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FAOSTAT ANALYTICAL BRIEF 1

The share of agriculture in total greenhouse gas emissions

Global, regional and country trends

1990–2017

HIGHLIGHTS

- In 2017, the percentage contribution of agriculture to world CO₂eq emissions from all human activities was 20 percent. This included a contribution of 11 percent from crop and livestock activities within the farm gate and an additional 9 percent from related land use.
- The contribution of agriculture is decreasing over time: from 29 percent on average in the 1990's to 25 percent in the 2000's and 20 percent in the current decade (2010–2017).
- In 2017, the relative contribution of agriculture to regional total CO₂eq emissions from all human activities was the largest in Africa and Latin America, with a share of about 60 percent.
- In 2017, emissions from crop and livestock activities within the farm gate were above 50 percent in ten countries, including Eritrea (57 percent), Mauritania (61 percent); Central African Republic (64 percent); Uruguay (68 percent) and Niger (76 percent).

FAOSTAT EMISSIONS SHARES

INTRODUCTION

Agriculture is highly at risk from climate change, requiring urgent adaptation response in coming years to meet global food supply. At the same time, agriculture emits significant amounts of greenhouse gases (GHG) into the atmosphere, so that mitigation in agriculture features prominently in many country climate change response plans. The largest contributors from agriculture are non-CO₂ emissions from crop and livestock activities within the farm gate and carbon losses from land use – mainly due to deforestation and peatland degradation.

FAO provides estimates of the percentage contribution of these agriculture emissions to total GHG emissions. These statistics are disseminated in the [FAOSTAT Emissions shares dataset](#), at country, regional and global level, over the time series 1990–2017. The database provides emissions of the major trace gases carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O), as well as their cumulative effect in carbon-dioxide equivalents (CO₂eq).

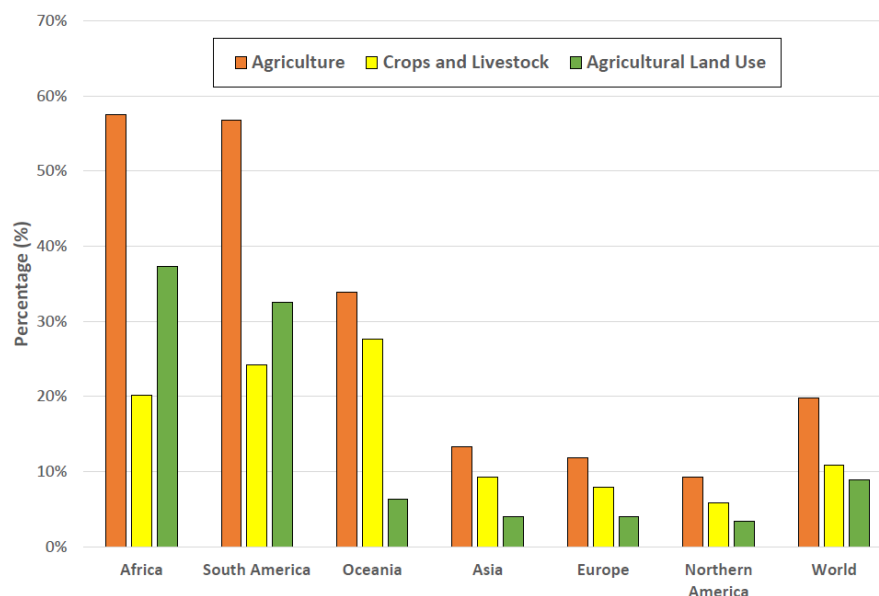
GLOBAL

In 2017, world total GHG emissions from all economic sectors totalled 51 billion tonnes CO₂eq (Gt CO₂eq yr⁻¹), and as much as 56 Gt CO₂eq yr⁻¹ including emissions from land use. Emissions

from agriculture were 11.1 Gt CO₂eq yr⁻¹, composed of 6.1 Gt CO₂eq yr⁻¹ from crop and livestock activities within the farm gate and 5.0 Gt CO₂eq yr⁻¹ from agricultural land use, largely due to deforestation and peatland degradation;

In 2017, the percentage contribution of agriculture to world CO₂eq emissions from all human activities was 20 percent. This included a contribution of 11 percent from crop and livestock activities within the farm gate, and an additional 9 percent from related land use (Figure 1).

Figure 1. Agricultural emissions shares of regional total GHG emissions

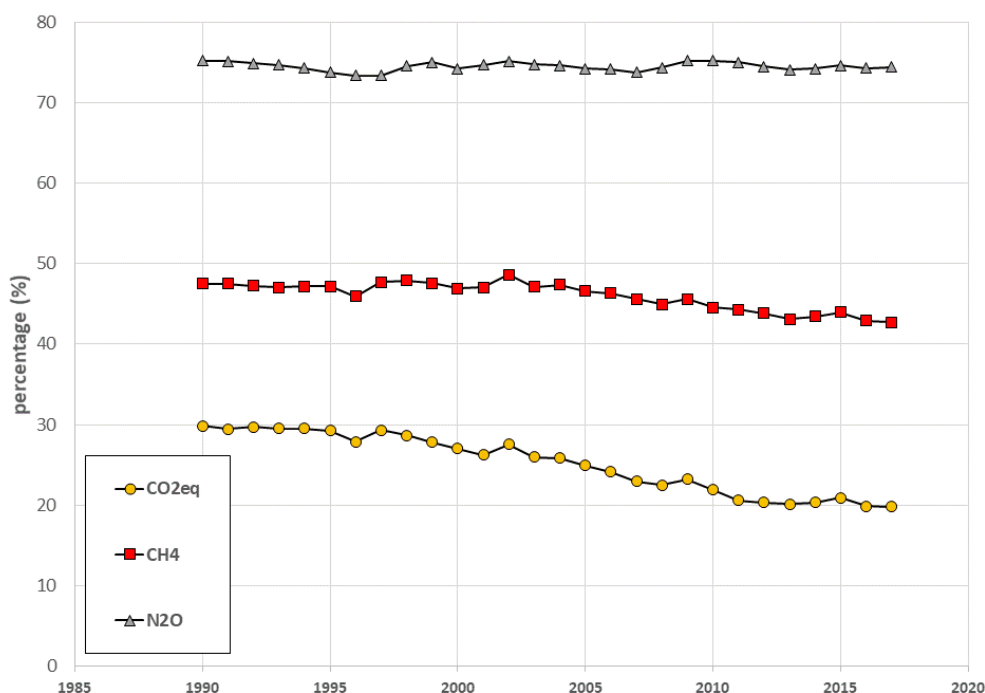


Source: FAOSTAT, 2020

The largest contributor to world total CO₂eq emissions was the energy sector, which emitted two-thirds of the total, due to the burning of fossil fuels for power and energy generation. Industrial processes were instead responsible for 8 percent of the total.

The contribution of agriculture is decreasing over time. It was 29 percent on average in the 1990's (1990–1999); 25 percent in the 2000's (2000–2009); and 20 percent in the current decade (2010–2017). This decrease is due to two main trends: i) emissions increases from 1990 to 2017 were greater in the energy sector (from 25 to 37 Gt CO₂eq) than for the crop and livestock sectors (from 5.2 to 6.1 Gt CO₂eq); and ii) emissions from agricultural land use decreased substantially during the same period 1990–2017, from 6.9 to 5.0 Gt CO₂eq;

The contribution of agriculture of CH₄ and N₂O emissions, expressed in these single gases, was much larger than computed in CO₂eq units. It furthermore stemmed almost exclusively from crop and livestock activities within the farm gate. In 2017, agriculture accounted for 42 percent of total CH₄ and 75 percent of total N₂O emissions. Such contribution did not change significantly over time. In the 1990s, it was 47 percent and 74 percent for CH₄ and N₂O, respectively (Figure 2);

Figure 2. Agricultural emissions shares of world total CO₂eq emissions

Source: FAOSTAT, 2020

Agriculture emissions are a major component of food-systems emissions, which move beyond farmer's fields and related land use activities to include processes in food manufacturing, refrigeration and transport, food supply chains, retail processes, food consumption and disposal of food waste. Food systems were estimated at 21–37 percent of world total annual CO₂eq emissions for 2007–2016 (Rosenzweig *et al.*, 2020), whereas FAOSTAT estimates for the same period a share of 21 percent from agriculture alone.

REGIONAL

In 2017, the relative contribution of agriculture to regional total CO₂eq emissions from all human activities was the largest in Africa and Latin America, with a share of about 60 percent (Figure 1); the share in Asia was about 30 percent, while it was near 10 percent – half of the world's average – in Asia, Europe and North America.

The large shares in Africa and Latin America were dominated by land use emissions, which in these two regions were larger than those from crop and livestock activities. The latter were nonetheless also significant in Africa and Latin America, as well as in Oceania (above 20 percent). In Asia, Europe and North America, the contribution of emissions from crop and livestock activities were between 6 percent–9 percent and twice those from land use.

Of the top two regional contributors in 2017, shares of agriculture since the 1990s decreased only slightly in Africa, i.e., from 63 percent to 58 percent in the current decade; and more markedly in Latin America, from 72 percent in the 1990s to 57 percent in the current decade.

Furthermore, they decreased strongly in Asia, from 29 percent in the 1990s to 14 percent in the current decade as increased the shares from the non-agricultural sectors.

COUNTRY

In 2017, the contribution of agriculture to national total CO₂eq emissions was above 90 percent in six countries, including Chad, Central African Republic, Guyana, Paraguay, South Sudan and Zambia.

In 2017, emissions from crop and livestock activities within the farm gate were above 50 percent of national total CO₂eq emissions in ten countries, including Eritrea (57 percent), Mauritania (61 percent); Central African Republic (64 percent); Uruguay (68 percent) and Niger (76 percent).

EXPLANATORY NOTES

The FAOSTAT [Emissions shares](#) domain disseminates data on the greenhouse gas (GHG) emissions shares of agriculture and related land use to the total emissions from all economic sectors, by gas, country and year, for the period 1990–2017. Absolute emissions are also disseminated for transparency. The economic sectors considered as emission sources are those defined by the Intergovernmental Panel on Climate Change (IPCC) in the 2006 guidelines (Vol.1, ch.8): energy, industrial processes and product use, waste, and agriculture. We additionally consider agriculture-related land use emissions, as in IPCC (2019).

Emissions from agriculture are from the FAOSTAT [Emissions–Agriculture](#) domain. Agriculture-related land use emissions are from the following FAOSTAT [Emissions–Land Use](#) categories: cropland, grassland, net forest conversion, fires from burning of organic soils and humid tropical forests. Emissions from the non-agriculture and land use sectors are from the third party data of the [PRIMAP–hist dataset v2.1](#) (Gütschow *et al.*, 2016; Gütschow *et al.*, 2019). Emissions statistics and their shares are provided in single gas components CO₂, CH₄ and N₂O, as well as cumulatively using CO₂eq units. The latter are computed using global warming potential (GWPs) conversion factors of the Intergovernmental Panel on Climate Change (IPCC), with results disseminated for three GWPs separately (see relevant [FAOSTAT metadata](#)): the IPCC Second Assessment Report, GWP-SAR, the IPCC Fourth Assessment Report, GWP-AR4, and the IPCC Fifth Assessment Report, GWP-AR5. The domain '[Emissions shares](#)' contains the following data categories available for download by sector, country and year: a) shares of total CO₂eq emissions; b) shares of total CO₂, CH₄, N₂O and and Fluorinated gases (F-gases, including Hydrofluorocarbons (HFCs), Perfluorinated compounds (PFCs), SF₆ and NF₃ gases; c) emissions in Gg CO₂eq; d) emissions in Gg of the single gases.

Emissions and shares statistics are [available](#) for 198 countries and 45 territories over the period 1990–2017. Data are also disseminated for regional aggregates and special groups, such as the Annex I and Non-Annex I Parties to the [United Nations Framework Convention on Climate Change \(UNFCCC\)](#).



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