Food and climate change - key facts

Food production accounts for a quarter of global greenhouse gas emissions

- Farming accounts for about 10-12%[1] of global greenhouse gas emissions.
- But the entire food system - including from the destruction of forests and other natural environments for agricultural land, as well as processing, transportation and refrigeration of food - generates 19-29% of manmade greenhouse gas emissions.
- Poorer countries produce more greenhouse gas emissions[2] from agriculture, deforestation and other land use change than rich countries. But the production and consumption of food in rich countries releases far more carbon per person.

Cattle, fertiliser and land use change are major sources of emissions

Forest destruction and other land use change:

- More than two thirds of the Earth's surface is devoted to agriculture - and about 80% of deforestation occurs because of the need to create farmland.
- Overall, deforestation and other land use change is responsible for about a tenth[3] of the world's greenhouse gas emissions.

Fertiliser:

- Agricultural fertiliser is responsible for the majority of the nitrous oxide released into the atmosphere as a result of human activity. Nitrous oxide is released into the atmosphere when artificial fertiliser is created, and when it is spread onto the land.
- Nitrous oxide has almost 300 times the warming effect of carbon dioxide and is responsible for about 6% of annual greenhouse gas emissions globally.
- Concentrations of nitrous oxide have been growing continuously in the atmosphere over the past century as a result of fertiliser use.

Livestock and meat production:

- 20 billion animals graze 30% of the Earth's land area. When they digest food, ruminants like cattle and sheep release methane - a greenhouse gas around 30 times as powerful as carbon dioxide.
- One third of the world's cropland area is used to grow food for animal feed. If the climate impacts of growing feed crops is included, the livestock sector is responsible for about 15% of all human-caused greenhouse gas emissions.

Soil degradation:

- The soil is a "carbon sink", locking two to three times as much carbon away as there is present in the atmosphere.
- But agricultural soils have lost 116 billion tonnes of carbon since farming began - about a quarter of the amount released by burning fossil fuels since the industrial revolution.
- At current rates of degradation all the world's topsoil could be gone by around 2075, creating an existential threat potentially as serious as climate change.

A third of the world's food is wasted

- Around 30-40% of food produced around the world is never eaten. If food waste was a country, its emissions would rank third in the world, after China and the US.

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[1] p.869
[2] p.18
[3] p.869 Land use and land use change accounted for 9-11% of human caused greenhouse gas emissions from 2000 to 2010.

- Western diets are highly carbon polluting for three reasons: high levels of meat consumption, large amount of food waste, and the energy needed to create large amount of dry and purified food like powdered milk, which is used the creation of processed meals.
- Overall the processing, production, transport, consumption and disposal of food account for about one fifth of the sector's emissions.
- The assumption that "food miles" is a major part of food's impact on climate change is largely incorrect. For most foodstuffs, transport accounts for less than 10% of the carbon emissions associated with its production.

Climate change will have big impacts on food production

- A global temperature rise of 3-4°C would create significant risks to food production.
- Our ability to grow crops is already being affected by climate change. Between 1980 and 2008, wheat yields dropped 5.5% and maize yields dropped 3.8% as a result of rising temperatures.
- Around the world, more than 70% of farmed land is rainfed rather than irrigated - meaning that changes in rainfall patterns will have a direct impact on livestock and crop production.
- In sub-Saharan Africa, where two out of three people depend on agriculture for their livelihoods, maize yields could fall by two fifths and wheat by more than a third[4] by the middle of the century.
- The loss of vital food crops is likely to prove a huge setback for efforts to tackle malnutrition. Women heading up small-scale farming households in sub-Saharan Africa are likely to be disproportionately affected.
- Unless drastic action is taken to curb emissions, virtually all the world's coral reefs will be under threat from bleaching. 500 million people depend on the fish that need reefs.

Reducing emissions means changing the whole food system

Rising emissions:

- Global food demand is likely to increase by at least 60% by 2050, compared to 2006, due to population increase, income growth and rapid urbanisation, which tends to make people eat more processed food and meat.
- World meat consumption will double by the middle of the century, as consumption rises in developing countries, according to the Food and Agriculture Organization (FAO).
- As a result of the increase in demand and changing diets greenhouse gas emissions from farming could increase by 30% by 2050. This is incompatible with preventing dangerous climate change.

Agricultural solutions:

- The FAO and United Nations trade body UNCTAD have called for a "transformative process" or "paradigm shift" away from industrial agriculture towards traditional farming methods.
- These include using no-till farming to preserve soil carbon, and limiting use of artificial fertiliser. It means paying more attention to indigenous and practitioner knowledge from people who work on the land.
- But high-tech solutions are also likely to be needed - for example methane inhibitors for cows, or wheat and maize varieties that limit the production of nitrous oxide.

A food systems perspective:

- Rapidly reducing emissions from the food sector means changing the food production system as a whole - including inputs to farming like fertiliser and farm machinery, how food is processed, and diets and lifestyle.
- It means placing greater emphasis on equity, social justice and inclusivity. An example of this is women in Africa needing greater access to information to change agricultural methods.
- Reducing emissions and tackling health issues are linked. If everyone in the world switched to a vegetarian diet, the resulting improvements to health would save seven million lives by the middle of

[4] p.1218

the century. It could also reduce food emissions by two thirds, relative to what they will otherwise be.

Food and climate change events in 2018 and beyond

Spring 2018: Launch of the EAT-Lancet Commission report on Food, Planet and Health, in which 20 world-leading scientists aim to reach a scientific consensus that defines a healthy and sustainable diet.

31 March 2018: Deadline for countries to submit their views on what should be included in the next steps of the Koronivia Joint Work on Agriculture under the Paris climate change agreement. At the UN climate change conference in December 2017, countries reached a decision to jointly address issues related to agriculture under the agreement.

15 - 16 May 2018: The inaugural Africa Climate Smart Agriculture Summit aims to bring governments representatives, UN and donor agencies, farmers and the private sector together to look at ways of advancing climate smart agriculture in East Africa.

Autumn 2018: Release of Intergovernmental Panel on Climate Change special report on the impacts of 1.5°C temperature rise by the end of this century, and the actions needed to limit emissions to 1.5°C. Limiting emissions to 1.5°C will require very fast and radical social, political and economic change - including to the food sector.

24 - 26 March 2019: The 3rd Agriculture and Climate Change Conference in Budapest, Hungary will focus on the likely impact of climate change on crop production.