Environment Impact of Food Production

What are the environmental impacts of food and agriculture?

**Context**

As the world’s population has expanded and gotten richer, the demand for food, energy and water has seen a rapid increase. Not only has demand for all three increased, but they are also strongly interlinked: food production requires water and energy; traditional energy production demands water resources; agriculture provides a potential energy source. This article focuses on the environmental impacts of food. Ensuring everyone in the world has access to a nutritious diet in a sustainable way is one of the greatest challenges we face.

### Inspiration

1. Which types of food have more negative impact on the environment?
2. What types of food production should be encouraged to consume nutritious diet in a sustainable way?
3. Which stage of food production contributes more to the greenhouse gas emmision?
4. Compare carbon footprint of plant-based foods?
5. Compare carbon footprint of animal-based foods?
6. Compare carbon footprint of protein rich foods?

Environmental Impact of Food Production' Dataset

link code

The **'Environment Impact of Food Production'** dataset contains 43 common foods grown across the globe and 23 columns as their respective land, water usage and carbon footprints. As stated in the [dataset FAQs](https://ourworldindata.org/faqs-environmental-impacts-food), these represent **greenhouse gas (GHG) emissions** expressed as **kg of CO2 equivalents per kg of food product** across different **stages in the lifecycle** of food production:

* *Land use change*
* *Animal Feed production*
* *On Farm* impacts in crop or livestock production (including the manufacturing of inputs such as fertilizers, or emissions from manure)
* *Food Processing*: the conversion of raw ingredients into sold products, such as the processing of cereals into bread
* *Transport*: this includes transport from the farm up to retail. Transport of food from retail to consumers’ homes is not included.
* *Packaging*
* *Retail*: energy consumption in retail stores, such as refrigeration.

Kg of CO2 equivalents is a unit of measure that takes into account all types of GHG using global warming potential (over 100-year timescale), a value which aims to represent the amount of warming that each specific gas generates relative to CO2. For example, 1kg of methane (CH4) corresponds to 28kg of CO2 (IPCC) in terms of global warming potential.

In addition, GHG emissions and other environmental impacts are reported related to the food's **mass, kilocalories and protein content**:

* *Eutrophying emissions (gPO₄eq)*: eutrophication refers the pollution of a superficial water body due to the addition of minerals and nutrients such as nitrogen and phosphorous. This excessive organic load can lead to the complete death of the ecosystem, since it promotes the excessive growth of algae which consume all the oxygen, causing all aerobic organisms to die.
* *Freshwater withdrawals (liters)*: 'Water withdrawals [...] are defined as freshwater taken from ground or surface water sources, either permanently or temporarily, and conveyed to a place of use.' ([OECD](https://data.oecd.org/water/water-withdrawals.htm#:~:text=Definition%20of,to%20a%20place%20of%20use.))
* *Land use (m²)*: 'Land use involves the management and modification of natural environment or wilderness into built environment such as settlements and semi-natural habitats such as arable fields, pastures, and managed woods.' ([Wikipedia](https://en.wikipedia.org/wiki/Land_use))
* *'Scarcity-weighted water use (liters)* represents freshwater use weighted by local water scarcity, combining water use and water stress in one indicator (however, several research papers do not recomment this indicator).