RD Resources for Professionals:

Plant-Based Diets in Climate Change Mitigation and Resource Conservation

Overview

Climate change refers to variations in the climate attributed to human activity that alters the global atmosphere.\(^1\) Scientific data demonstrates that human activity over the past 100 years has generated increased levels of greenhouse gas emissions effecting our atmosphere and ecosystems.\(^2\) While greenhouse gas emissions climb and the planet continues to warm,\(^3\) climate change has created unprecedented challenges such as food insecurity, extreme weather events, drought, the acidification of the ocean, increased wildfire frequency, displacement, and numerous other public health problems such as air quality deterioration, etc.\(^6\)\(^-\)\(^8\) Additionally, climate change is an overarching social justice, environmental justice, and human rights issue.\(^9\)\(^-\)\(^10\) Because of the observed effects of climate change, scientists express a heightened sense of urgency in reducing greenhouse gas emissions to restore and balance the climate systems.\(^6\)\(^-\)\(^8\) With ecosystems in decline and resource consumption outpacing biocapacity,\(^11\) actions to mitigate climate change and restore planetary health are imperative.

Dietary modification remains an important but underutilized entity in reducing greenhouse gas emissions, i.e., reductions in meat and dairy consumption are considered instrumental in achieving reduced greenhouse gas emission goals.\(^12\)\(^-\)\(^13\) As experts on the frontline of food and nutrition recommendations and food procurement, Registered Dietitian Nutritionists (RDN) and Dietetic Technicians (DT) can lead efforts in mitigating diet-related greenhouse gas emissions and other environmental burdens associated with food choices by promoting a shift toward plant-based diets.

Greenhouse Gas Emissions

The landmark publication Livestock’s Long Shadow: Environmental Issues and Options drew attention to the global environmental impact of the livestock industry. The livestock industry not only emits large amounts of greenhouse gases such as carbon dioxide that contribute to climate change, but emits other greenhouse gases such as methane and nitrous oxide that have greater warming potential than carbon dioxide.\(^14\) Additionally, recent studies have found that methane emissions from livestock in the United States (U.S.) have been underestimated,\(^15\)\(^-\)\(^16\) with methane emissions from livestock 70% greater than that of oil and gas emissions.\(^16\) Even using conservative estimates, the livestock sector could exceed our “safe atmospheric operating space” by the year 2050.\(^17\) That is, the projected increased production of meat, milk, and eggs may surpass proposed biophysical boundaries.\(^17\) Substituting legumes to satisfy protein needs in this scenario would create outcomes that substantially minimize risk to the atmosphere.\(^17\)

Environmental Degradation

Globally, livestock are associated with numerous environmental burdens including land degradation and erosion, deforestation, the acidification of ecosystems, the loss of biodiversity, increased water use, and water pollution due to animal waste.\(^14\) Additionally,
hormone, antibiotic, chemical, and pesticide applications further add to ecosystem degradation—not to mention “dead zones”. A comprehensive study of industrial farm animal production in the United States is not sustainable and presents an unacceptable level of risk to public health and damage to the environment... Aquaculture, overfishing, and the anthropogenic contamination of fish in our waterways from substances such as methyl mercury also pose environmental concerns. Reduced Emissions and Resource Use with Plant-Based Diets

Numerous studies document the beneficial role of plant-based diets in reducing greenhouse gas emissions, resource consumption, and environmental degradation. While this area of research is evolving, studies generally find that plant-based foods (with some exceptions) require less energy to produce and generate fewer greenhouse gas emissions than animal foods.

Agricultural practices within the Mississippi River Basin contribute to the dead zone in the Gulf of Mexico. An important study found that shifting production in the area away from beef and pork to producing a lacto-ovo vegetarian diet or a vegetable protein-based diet could result in impressive reductions in land and chemical use—with the plant-based diet offering the greatest reductions. Such changes could mitigate hypoxia in the Gulf of Mexico dead zone. However, it should be noted that decreasing animal product consumption does correspond with decreasing greenhouse gas emissions and other benefits to the natural environment.

A Swedish study of 22 foods and their respective energy use and greenhouse gas emissions found that the higher the protein content of the plant-based food, the lower the greenhouse gas emissions and the more energy-efficient the food was. The opposite was true for animal foods. In another study of 84 common foods in Sweden, the protein delivery efficiency was highest among plant foods while greenhouse gas emissions were lowest. As an example, eating soybeans as the main protein source for a meal generated far fewer greenhouse gas emissions as measured in carbon dioxide equivalents (0.23 kg) than serving pork (0.94 kg) or beef (3.0 kg), respectively.

A recent study of several dietary patterns consumed by participants of the EPIC-Oxford study in the United Kingdom (UK) found that eating more than 100 grams (~1/2 cup) of meat daily generated 2.5 times the greenhouse gas emissions as the vegan diet when analyzing for a 2,000 calorie per day intake. Using environmental impact indicators such as greenhouse gas emissions, air acidification, and freshwater eutrophication (an excessive amount of anthropogenic-induced nutrients such as nitrogen and phosphate that contributes to conditions such as hypoxia and algal blooms), a recent analysis of the French diet found that the environmental impact was highest for animal products such as meat, fish, eggs, and dairy products. Eutrophication and greenhouse gas emissions were highest for ruminants while eutrophication alone was highest for pork, poultry, and eggs. Conversely, starchy foods (grains, beans, potatoes) and fruits and vegetables had the lowest environmental impact.

An analysis of 61 food categories and their related embodied greenhouse gas emissions in the UK found that meat and dairy products generally had the highest carbon intensities, whereas fruits and vegetables that had not been air-freighted or grown with artificial heat had the lowest emissions. Additionally, switching from a typical UK omnivorous diet to a vegetarian or a vegan diet could decrease greenhouse gas emissions by 22% to 26%, respectively.

Researchers analyzing data from the Adventist Health Study-2 cohort in North America found that carbon-dioxide equivalents were significantly lower for...
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semi-vegetarian and vegetarian diets compared to non-vegetarian diets. With regard to the agricultural inputs of water, pesticide, and energy use in the state of California, non-vegetarian diets used 2.9 times the water, 2.5 times more energy, 13 times more fertilizer, and 1.4 times more pesticides than vegetarian diets. Lastly, foods of plant origin generally have smaller water footprints than animal products. Milk, eggs, and chicken utilize 1.5 times the water per gram of protein than pulses (dried legumes) while beef uses 6 times the water. Substituting plant-foods such as pulses and nuts for meat would decrease the average U.S. food-related water footprint by 30%.

Strategies For Promoting A Healthy Planet

The RDN and DT have an unlimited range of promotion ideas for improved planetary health such as:

1. Create awareness promoting events at:
   - Earth Day (April 22)
   - National Nutrition Month (March)
   - World Water Day (March 22)
2. Increase plant-based food procurement and offerings in the workplace and community events
3. Promote plant-based diets for planetary health to legislators, policy councils, food justice, environmental, agriculture, and public health organizations, restaurants, and chefs
4. Encourage prevention of food waste, minimize food packaging and demonstrate composting techniques for plant-based food scraps
5. Interdisciplinary collaboration such as seminars for health care and public health providers about the role of plant-based diets in planetary health
6. Offer plant-based cooking classes and food demonstrations that encourage cooking from scratch
7. Teach others how to grow organic produce throughout the seasons.

For more ideas and vegetarian resources, visit www.vndpg.org and www.vegetariannutrition.net

Additional Resources

Ecological Footprint Analysis, Center for Sustainable Economy: http://myfootprint.org/en/


Growing Food and Saving Seeds, Native Seed/SEARCH: http://www.nativeseeds.org

Tour the Food Supply, Center for Science in the Public Interest: https://www.cspinet.org/EatingGreen/tour.html

References


