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FAOSTAT ANALYTICAL BRIEF 12

Forest land emissions and removals

Global, regional and country trends

1990–2020

>> FAO Statistics Division

HIGHLIGHTS

- → **Deforestation was responsible for annual emissions of roughly 3 billion tonnes CO_2 globally, in the period 2016–2020. At the same time, remaining forests sequestered some 2.5 billion tonnes CO_2 , resulting in net emissions of about 0.5 billion tonnes of CO_2 per year from forest land to the atmosphere.**
- → **South America and Africa were the regions with the largest deforestation emissions in 2020 — about 1 billion tonnes CO_2 each. Compared to 2010, deforestation in South America had nearly halved, while it increased by a quarter in Africa.**
- → **Europe had the largest forest sink during the period 2016–2020 (1 billion tonnes CO_2 removed per year), with Asia and the Americas close seconds.**
- → **Brazil, the Democratic Republic of Congo and Indonesia were the three largest countries in terms of deforestation (about 0.5 billion tonnes CO_2 each) while China, the Russian Federation and the United States of America were the largest carbon sinks (also about 0.5 billion tonnes CO_2 removed annually).**

FAOSTAT FOREST LAND

BACKGROUND

Statistics of forest land area and biomass stock are collected from countries, analysed and disseminated by FAO in five-year cycles through the Forest Resources Assessment (FRA). They are relevant for monitoring trends in sustainable land management, forest dynamics and forest health. FAOSTAT uses the FRA data as input for estimating CO_2 emissions and removals from forest (Federici *et al*., 2015), an integral component of total greenhouse gas emissions from land, disseminating the information via the FAOSTAT Land Emissions-Forest Land domain. The new FRA 2020 data allowed for updating the FAOSTAT domain with emissions and removals from forests for the period 1990–2020.

The Forest Land domain contains information for 214 countries and territories, with complete coverage over the 1990–2020 time series of statistics on: forest land area, area of planted forests and naturally regenerating forests, carbon stock and emissions from deforestation and emissions/removals from remaining forest land, by country, with regional and global coverage.

The 2020 FAOSTAT update features a significant update to “t minus zero”, only possible in FRA years, through which the most recent information on forest emission trends is made available. The

FAOSTAT dissemination is the first product to offer estimates of land emissions using the newly released FRA 2020 data.

This analysis focuses on new trends in forest emissions in terms of deforestation, carbon storage on remianing forest land, and overall net impact of forests on climate. In this respect, it is a notable contribution to ongoing efforts to update the global carbon cycle, to which it regularly contributes through analyses published in high-impact peer-reviewed journals (e.g, Le Quéré *et al*., 2019) and international assessments (e.g. IPCC, 2019).

It should be noted that all emissions/removals in this report are all treated as anthropogenic. While there is no doubt that emissions stemming from deforestation activities are indeed attributable to human action, not all of the other dynamics on forest land are necessarily due to human action. It is nonetheless a fact that the vast majority of forest land on earth is actively or passively managed, protected or covered by administrative regulations, and in this respect it can be considered to be under human influence.

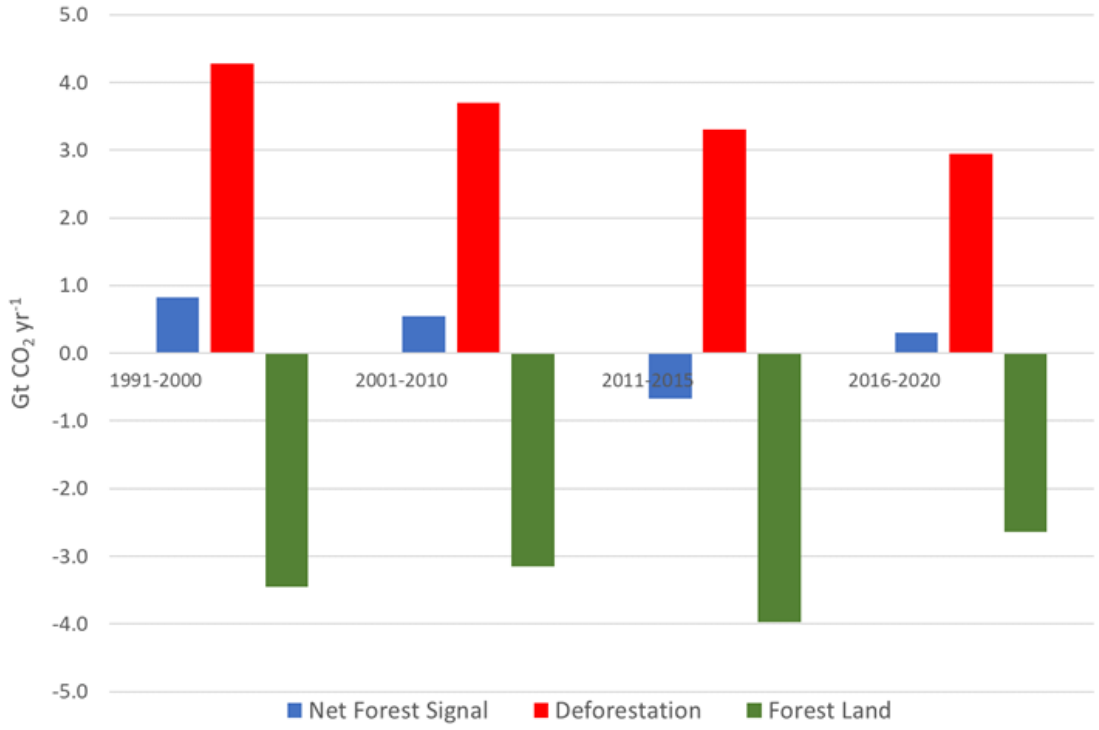
GLOBAL

Overall emissions/removals. Forests' global net CO_2 flux to the atmosphere was small in 2020 (0.5 Gt CO_2 per year) and had steadily decreased over the period 1990–2020. Remarkably, the new estimates based on FRA 2020 data suggest that forests acted globally as a net carbon sink (-0.6 Gt CO_2 per year) in the period 2011–2015. This is the first time that such an event has been calculated from the underlying forest area and biomass statistics, and it remians to be verified independently, including through careful observation of the atmospheric CO_2 record during that period. Compared to FAOSTAT estimates made with the FRA 2015, the FRA 2020 data led to significantly reduced estimates of total forest emissions—by about half on average over the full period 1990–2020.

Deforestation. Globally, deforestation carbon fluxes decreased by about one-third from 1990 to 2020, reaching about 3 Gt CO_2 per year in 2020.

Forest Land. Remaing forest land, i.e. the area not being deforested, acted globally as a significant net carbon sink over the entire period 1990–2020. The 2020 sink, at -2.6 Gt CO_2 per year, was nonetheless roughly one-quarter smaller than in 2000, and 35 percent less than in 2015. The FRA 2020-based estimates predicted a stronger global forest sink compared to previous estimates, particularly during the period 2011–2015 (-4 Gt CO_2 per year).

Figure 1. Global emissions (positive values) and removals (negative values) from forests, 1990–2020



Source: FAOSTAT, 2020.

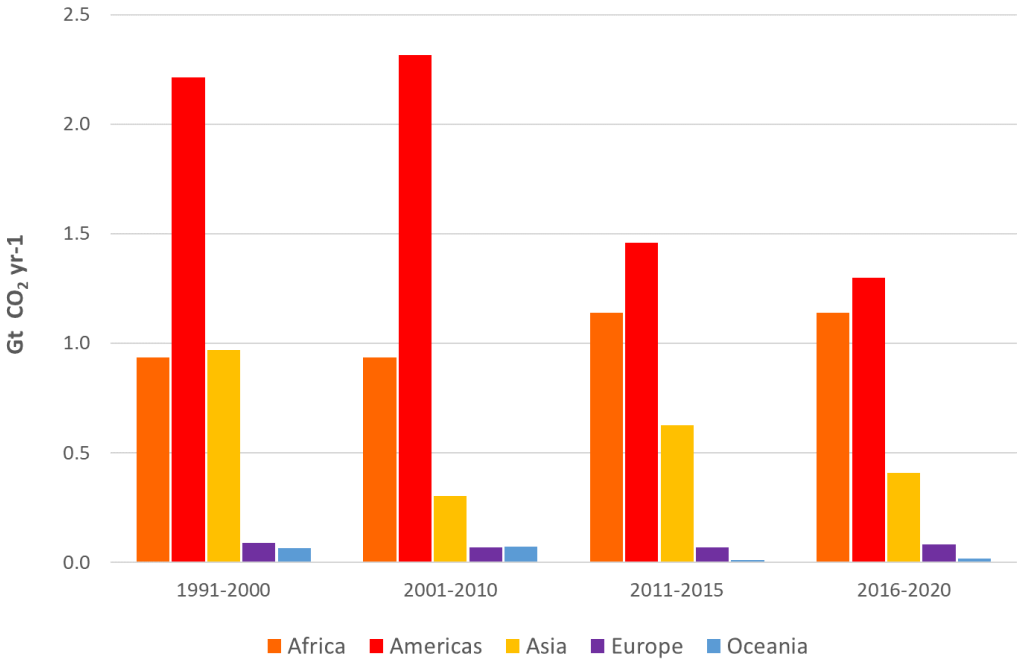
REGIONAL

Overall emissions/removals. The global forest land flux was determined in 2020 by large net fluxes to the atmosphere from Africa (>1 Gt CO_2 per year) and the Americas (0.5 Gt CO_2 per year), counterbalanced by net sinks from Europe (-1 Gt CO_2 per year) and Asia (-0.5 Gt CO_2 per year).

Deforestation. America remained in 2020 the region with the highest deforestation emissions (1.3 Gt CO_2 per year), with Africa becoming a close second in the same period (1.1 Gt CO_2 per year). While in the Americas emissions had declined since 2010 by about one-half, deforestation emissions in Africa increased by nearly one-fourth from 2010 to 2020 (Figure 2).

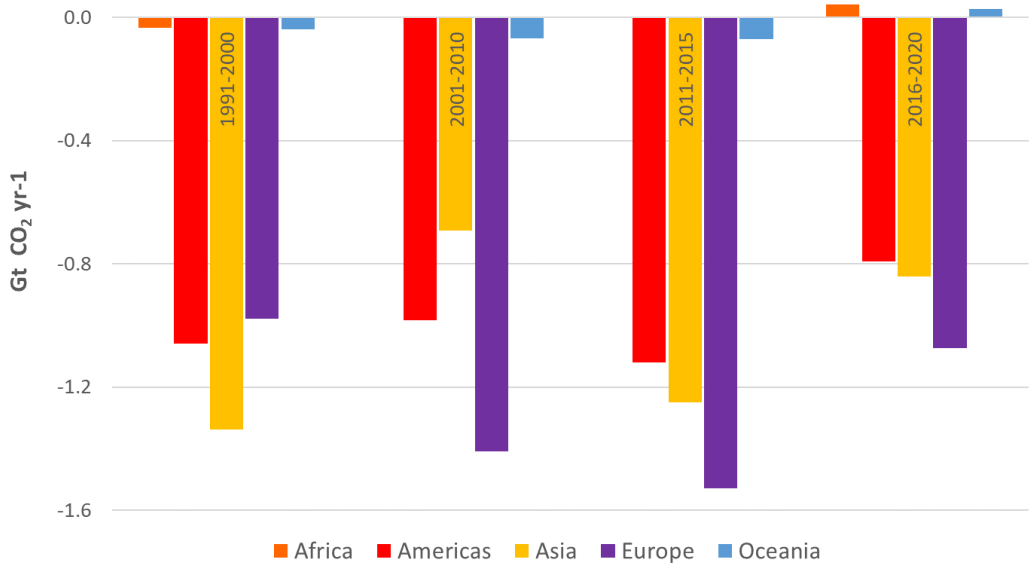
Forest Land. The strongest sinks were in Europe, Asia and the Americas (-1 Gt CO_2 per year). However they declined strongly in 2020 compared to 2015, by nearly 50 percent in Europe, and by nearly one-third in Asia and the Americas (Figure 3).

Figure 2. Regional distribution of emissions from deforestation, 1990–2020



Source: FAOSTAT, 2020.

Figure 3. Regional distribution of emissions (positive values) and removals (negative values) from forest land, 1990–2020



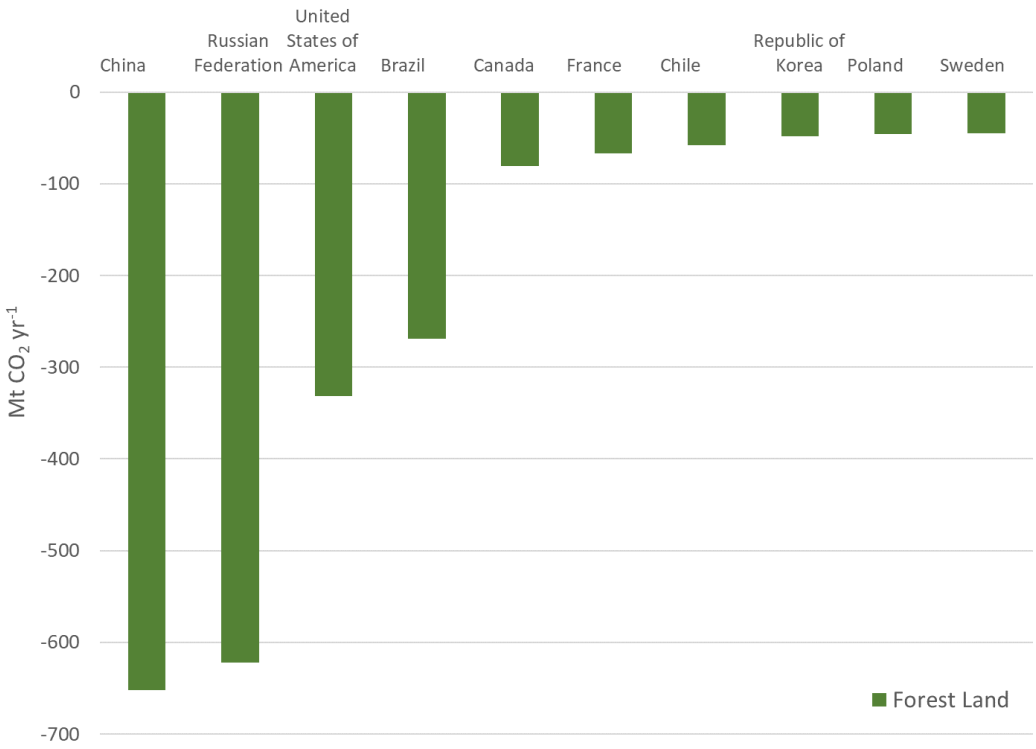
Source: FAOSTAT, 2020.

COUNTRY ANALYSIS AND COMPARISON TO DATA REPORTED TO THE CLIMATE CONVENTION

Deforestation. Brazil and the Democratic Republic of the Congo were the countries with the highest estimated emissions from deforestation during the recent 2016–2020 period, around 600 Mt CO_2 per year. Indonesia was a distant third with about 200 Mt CO_2 per year.

Forest Land. During the recent period 2016–2020, countries with the largest forest sinks were China (about -650 Mt CO_2 per year), followed closely by the Russian Federation (~ -620 Mt CO_2 per year), the United States of America and Brazil (with ~ -350 Mt CO_2 per year and ~ -300 Mt CO_2 per year, respectively) (Figure 4).

Figure 4. Top ten countries by removals (negative values) from forest land, 2016–2020



Source: FAOSTAT, 2020.