



Life on Land, where does your food come from?

**Briefing, 2022 Sustainable Development
Transformation Forum, 3 March 2022**

Pierre Boileau

Thanks to funders and partners

- Not possible to conduct a project of this size without significant contributions from funders and partners
- We had contributions of expertise and time from many authors.
- Their institutions also allowed them time away from their main activities to assist us.

GEO-6 Funders

Producing an assessment of this scale requires many generous contributions. The following organizations provided funding directly or indirectly to the sixth *Global Environment Outlook*: The Government of Norway, the European Union, the Governments of Italy, Singapore, China, Mexico, Switzerland, Denmark, Egypt and Thailand. Together with UN Environment's Environment Fund and Regular Budget, these contributions allowed for the production of GEO-6 and its accompanying Summary for Policymakers, as well as subsequent outreach activities.



GEO-6 Partners

GEO-6 also benefited from the generous contributions of several partners, including: GRID-Arendal, World Conservation Monitoring Centre (WCMC), The Centre for Environment and Development in the Arab Region and Europe (CEDARE), The Big Earth Data Science Engineering Program (CASEarth), the European Space Agency (ESA), the Netherlands Environmental Assessment Agency (PBL), the Freie Universität Berlin and the Massachusetts Institute of Technology (MIT).



How we got here

Main report

- 146 authors, 78 members of advisory bodies
- 41 review editors
- From more than 70 countries
- 301 UN reviewers
- More than 1,000 technical reviewers
- 364 Intergovernmental reviewers
- 5 review periods, 2 of which were intergovernmental reviews

Summary for Policymakers

- Negotiated in January, 2019
- 95 countries, 250 participants, 4 days
- 37 page summary plus 'Key Messages'

GEO-6 findings for Life on Land

- **Biodiversity is in crisis** - We might be observing the sixth mass extinction in the earth's history
- **Ecosystem decline** – 10 out of 14 terrestrial habitats showed a decrease in vegetation productivity between 2000 and 2013.
- **Deforestation** – The deforestation rate has dropped to 6.5 million ha/yr, with planted forests increasing to 3.2 million ha/yr.
- **Food production** – Is the primary use of land (50% of habitable land). We will need 50 percent more food to feed the 10 billion people on the planet in 2050
- **Monoculture crops** – Have helped increase productivity but led to environmental degradation, biodiversity and nutrition loss.



Climate change

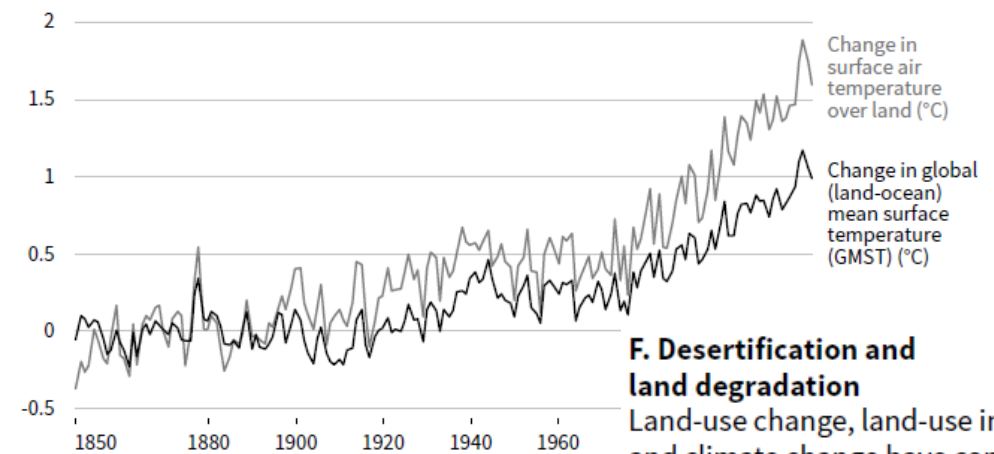
- **Temperature over land** – Average land surface temperature has increased by 1.5 degrees C, while global average temperature has increased only 1 degree C
- **Desertification** – In 2015, about 500 million people lived in areas experiencing desertification between the 1980s and 2000s. (South and East Asia, circum Sahara region, including North Africa, Middle East, including the Arabian peninsula)
- **Degradation** – About a quarter of Earth's ice-free land area shows human-induced degradation. Soil erosion from agricultural fields is estimated to be 10 to 20 times (no tillage) to more than 100 times (conventional tillage) higher than the soil formation rate

Land use and observed climate change

A. Observed temperature change relative to 1850-1900

Since the pre-industrial period (1850-1900) the observed mean land surface air temperature has risen considerably more than the global mean surface (land and ocean) temperature (GMST).

CHANGE in TEMPERATURE rel. to 1850-1900 (°C)

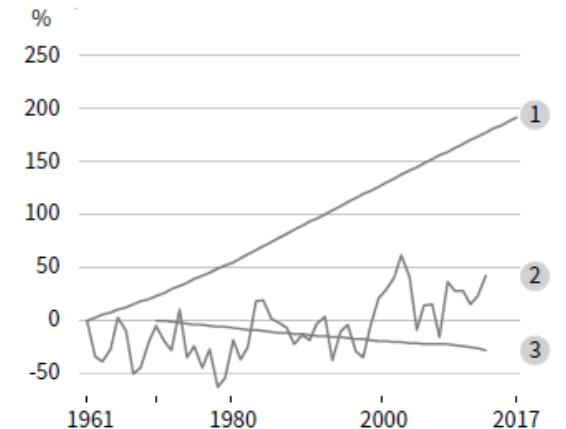


F. Desertification and land degradation

Land-use change, land-use intensification and climate change have contributed to desertification and land degradation.

CHANGE in % rel. to 1961 and 1970

- 1 Population in areas experiencing desertification
- 2 Dryland areas in drought annually
- 3 Inland wetland extent



For Life on Land, focus on the food system

- **Food waste** – globally a third of food is wasted, 56% in developed countries and 44% in developing countries
- **Diminishing land and water resource** – due to climate change, land is being lost to desertification and more frequent droughts are decreasing available freshwater. Biofuels, biodiversity protection and reforestation compete for land.
- **Link between human health and environmental impacts** – overuse or unmanaged use of chemicals, fertilizers and pharmaceuticals, along with intensive farming practices are making food production environmentally unsustainable. 77% of all agricultural land is used for meat production.



Food loss and waste

- **One third of edible food is wasted** or lost annually (**about 24% of all calories**) accounting for losses of US\$750 billion to US\$1 trillion
- **Food losses and waste used about 28 per cent** of the world's agricultural land area in 2007
- **Food losses and waste released approximately 4.4 Gigatonnes of CO₂ equivalent**, or about 10 per cent of total global GHG emissions, in 2015
- **If waste cannot be reduced, opportunities to convert to compost, liquid fertilizers, biogas or higher value end-use products such as animal feed protein or biochemicals could be explored**
- **If this waste was reduced, more land would be available for agricultural production methods that are environmentally friendly such as organic farming**

Figure 5-1 | Approximately 24 percent of all food produced (by caloric content) is lost or wasted from farm to fork

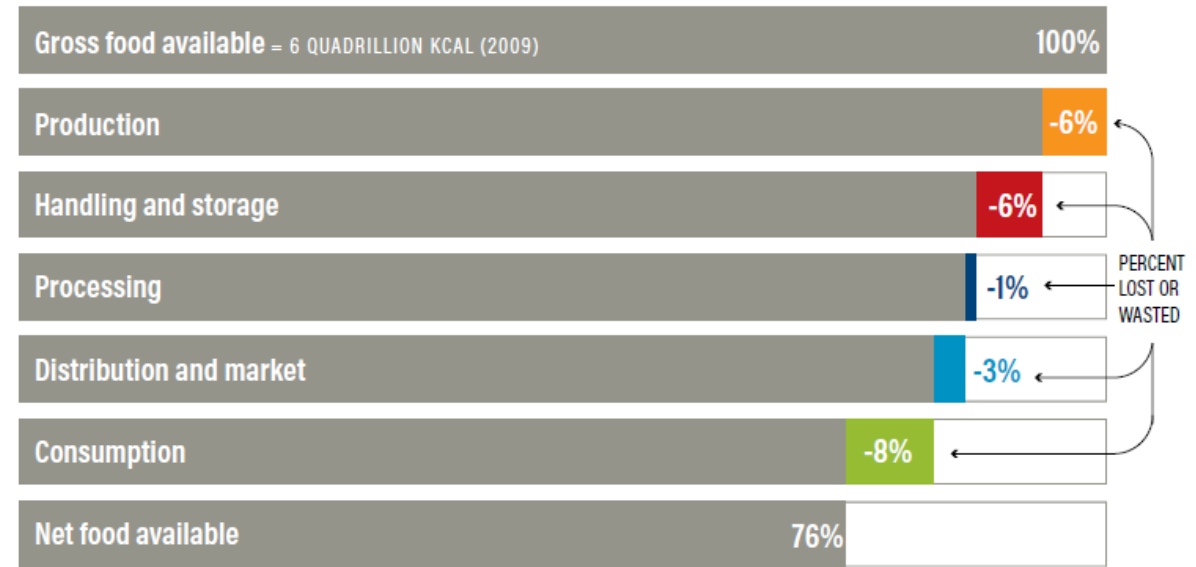
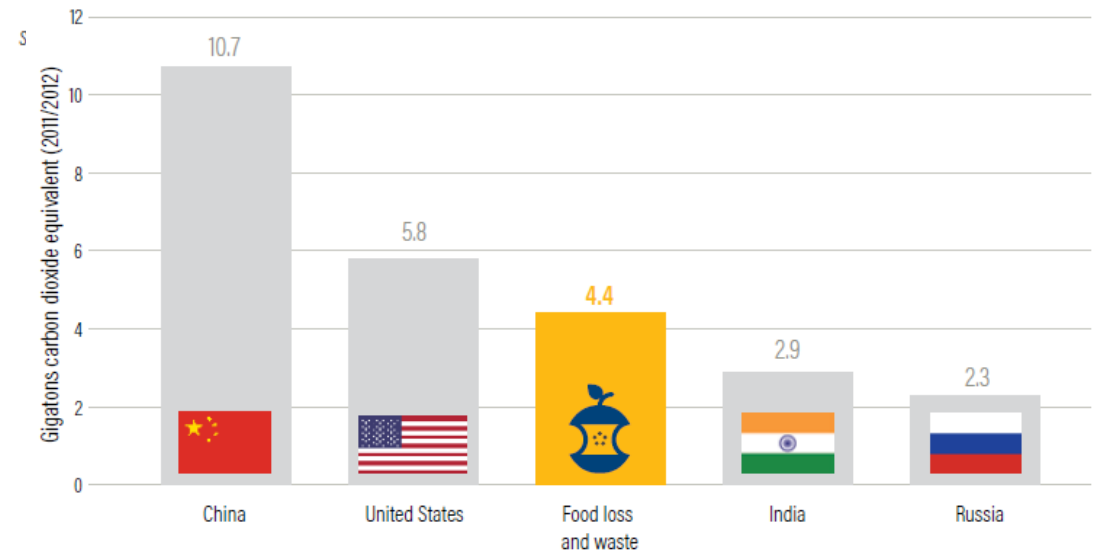
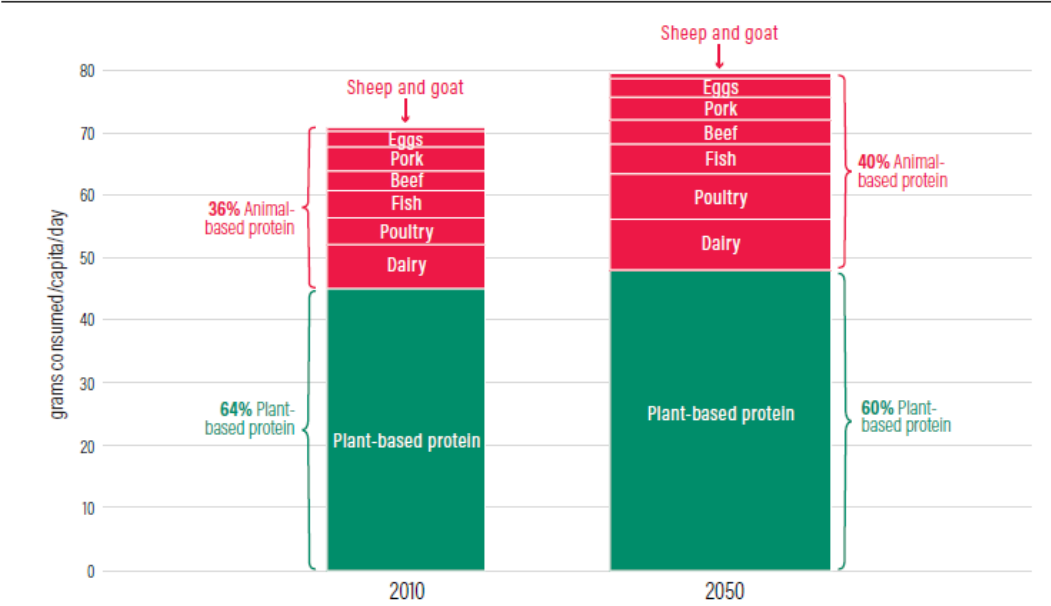


Figure 5-2 | If food loss and waste were a country, it would be the third-largest greenhouse gas emitter in the world



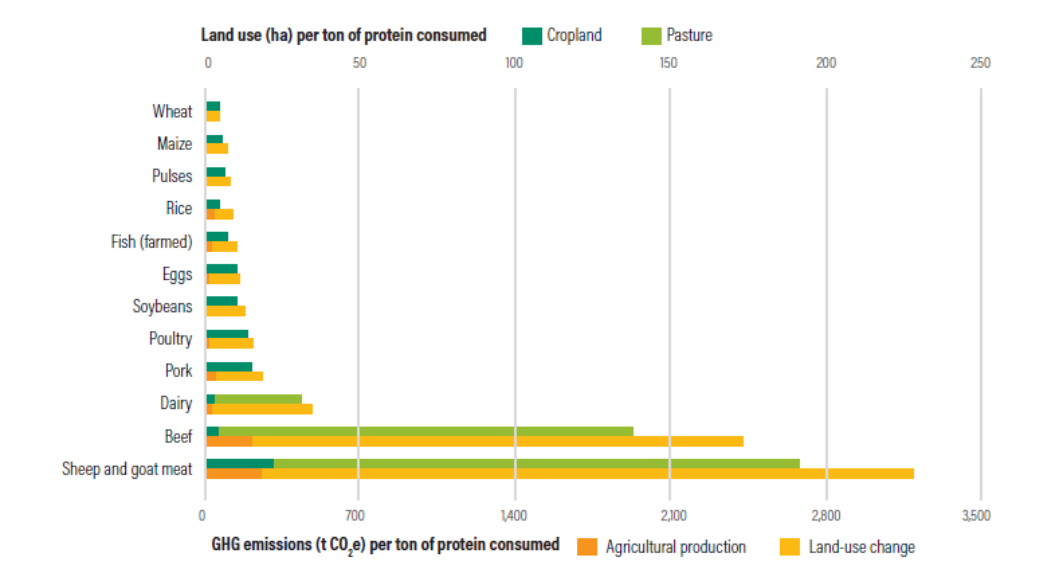
Note: Figures reflect all six anthropogenic GHG emissions, including those from land use, land-use change, and forestry (LULUCF). Country data are for 2012, while the food loss and waste data are for 2011 (the most recent data available). To avoid double counting, the food loss and waste emissions figure should not be added to the country figures.
Sources: CAIT (2017); FAO (2015a).

Figure 6-4 | Both global protein consumption and the share from animal-based foods are likely to grow by 2050



Note: Width of bars is proportional to world population.
Source: GlobAgri-WRR model with source data from FAO (2019a) and FAO (2011c).

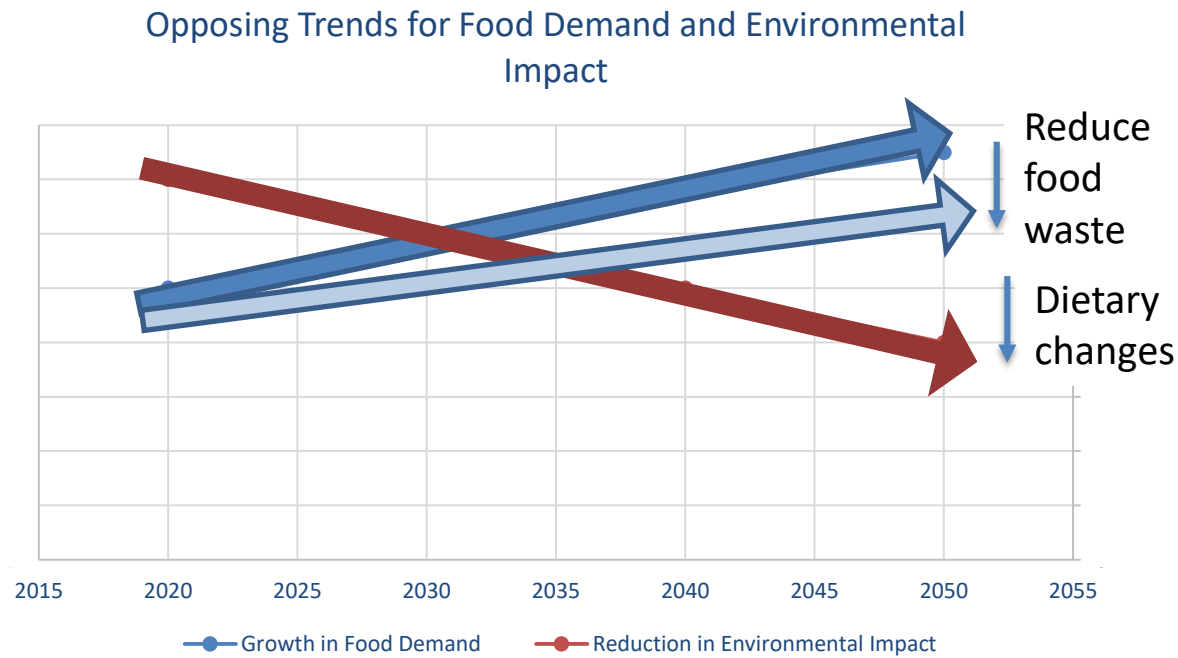
Figure 6-6b | Foods differ vastly in land-use and greenhouse gas impacts



How we get our protein

- **Plant-based protein** – Over 60% of global protein comes from plant-based sources (ranging from sugar and wheat, to lentils and beans)
- **Animal protein** – Beef, goat and sheep (ruminants) are the least efficient sources of protein and also use the most land and produce the most GHGs/ton of protein.
- **Eggs, milk, pork, poultry and fish** – Are the most efficient sources of animal protein and have lighter GHG footprints
- **Regionally** – ‘Western-style’ diets consume almost double the land and produce nearly double the GHGs compared to the world average.

The pandemic has likely set us back, but there are ways to change the path we are on

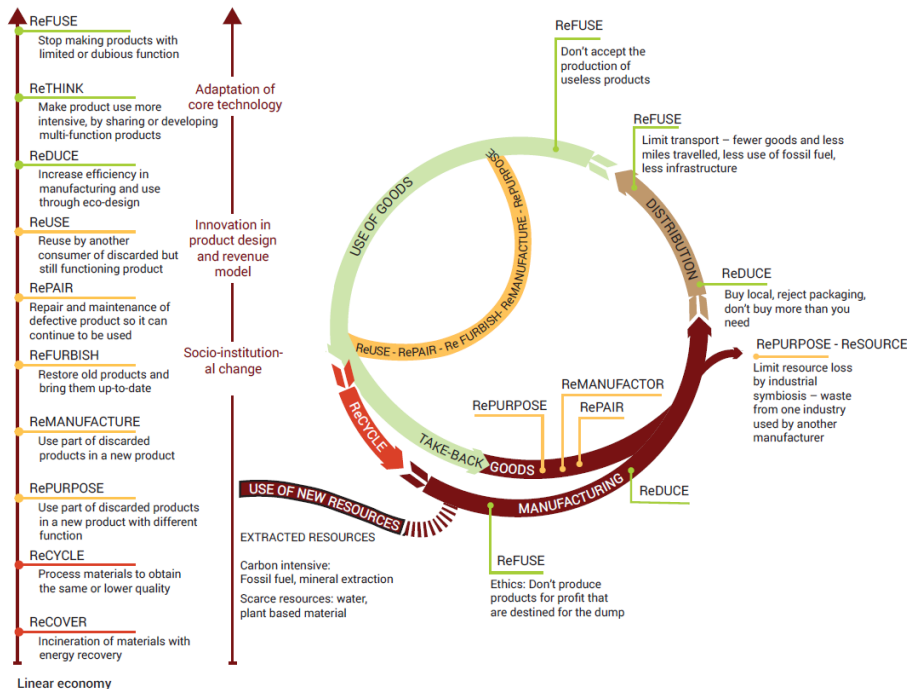


- **Pathways exist to meet the environmental dimension of SDGs/MEAs** – transitions in consumption, production, access and environmental management.
Transforming food systems is central to the pathways that could achieve environmental sustainability.
Incremental policies will not be sufficient – all pathways require rapid and wide-ranging innovations; many beyond historic rates of change.
- **Policy integration and coherence are needed** – integrate environmental concerns in all policy sectors at all levels to deal with possible trade-offs.
- **More synergies than tradeoffs exist** – e.g. plant-based diets can create health benefits

Figure 17.4: Building a circular economy

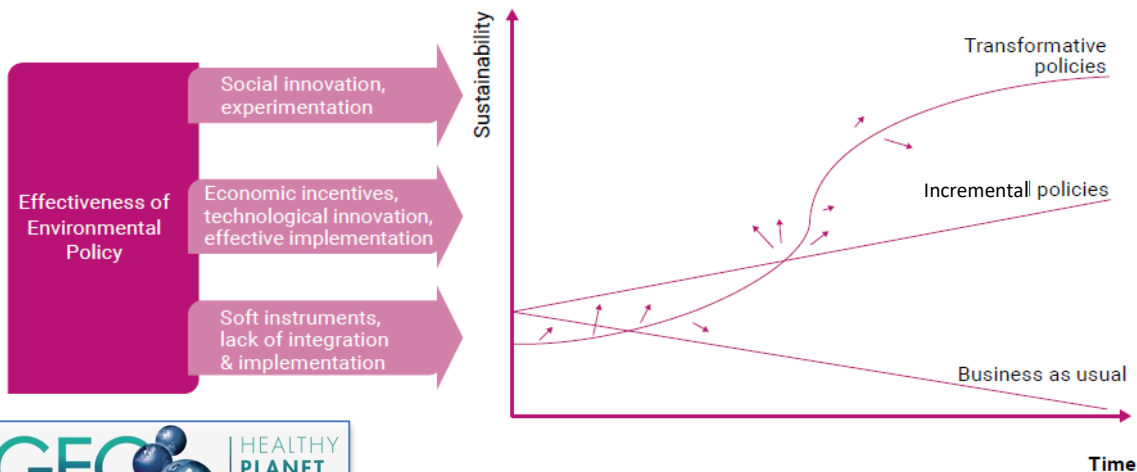
Ultimate circularity Circular economy goes beyond recycling

Circular economy



Source: Based on Stahel (2016) and Potting et al. (2017).

Figure 24.1: Different policy approaches



The way forward

- **Healthy planet is a foundation for supporting all life forms** – but, we have transformed earth's natural systems and disrupted self-regulatory mechanisms and life-support systems.
- **Human health is now affected at a significant scale** – through exposure to harmful pollutants, pandemics and reduced access to ecosystem services.
- **Policy innovation** – can help guide the transformative change that is needed.
- **Systemic innovation** – the key to socioeconomic development towards a sustainable world.
- **Transformative change** – is a disruptive process that goes beyond incremental improvement, but can be achieved.



Thank you

Producing an assessment of this scale requires many generous contributions. The following organizations provided funding directly or indirectly to the sixth *Global Environment Outlook*: The Government of Norway, the European Union, the Governments of Italy, Singapore, China, Mexico, Switzerland, Denmark, Egypt and Thailand. Together with UN Environment's Environment Fund and Regular Budget, these contributions allowed for the production of GEO-6 and its accompanying Summary for Policymakers, as well as subsequent outreach activities.



This project is co-funded by the European Union



Ministry of the Environment and Water Resources



www.unenvironment/global-environment-outlook

Contact: Pierre.Boileau@un.org