow soy = lost ability to sequester carbon.
- **Overgrazing depletes soil**
- **Habitat destruction** due to land clearing for agriculture around the world [1]

If this continues as is: 80% increase in global greenhouse gas emissions from food production

"Its not the cow, it's the *how*"

1. Gerber, PJ et al. "Tackling Climate Change through Livestock", (2020)
2. Kim, B et al. The Importance of Reducing Animal Product Consumption and Wasted Food in Mitigating Catastrophic Climate Change (2015)
3. Tilman et al (2014)

SHIFTING MEAT PRODUCTION AWAY FROM CAFO'S

The American Public Health Association has called for a precautionary moratorium on the establishment and expansion of CAFOs

Concentrated Animal Feeding Lot – CAFO

- Inhumane environment for animals
- Accumulate massive amounts of manure and other untreated waste

Lindwall, "Industrial Agricultural Pollution 101", (2019).

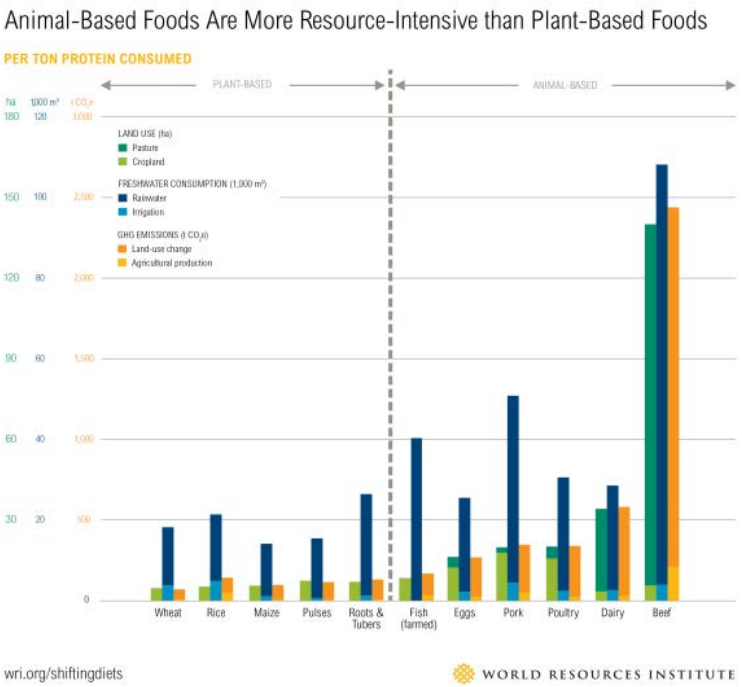
1. American Public Health Association, "Precautionary Moratorium", (2019).

IMPACT ON ENVIRONMENT AND HEALTH: INDUSTRIAL ANIMAL AGRICULTURE

Industrial Animal agriculture (Factory Farms)

- **Health:**
  - Contaminated water/soil & air pollution → diseases in nearby communities (often marginalized individuals)
  - Poor treatment and transmission of pathogens to CAFO workers (respiratory issues)
  - Antibiotic resistance; (80% of antibiotics are used for animals)
  - Effects of antibiotics on human gut microbiome?
  - Poor quality animal protein **in excess** linked to numerous chronic diseases
    - Corn fed beef (⇑Palmitic acid)– associated with obesity & inflammation
  - Higher phytonutrients found in grass fed meat and milk

1. Neff R, "Introduction to the US Food System- ", (2014).
2. "History of Agriculture", (2019).
3. "2017 Annual Report", (2017).
4. Arsenault C, "Only 60 Years of Farming- ", (2014).
5. Eshel, G. Land, irrigation water, greenhouse gas, and reactive nitrogen burdens of meat, eggs, and dairy production in the United States (2014)
6. Moyer J, Stoll S, Schaeffer Z, et al. "THE POWER of the PLATE- ", (2020).
7. Steinfeld H, Gerber P, Wassenaar T, Castel V, Rosales M, de Haan C, "Livestock's Long Shadow- ", (2006).
8. Rovira, P et al;Characterization of the Microbial Resistome in Conventional and "Raised Without Antibiotics" (2019)
9. Van Vliet, S et al. Health-Promoting Phytonutrients Are Higher in Grass-Fed Meat and Milk 2021



World Resources Institute, "Shifting Diets for a Sustainable Food Future- ", (2016).

Even cutting meat by 50% can reduce greenhouse gas emissions by 40%

Meet people where they are at ☺

It may depend on access and culture.

1. Tilman D, Isbell F, Cowles JM, "Biodiversity and Ecosystem Functioning", (2014).

DON’T TAKE MY BACON!

ANIMAL AGRICULTURE/HUSBANDRY CAN PLAY A POSITIVE ROLE

"BETTER" MEAT AS A PART OF LAND RESTORATION, A HEALTHIER ECOSYSTEM & PLANET [1]

Well managed farms with Humane practices, grass-fed, has benefits for the well-being of animals & land

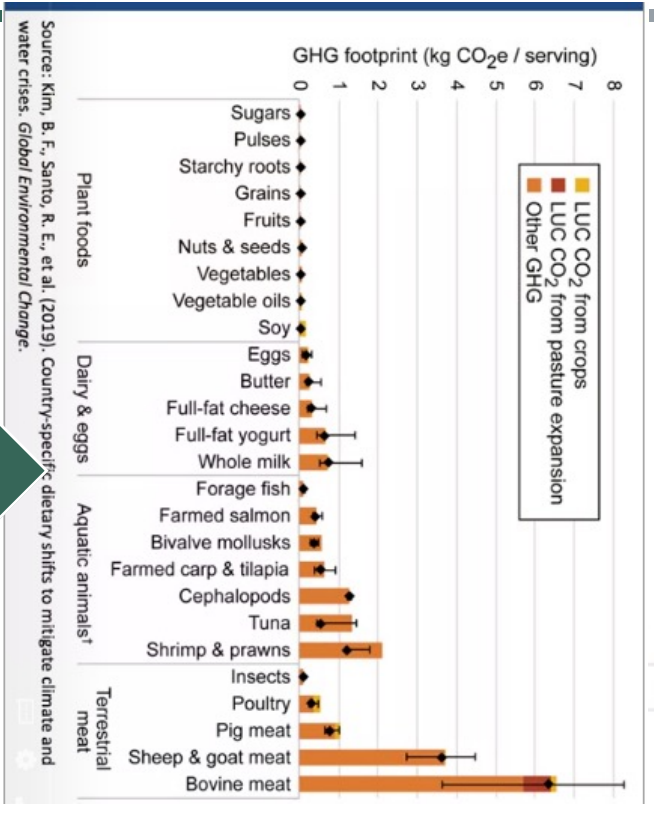
Crop/Livestock system: Livestock consume cover crops → Manure → nourishment for soil.

Intentional rotated grazing → Healthier soil →Healthy more resilient system = habitat for other wildlife and pollinators

Consider food and land sovereignty of indigenous communities who may practice sustainably

1. Hamerschlag, "Less and Better Meat is Key for a Healthier Planet", (2018).
2. Semba RD et al. "Adoption of the 'planetary health diet'- ", (2020).

Greenhouse gas foot print of a variety of foods



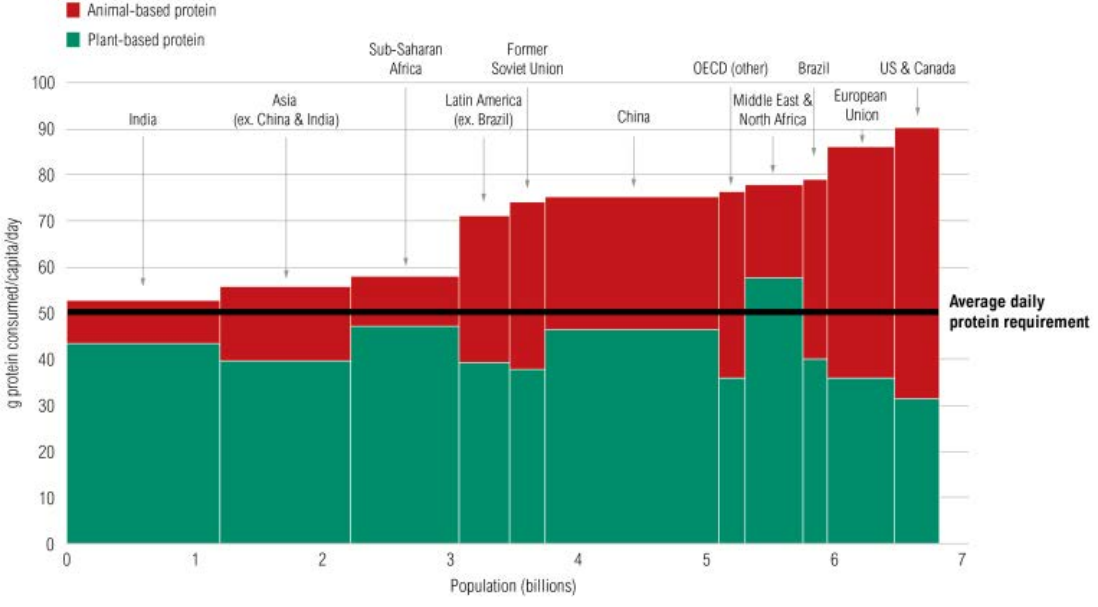
Source: Kim, B. F., Santo, R. E., et al. (2019). Country-specific dietary shifts to mitigate climate and water crises. *Global Environmental Change*.

LUC = Land use Change

LUC CO_2 from crops
LUC CO_2 from pasture expansion
Other GHG

Kim, B et al. Country-specific dietary shifts to mitigate climate and water crises (2019)

People Are Eating More Protein than They Need—Especially in Wealthy Regions



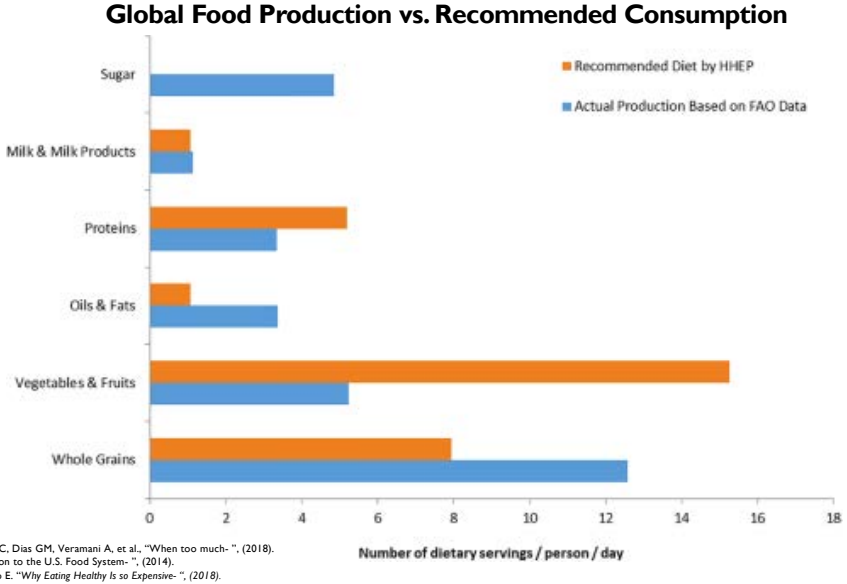
wri.org/shiftingdiets

WORLD RESOURCES INSTITUTE

IMBALANCE BETWEEN RECOMMENDATIONS IN DIETARY GUIDELINES AND REALITY

An imbalance exists between what we recommend people eat and what we actually produce

- Globally, the supply of cereals is 154% of what the population needs for a healthy diet. **Red meat is at 568%** [1]
- If the entire US population wanted to meet dietary guidelines, our agricultural system would fall short, especially in fruits, vegetables, legumes and tree nuts[1]
- Often cheaper to purchase a liter of soda than it is to buy a head of broccoli.
- **Policy/Legislation/Systemic change is needed and necessary**



1. Krishna Bahadur KC, Dias GM, Veramani A, et al., "When too much- ", (2018).
2. Neff R, "Introduction to the U.S. Food System- ", (2014).
3. Sotirovska D, Philip E. "*Why Eating Healthy Is so Expensive- ", (2018).*

TRANSFORMING OUR FOOD SYSTEM ***IS*** A SOLUTION

EAT

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

Food Planet Health

- **THE UN & EAT-Lancet Commission & Diets for a Better Future (1,2)**
  - *"**National dietary guidelines** are an opportunity for policymakers to support coherent food and agriculture priorities **aligned with the Paris Agreement and Sustainable Development Goals."***
  - *"Plant-based diets as a major opportunity for mitigating and adapting to climate change"*

Eat less meat: UN climate-change report calls for change to human diet

The report on global land use and agriculture comes amid accelerating deforestation in the Amazon.

- *The responsibility for dietary changes is biggest for those countries that have the largest environmental food print*

1. Willett W, Rockström J, Loken B, et al., "Food in the Anthropocene- ", (2019).
2. Schiermeier, "Eat less meat: UN climate-change report- ", (2019).
3. "Critical Points - Diets for a Better Future"

IPCC Sixth Assessment Report

Mitigation of Climate Change

IPCC: SUPPORTS THIS TRANSFORMATION

CHAPTER 7

Agriculture, Forestry, and Other Land Uses (AFOLU)

DOWNLOAD

- **Diversification of the food system** can **reduce risks associated with climate change** and produce significant **co-benefits to human health**
  - Plant-based foods
  - Animal-based foods produced in sustainable ways
  - Some countries may need to increase animal production

1. Special Report on Climate Change, IPCC, (2019) 3. Poore (2018)

HEALTHY FOR ENVIRONMENT = HEALTHY FOR PEOPLE

Whole- foods/ "Healthier" **plant-based diets reduce risk of food-related chronic diseases and are more environmentally-friendly**[1]

- Reduce risk of coronary heart disease, colorectal cancer and type 2 diabetes ***and*** reduced greenhouse gas emissions and other environmental pollutants [2,3]
- Perfect talking point for health providers to bring in the health component

1. Hallström E, Gee Q, Scarborough P, Cleveland D, "A healthier US diet- ", (2017).
2. Sabaté J, Soret S, "Sustainability of plant-based diets- ", (2014).
3. Springmann M, Godfray HCJ, Rayner M, Scarborough P, "Analysis and valuation of the health- ", (2016).

GREAT ARGUMENT: MANY STUDIES SHOW BENEFITS OF PULSES

- **Improved glycemic profile**
- **Reduction in hypertension**
- **Improvement in body weight**
- **Associated with decreased CHD**
- **Antioxidant Benefits**
- **Reduced Inflammation**
- **Beneficial to gut microbiome**

1. Ha, V, 2014, 2. Sievenpiper JL, Kendall CWC, Esfahani A, et al. Effect of non-oil-seed , 3. Singh B, Singh JP, Shevkani K, Singh N, Kaur A, 2017

BENEFITS OF BEANS/LEGUMES ON THE ENVIRONMENT

Easy to grow.

Use fewer resources & have fewer emissions/environmental effects

Build soil & support healthy bacteria in a symbiotic relationship

"Fix Nitrogen": Working with the microbes in soil, they help take nitrogen out of the atmosphere and bring it into the soil where it gets used as fuel and acts s natural fertilizer

(World Resources Institute, 2016)

IMPACT ON ENVIRONMENT AND HEALTH: FISHING/AQUACULTURE
34% OF FISH STOCKS AT UNSUSTAINABLE LEVELS.

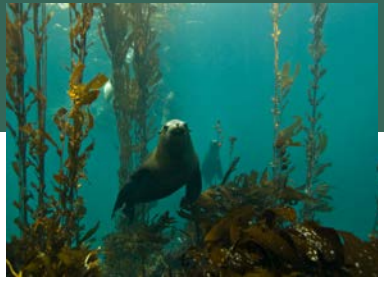
Fishing & Aquaculture (= 50% of seafood production)

- **Environment:**
  - Overfishing →Affects ecosystem & reduces biodiversity (23% of wild caught fish goes to aquaculture)
  - **Farmed fish (Aquaculture)**
    - Feed, pesticides and antibiotics → eutrophication and can contaminate water & may impact other fish.
  -
- **Health:**
  - Issues of antibiotic resistance
  - Farmed fish may be less nutrient dense - Lower in Omega 3
  - Impact on indigenous communities
  - Poor working conditions/human rights abuses in many operations

Depends on the how and where. There are sustainable operations

1. Neff R, "Introduction to the US Food System- ", (2014).
2. "Preserve habitats" Monterey Bay Aquarium Watch.
3. "What is sustainable seafood"
4. Zhao J, Zhang M, Xiao W, et al., "Large methane emission from freshwater – ", (2021).
5. Moyer J, et al. "THE POWER of the Plate (2019)
6. Cashion, T et al. Most fish destined for fishmeal production are food-grade fish. (2017)

OCEAN REGENERATIVE AGRICULTURE (TERRESTRIAL SYSTEMS HAVE REACHED A TIPPING POINT)



CERTIFIED SUSTAINABLE SEAFOOD MSC www.msc.org

- **"Blue Food Assessment"** www.Bluefood.earth
- 2500 species of **blue foods:** shellfish, fish, algae, seaweeds
  - We are only using Tuna, Salmon, Tilapia, Trout
  - We need to be using mollusks and seaweed
- Fewer greenhouse gases than meat.
- Blue foods will play a role in food security

ROLES THAT HEALTHCARE PROVIDERS CAN PLAY IN ADVOCATING FOR CHANGE IN THE FOOD SYSTEM TO MITIGATE CLIMATE CHANGE

- **Advocate for/Offer more Whole Foods Plant-Based (minimally processed) Options**
  - On an individual level
  - **Work with institutions:** schools, hospitals, prisons to shift menus
  - Consult with restaurants & chefs & eateries to shift menus
  - Offer/Suggest "**Climatarian"** option or **"Meatless Mondays"** or "**Green Tuesdays"** (gradual changes work best)
  - Combine beef with plant-based proteins
  - Encourage **mollusks/bivalves** & **"better meat"**
  - **Look at most sustainable Fish:** https://www.seafoodwatch.org/recommendations/download-consumer-guides
  - Consider culture and systems
  - **POLICY: Advocate for the "Future Healthy Students and Earth Act"**

HOW WE ARE GROWING/RAISING FOOD AND THE ENVIRONMENTAL AND HUMAN HEALTH IMPACTS.

IMPACT OF INDUSTRIAL FOOD SYSTEM ON ENVIRONMENT AND HEALTH

- **Environment:**
  - Associated with deforestation (Carbon sequestration affected)
  - Reduces biodiversity (variety of all plants, insects, wildlife)
  - Doesn't build soil/depletes soil. (Carbon sequestration affected)
  - Plants are more susceptible to disease & to pests → more pesticides.
  - More herbicides often become necessary for herbicide resistant weeds (glyphosate resistant crops → increased use of glyphosate)

1. Neff R, "Introduction to the US Food System- ", (2014).
2. "History of Agriculture"
3. "2017 Annual Report", (2017).
4. Arsenault C, "Only 60 Years of Farming- ", (2014).

IMPACT OF INDUSTRIAL FOOD SYSTEM ON ENVIRONMENT AND HEALTH

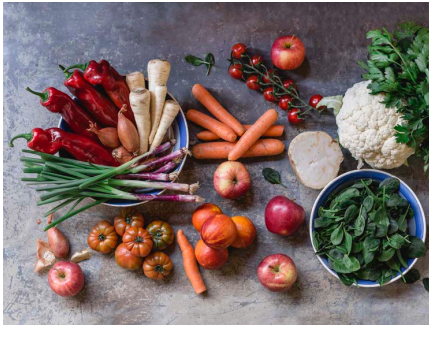
- **Health:**
  - Less nutrient dense (nutrients lost from depleted soil)
  - Often going to produce ultra processed foods & sugar = cheap and abundant → chronic disease (HFCS – associated with obesity)
  - Agro-chemicals can contaminate water supply, air, ground & contribute to diseases
  - Biodiversity loss threatens food supply

1. Neff R, "Introduction to the US Food System- ", (2014).
2. "History of Agriculture"
3. "2017 Annual Report", (2017).
4. Arsenault C, "Only 60 Years of Farming- ", (2014).

WHY IS BIODIVERSITY IMPORTANT?

75% OF OUR CONSUMED CALORIES COME FROM JUST 12 FOODS

BIODIVERSITY= THE DIVERSITY OF PLANTS, ANIMALS, INSECTS AND OTHER ORGANISMS = CREATES RESILIENCE = KEY FOR FOOD SECURITY



Diverse agroecosystems: safeguard food security

- Retain more water, prevent soil loss, and have better quality soil.
- Better quality soil = healthier plants which are less vulnerable to pest damage and disease
- More resilient to extreme weather patterns

Diet diversity associated with better health

- Access to greater number and array of nutrients
- Supports microbiome & contributes to immune system

Loss of beneficial insects – impacts food supply

Biodiverse farming (organic/regenerative) = fewer pesticides and fungicides

1. Bélanger J, Pilling D (eds). "The State of the World's Biodiversity- ", (2019)
2. Lachat et al. Dietary species richness as a measure of food biodiversity and nutritional quality of diets. Sustainability Science

IMPACT OF INDUSTRIAL FOOD SYSTEM ON ENVIRONMENT AND HEALTH: FERTILIZERS & PESTICIDES[1,2,3,4,5,6,7,8,9,10]

Chemical Fertilizers (increased by 800% since 1960s & = 21% of agricultural emissions)

- **Environment:**
- Decreases soil bacteria & depletes soil – less resilient;
- Runoff →oceans and creates **dead zones** that threaten fish. ("Eutrophication")
- Source of green house gases: Nitrous Oxide and CO2

Health:

- Pollutes air →respiratory issues
- Runoff contaminates water → health impact
  - Impact on thyroid function
- Affects soil → affects nutrient density of plants/crops
- Plant produces fewer nutrients

1. Neff R, "Introduction to the US Food System- ", (2014).
2. "History of Agriculture"
3. "2017 Annual Report", (2017).
4. Arsenault C, "Only 60 Years of Farming- ", (2014).
5. Li Z, Jennings A, "Worldwide Regulations of Standard- ", (2017).
6. Siviter H, Bailes EJ, Martin CD, et al., "Agrochemicals interact synergistically- ", (2021).
7. Willis Chan DS, Raine NE, "Population decline in a ground-nesting- ", (2021).
8. "New research shows 50 year- ", (2021).
9. Tarcea M, Bacarea A, Fulop E, et al., "Chemical pollution with nitrates- ", (2016).
10. Moyer J,. et al. "THE POWER of the PLATE- ", (2020).

PESTICIDES/HERBICIDES: 1.2 BILLION POUNDS OF PESTICIDES/YEAR IN U.S. [1,2,3,4,5,6,7,8,9,10]

IMPACT

- **Environment**
  - Harms wildlife & pollinators (responsible for 1/3 of our food supply) & toxic to aquatic invertebrates
  - Reduces biodiversity; Kills beneficial bugs
  - Affects ecosystem/microbiome of soil → less resilient
  - Contribute to acidification of oceans
  - Production → greenhouse gases

- **Health:**
  - Runoff can contaminate water systems for humans and food chain
  - Linked to numerous health issues: endocrine; cardiovascular, diabetes, neurodegenerative diseases: Parkinsons, Alzheimers, ALS,; birth defects, cancers, autism
  - Soil microbiome affects human gut microbiome
  - Plants stop producing as many **phytochemicals**
  - Often a greater impact on marginalized populations & children

1. Neff R, "Introduction to the US Food System- ", (2014).
2. "History of Agriculture"
3. "2017 Annual Report", (2017).
4. Arsenault C, "Only 60 Years of Farming- ", (2014).
5. Li Z, Jennings A, "Worldwide Regulations of Standard- ", (2017).
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10. Moyer J,. et al. "THE POWER of the PLATE- ", (2020).

AGROECOLOGY/"CONSERVATION AGRICULTURE"/ORGANIC/"REGENERATIVE AGRICULTURE": BUILDS HEALTH INTO THE SYSTEM STARTING WITH SOIL WHICH CAN STORE CARBON = "FARMING AS MEDICINE"[1,2]

Minimize disturbances to soil	No/low tilling so plants stay connected to microorganisms in soil
Maximize crop diversity	Different crops feeds the soil Reduces pests
Use Cover Cro	build soil & sequester carbon and feed to plant; oil erosion
No synthetic chemicals	Minimizes fertilizer and pesticide
Often Integrates Livestock	Rotational grazing stimulates new growth. Manure = fertilizer
Builds resilience & Healthier soil	Helps mitigate issues of climate change/extreme weather

Promotes Food Sovereignty
Better human health outcomes

1. Chrisman S, "What Is Regenerative Agriculture? ", (2019).
2. "The dirt on climate change- ", (2020).

BENEFITS OF ORGANIC/REGENERATIVE FARMING/AGROECOLOGY ON CROPS & HEALTH/NUTRITION

- **Higher nutrient levels:** minerals and vitamin C, amino acids
- **Higher in phytochemicals:** beta carotene, anthocyanins,
  - **P**revent disease and **supports human gut microbiome**
- **Higher in Ergothioneine** ("ergo"): naturally occurring antioxidant
  - May reduce the risk of neurodegenerative diseases like Alzheimer's.
  - Depends on healthy fungal networks in soils, many of which are destroyed in industrial farming through fungicide use and tillage.
- **Greater diversity of microbiota than conventionally grown**
- **Lower levels of heavy metals**
- **Increased organic intake was associated with** reduced incidence of infertility, birth defects, metabolic syndrome, non-Hodgkin lymphoma and other health conditions.

1. Barański M, Srednicka-Tober D, Volakakis N, et al. "Higher antioxidant and lower- ", (2014).
2. Johansson E, Hussain A, Kuktaite R, Andersson SC, Olsson ME. "Contribution of Organically Grown- ", (2014).
3. "3 Studies That Show Healthy Soil- ", (2020).
4. Vigar et al., "A Systematic Review of Organic Versus Conventional Food Consumption"
5. Wassermann, B. et al. An Apple a Day: Which Bacteria Do We Eat With Organic and Conventional Apples? (2019)|

THIS JUST OUT JAN 2022!

PeerJ
Related research
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‹ ENVIRONMENTAL SCIENCE

Soil health and nutrient density: preliminary comparison of regenerative and conventional farming

David R. Montgomery [1], Anne Biklé [2], Ray Archuleta [3], Paul Brown [4], Jazmin Jordan [4]

[1] Department of Earth and Space Sciences, University of Washington, Seattle, WA, United States
[2] Dig2Grow.com, Seattle, WA, USA
[3] Unaffiliated, Seymour, MO, USA
[4] Brown's Ranch, Bismarck, ND, USA

- **10 Farms** with no-till, cover crops, and diverse rotations produced crops with **higher "soil organic matter"** levels, soil health scores, and levels of certain vitamins, minerals, (Cu, Ca, Zn)
- Higher levels of **phytochemicals** (including phytosterols) with regenerative farming than conventional (promote immune health)
- **Regenerative grazing practices** produced meat with a **better fatty acid profile** & ratio
- Regenerative farming systems provided greater ecosystem services and **profitability for farmers** than an input-intensive model of corn production

1. Montgomery DR, Biklé 2022. Soil health and nutrient density: preliminary comparison of regenerative and conventional farming. *PeerJ* 10:e12848
2. Montgomery d et al, Soil Health and Nutrient Density: Beyond Organic vs. Conventional Farming: Front. Sustain. Food Syst., 04 November 2021
3. LaCanne CE,. Regenerative agriculture: merging farming and natural resource conservation profitably. 2018.

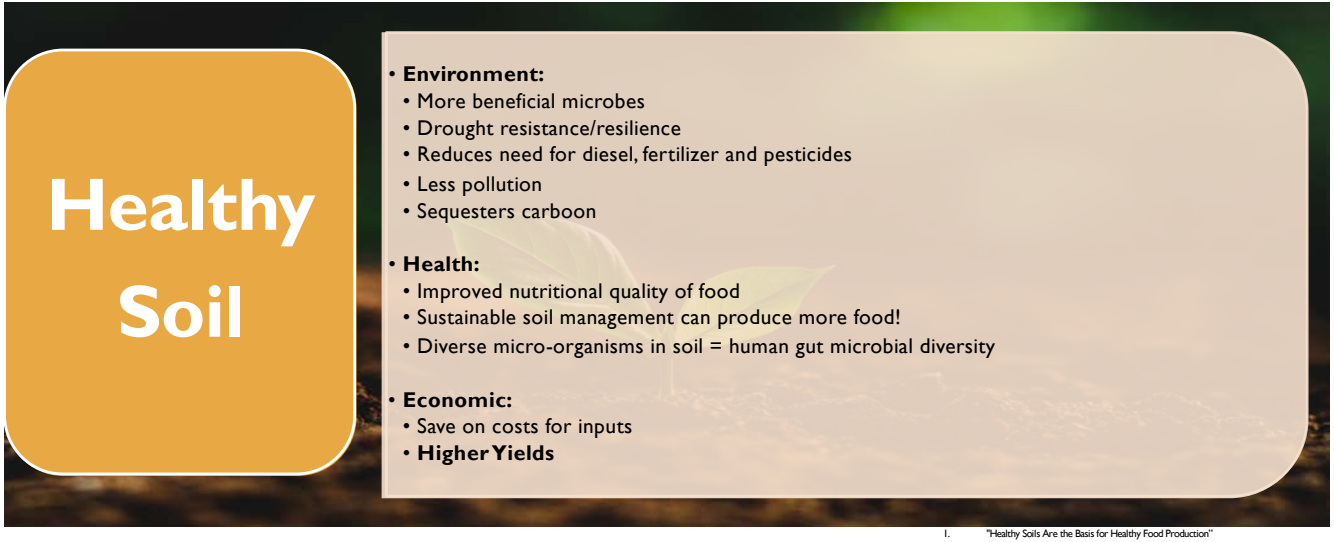
DIRECT EXPOSURE TO SOIL AFFECTS HEALTH

- Exposure to outdoors/forests/soil/green spaces – helps build immune system
- Greater exposure linked to increase diversity of microbes on skin and gut microbiome

- **Less Biodiversity in more urban and modern environments**
  - May contribute to uneducated immune system
  - May increase susceptibility to immune-mediated diseases
  - Potentially contributes to asthma and allergies
  - Disproportionate impact on communities of color

Tasnim N, et al Linking the Gut Microbial Ecosystem with the Environment: (2017)
Roslund et al. Biodiversity intervention enhances immune regulation (2020)

HEALTHY SOIL = BASIS FOR HEALTHY FOOD PRODUCTION

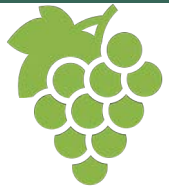


1. "Healthy Soils Are the Basis for Healthy Food Production"
2. https://www.soilregensummit.com/events/dr-david-montgomery-growing-a-revolution-and-what-your-food-ate/

ROLES THAT YOU CAN PLAY IN ADVOCATING FOR CHANGE IN THE FOOD SYSTEM TO MITIGATE CLIMATE CHANGE

Support/Advocate for Small Farmers and Local/Regional Food Systems

- Encourage eating/buying locally/seasonal
- **(More nutrients when allowed to ripen)**
- Work with restaurants & chefs & institutions to source local/regional products (Farm to School)
- Promote farmers markets & connect farmers with organizations serving food
- **Apply for Grants:** The Local Food Promotion Program (LFPP)



Promote or source from Sustainably/ Regeneratively-Grown Foods

- Advocate for Community/Urban Gardens
- Educate and advocate for sustainable foods labeled "**USDA Organic**", "**Fair Trade**" or "**Non-GMO Project**" of (3rd party certified)
- **Discuss potential health benefits:** higher phytonutrients & nutrient density from nutrient dense soil
- **POLICY:** https://regenerateamerica.com/ - **Farm Bill**


THE NEW COAL
PLASTICS & CLIMATE CHANGE
Beyond Plastics | October 2021
ST. JAMES IS OUR HOME

PLASTICS

IMPACT ON ENVIRONMENT AND HEALTH: PLASTICS

Plastics

(50 % of plastic in ocean is from discarded fishing gear)

(45%= food packaging)

- **Environment:**
  - Production and incineration →greenhouse gases & air pollution.
  - Affects soil health
  - Microplastics → threaten ocean health and marine life; disrupt ecosystems and consumed by marine life.
  - In 30 years, there will be more plastic than fish in ocean
- **Health:**
  - Human exposure to microplastics → possible inflammation and immune, endocrine disruption;
  - Factories pollute air mostly in marginalized and low income communities
  - Environmental Justice Issue.

1. Neff R, "Introduction to the US Food System- ", (2014).
2. "History of Agriculture", (2019).
3. "2017 Annual Report", (2017).
4. Arsenault C, "Only 60 Years of Farming- ", (2014).
5. "Marine Plastic Pollution", (2021).
6. Landrigan PJ, Stegeman JJ, Fleming LE, et al., "Human Health and Ocean Pollution", (2020).
7. Prata JC, da Costa JP, Lopes I, Duarte AC, Rocha-Santos T, "Environmental exposure to microplastics- ", (2020).

ACTIONS THAT WE CAN TAKE TOWARDS REDUCING PLASTIC

Reduce Food Packaging/Plastics

- Buy in bulk
- Reuse items: bags, ("Circular economy")
- Offer fewer single use plastics & packaged foods
- Ensure more **reusable** silverware/cups/plates at restaurants, facilities, events, conferences
- Encourage bringing and using glass containers & eco-friendly kitchen ware
- Cook more!
- Work with brands to reduce packaging/find sustainable packaging
- POLICY: Advocate for the "Break Free From Plastic Pollution Act of 2021" In Congress

- **30-40% OF THE FOOD PRODUCED = LOST OR WASTED** [1]
- **RESPONSIBLE FOR 8% OF GREENHOUSE GASES** [1] **(METHANE GAS)**
- **A LEADING CAUSE OF FRESHWATER POLLUTION**

1. "Food Loss and Food Waste", (2022).

WHY SO MUCH FOOD WASTE?

- Bad weather or…Pandemics!
- Overproduction & overbuying
- Processing issues & Market Conditions
- Lack of planning & Label confusion
- Fear of ugly produce
- No composting programs
  - Resources have still been used even when food gets composted.
- Resources have still been used even when food gets composted.
- Labor issues/farmworkers – Immigration reform issue
- What percentage is wasted at the consumer level?
- 40% is wasted by consumers
- 40% is wasted by major food producers
- $218 billion/year in cost (business case)

ACTIONS THAT WE CAN TAKE TOWARDS REDUCING FOOD WASTE

- Educate on "Best By"
- Support Grocery Stores, Institutions, Restaurants & chefs with waste reduction
- Start a composting program at your facility
- Encourage "Imperfect produce"
- Broccoli Stalk soup, anyone?
- "Too Good to Go" App
- **POLICY:** The Food Donation Improvement Act
- 2018 Farm Bill, Congress created the Community Compost and Food Waste Reduction Grant Program

- WE EAT EVERY SINGLE DAY IF WE ARE LUCKY.
- WHEN SYSTEMIC CHANGE ISN'T ALWAYS POSSIBLE
- **CONSUMER DEMAND** CAN DRIVE CHANGE
- **INSTITUTIONAL DEMAND** CAN DRIVE CHANGE
- **ADVOCACY CAN DRIVE CHANGE**
- WE CAN HELP MAKE THIS HAPPEN

MOVEMENTS FOR CHANGE ALREADY IN PLACE

- **"Cool Food Pledge" & "Plant-Forward Future"** :
  - **Healthcare Without Harm**, Practice Greenhealth & Restaurant Associates[1,2,3]
  - Helps facilities track carbon footprint & slash food-related greenhouse gas emissions by 25 percent by 2030.
  - **"Cool Food Meals" Badge for restaurants (October 2020)**
    - Panera bread was first adopter

- **"Menus of Change":** Culinary Institute of America:
  - Combines optimal nutrition + environmental stewardship and restoration, + social responsibility within the **foodservice industry and the culinary profession**

1. "Cool Food", World Resources Institute.
2. "Cool Food Pledge". Cool Food.
3. "Cool Food Pledge", Practice GreenHealth.

GRASSROOTS MOVEMENTS: LOOK TO AND LEARN FROM BIPOC FARMERS AND FARMING COMMUNITIES, URBAN FARMS

- Leah Penniman of **Soul Fire Farm**
  - Highlights contributions of African-heritage people to sustainable agriculture
  - Working to inspire those with African-heritage to **reclaim their role in farming**.

- **Nurturing Roots Farm, Seattle, WA**

- Many Black, brown, Indigenous farmers have been using environmentally friendly practices for centuries

WHAT CAN YOU DO PROFESSIONALLY? SPEAK UP & PARTICIPATE AND EDUCATE

- **Social Media Platforms**
  - Promote plant forward food & sustainable practices
  - Educate on Eco-Friendly Diets and Agriculture
  - Amplify BIPOC communities
  - Call out brands, orgs who promote sustainability
  - Keep the messages positive

- **Educating students and Other Health Practitioners**
  - Webinars on sustainable eating/growing practices
  - Create handouts/downloadable docs on eco-friendly eating
  - Include in curriculum, classrooms & workshops
  - Write papers, articles, blogs, etc.
  - Encourage your associations to include sustainability discussions/webinar/articles

SUMMARY: WE ARE ALL A PART OF THE FOOD SYSTEM

- 25% - 37% of greenhouse gas emissions come from the food system
- Agricultural practices & the food that is produced have an effect on both environmental and human health
- Changes in our Agriculture over the past 50 years have coincided with dietary patterns and increased chronic disease.
- Switching to **soil-building, water saving, carbon sequestering regenerative agriculture** and to diets with more **whole and plant-based foods, fewer processed foods,** and **reducing food waste** and plastic improves food systems, public health and planetary health.
- Without major changes, our food system will continue to push Earth well beyond its planetary boundaries.
- What we put/serve on our plates is one of the ways we can most impact the health of the planet.

1. Ritchie H, "Food production is responsible- ", (2019).
2. "Critical Points - Diets for a Better Future"

REALITY

If we don't address food emissions, we cannot meet our goals of reducing our emissions and achieving the UN Sustainable Development Goals

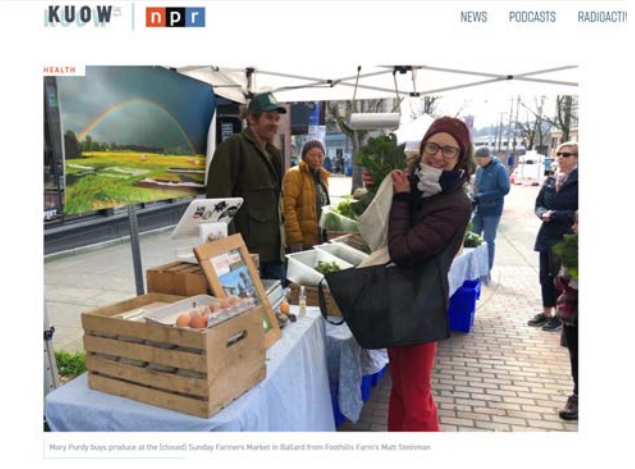
1. "History of Agriculture", (2019).

“TO PLANT A GARDEN IS TO BELIEVE IN TOMORROW”

- AUDREY HEPBURN

What seed will YOU plant this week?

QUESTIONS?



Podcast: "The Nutrition Show" - Available on iTunes

www.MaryPurdy.co
Mary@MaryPurdy.co

FB: MaryPurdyRD

Instagram:MaryPurdyRD

Twitter:@marypurdyhere

Resources :

https://marypurdy.co/sustainable-food-systems-educational-resources

Many more resources in additional slides below

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CERTIFICATES AND RESOURCES FOR LEARNING AND SELF EDUCATION

- **The Academy's Sustainable Food Systems Primer for RDNs and NDTRs**
- **Sustainable Food Systems Certificate of Training from the Academy:**
- **Johns Hopkins Courses on Coursera**
  - **Public Health Perspectives on Sustainable Diets:** https://www.coursera.org/learn/sustainable-diets
  - **An Introduction to the U.S. Food System: Perspectives from Public Health** https://www.coursera.org/learn/food-system?
  - **Johns Hopkins Food Systems Primer: (On their site)**
- Harvard Extension Sustainable Food Systems Certificate
- Portland State University Graduate Certificate in Sustainable Food Systems
- **ANH: Agriculture, Nutrition and Health Academy:** https://www.anh-academy.org/ (Immana)
  - Working at the intersection of agriculture and food systems for improved nutrition and health
  - Healthy and sustainable diets

RESOURCES FOR FURTHER EDUCATION

Academic Institutions & Government Agencies

- Food and Agriculture Organization
- Johns Hopkins Center for a Livable Future
- Planetary Health Alliance
- The International Panel on Climate Change
- The World Resources Institute

Education

- **Oregon State University: E-Organic Site:** https://eorganic.org/
- **Grand Challenges: Food for Thought: https://www.futurelearn.com/courses/grand-challenges-food-for-thought (online course)**

  University of Arizona: Environmental Health: An Integrative Approach (2022-2024)
- **Article in JAND:** Cultivating Sustainable, Resilient, and Healthy Food and Water Systems: A Nutrition-Focused Framework for Action
- Sustainable Food and farming Online

RESOURCES FOR LEARNING AND SELF-EDUCATION

- Be mindful of organizations/businesses who provide information about sustainability who are either part of or are representing or funded by large agri-businesses
- Who is funding the studies?
- Who is creating the narrative?
- Healthcare practitioners/dietititans/students/consumers should get information from unbiased and impartial organizations

RESOURCES FOR FURTHER EDUCATION

Academic Institutions & Government Agencies

- Food and Agriculture Organization
- Johns Hopkins Center for a Livable Future
- Planetary Health Alliance
- The International Panel on Climate Change
- The World Resources Institute

Certificates & Education

- Harvard Extension Sustainable Food Systems Certificate
- Portland State University Graduate Certificate in Sustainable Food Systems
- Sustainable Food Systems Certificate of Training Program
- Sustainable, Resilient, and Healthy Food and Water Systems
- Environmental Health: An Integrative Approach

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