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New FAOSTAT forest emissions and removals estimates: 1990-2025

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Abstract. FAOSTAT forest emissions and removals statistics were updated for the period 1990–2025 for 234 countries and territories, using new country data collected via the Forest Resources Assessment (FRA) 2025. The new FAOSTAT estimates align with the published literature, indicating that the world forests were net carbon sinks, storing an additional 140 Gt CO_2 in their standing living biomass over the 1990-2025 period, while losing 100 Mha and 17 Gt C through net forest conversion—a proxy used in FAOSTAT for deforestation. For the most recent period available in this release, 2021-2025, the FRA 2025 FAOSTAT estimates of mean annual forest removals were -3.6 Gt CO_2 yr^{-1}, only partially offset by net forest conversion losses averaging 2.8 Gt CO_2 yr^{-1}, resulting in mean annual net removals of −0.8 Gt CO_2 yr^{-1} during 2021-2025. This net flux had decreased nearly 80% from mean annual values of −1.4 Gt CO_2 yr^{-1} a decade earlier, during 2011–2015. Forest emissions/removals data independently reported by countries to the United Nations Framework on Climate Change were found to be in good agreement with the FAOSTAT estimates. Data are made available as open access via the Zenodo portal (Tubiello et al., 2025), with DOI 10.5281/zenodo.17395879..

1 Introduction

The Food and Agriculture Organization of the United Nations (FAO) regularly collects from its member countries and disseminates as global public goods statistics on forest area and biomass data via its signature Forest Resources Assessment (FRA) program (FAO, 2025a). The FRA data inform key international estimates of forests emissions and removals, including estimates of the global carbon cycle (Friedlingstein et al., 2025) and FAOSTAT (Tubiello et al., 2020). This paper documents the new FAOSTAT statistics of forest CO_2 emissions and removals for the period 1990-2025, covering 234 countries and territories based on the newly released FRA 2025.

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2 Material and Methods

FAOSTAT statistics of CO_2 emissions and removals from forests include estimates of CO_2 fluxes on both forest land and on land lost due to net forest conversion. They are computed using carbon stock changes following the IPCC (2006) Tier 3, approach 1 guidelines (Tubiello et al., 2020), based on inputs of forest land area and biomass data from the FRA. Specifically for this update, annual mean forest emissions/removals were estimated for the 5- and 10-year periods defined by the newly released FRA 2025 data, covering 1990-2025, using the following equations (Fig. 1).

$$FL\_Tot_{pi} = (B_i - B_{i-1}) * -\frac{44}{12} * 10^{-3} / D \quad (1)$$

$$NFC_{pi} = (B_{i-1})/(A_{i-1}) * \sum j \ \{Min\left[(A_{i,j} - A_{i-1,j}), 0\right]\} * -\frac{44}{12} * 10^{-3} \ / D \quad (2)$$

$$FL_{pi} = FL\_Tot_{pi} - NFC_{pi} \quad (3)$$

Where:

FL_Tot is the overall carbon flux from forest change, expresses in Gg CO_2 yr^{-1};

NFC is net forest conversion, expresses in Gg CO_2 yr^{-1};

FL is net emissions/removals on (remaining) forest land, expresses in Gg CO_2 yr^{-1}; and

B_i is the carbon stock in living biomass at year *i*, expresses in Mt C;

A_i is the forest land area at year *i*, expresses in k ha;

$A_{i,j}$ is the forest land area category *j* = naturally regenerating, planted; at year *i*; expressed in k ha.

i = 1990, 2000, 2010, 2015, 2020, 2025 is the year for which FRA data exist;

pi =1991-2000; 2001-2010; 2011-2015; 2016-2020, 2021-2025 is the time period between FRA years;

D is the length of the period *pi*, i.e., either 5 or 10 years.

Finally, multiplication by - 44/12 * 10^{-3} converts Mt C to Gg CO_2 and positive carbon stock changes to negative emissions (removals) to the atmosphere, and vice-versa. The mean values computed during each period were associated to each year in that period for the purpose of populating the FAOSTAT dataset with annual values.

2.1 Data Availability: Structure of FAOSTAT data and online access

Results were computed by country and regionally aggregated following standard FAOSTAT procedures, resulting in annual data on emissions/removals on forest land, net forest conversion, carbon stock change and associated area statistics, disseminated for every year of the period 1990-2025, for 195 countries, 39 territories, 22 sub regions, 5 continents, and 8 special aggregates, the later including UNFCCC Annex and non-Annex I, OECD, least-developed countries, small island developing states, etc. (Table 1). In addition to the FAO carbon stock change estimates based on the FRA, the FAOSTAT 'emissions from forest' database also disseminates all available National GHG Inventory (NGHGI) data submitted to the

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UNFCCC via Biennial Update Reports (BURs) or Biennial Transparency Reports (BTRs). The NGHGI are disseminated in FAOSTAT without interpolation of missing values, resulting in nearly 4000 data points for a combined total of 93 countries over the period 1990-2023. Of these, AI parties were fully represented (41 countries), whereas AI were only partially covered (52 countries, less than half of the total). Finally, to facilitate comparisons among data sources, NGHGI emissions data on 'forest land' wre disseminated under the FAOSTAT 'forestland emissions/removals' category, whereas the NGHGI emissions data due to land use change, specifically emissions from land conversion to cropland and grassland, were combined and disseminated under the 'FAOSTAT net forest conversion emissions/removals' category

The FAOSTAT Forest emissions data (FAO, 2025b) are available as open access and freely to users worldwide. They can be accessed in the version discussed herein via Zenodo (Tubiello et al., 2025), with DOI 10.5281/zenodo.17395879..

2.2 Limitations and uncertainty

The FAOSTAT forest emissions/removals data are based on, and thus limited by, differencing of country-level data on forest area and biomass stock reported by FAO member states. Thus, they may not be representative of the full range of forest carbon fluxes covered in other, more complete studies on the role of forests, natural and managed, within the terrestrial carbon cycle. We follow IPCC default assumptions and recent work on land use statistics accuracy (Tubiello et al., 2023a,b) in assigning uncertainty of about 20% to FAO country statistics. Error propagation through equations (1)-(3) above suggest that uncertainty in the FAOSTAT emissions/removals estimates is 40%-50%, a range that is fully in line with LULUCF uncertainty estimates published by the IPCC (2022).

Secondly, the FAOSTAT emissions/removals data were estimated using only the first two of four carbon pools identified by the IPCC guidelines and present in the FRA 2025 data, namely belowground and aboveground biomass. Data on litter and soil carbon stocks were not included because they were considered more uncertain than the former two. Nonetheless, we performed separate calculations including all FRA 2025 carbon stock data (not shown), indicating that including litter and soil stock would not change FAOSTAT forest emissions/removals significantly, with differences no greater than 10% globally and regionally. Thirdly, the computation of net forest conversion emission, based on national-level statistics of area and biomass density as per equation (2), may lead to underestimates of carbon fluxes, so that actual deforestation emissions may be larger than estimated in FAOSTAT.

3 Results

The updated FAOSTAT dataset makes values available forest emissions/removals estimates by country and by standard FAO regional aggregations, alongside the official data the same countries report to the UNFCCC. The emissions data are complemented by FRA 2025 data on forest land area and biomass stock, as well as by the net area changes underlying net forest conversion emissions. Results for the five FRA 2025 periods: 1991-2000, 2001-2010, 2011-2015, 2016-2020, 2021-

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2025 were summarized by UNFCCC annex, regionally and globally (Tab. 1). A copy of the data used for this paper is available at Zenodo (Tubiello, 2020), with DOI 10.5281/zenodo.XYZ.

3.1. Global and regional results

The FAOSTAT data show that forests acted globally as sinks of atmospheric CO_2 during the period 1991-2025 (-4.0 Gt CO_2 yr^{-1}) and specifically during 2021-2025 (Fig. 2). For this period, mean carbon sequestration on forest land was -3.6 Gt CO_2 yr^{-1}, while emissions from net forest conversion were 2.8 Gt CO_2 yr^{-1} (having been as high as 5.2 Gt CO_2 yr^{-1} during 1991-2000). The combined effect of removals on forest land and emissions due to net forest conversion was a net removal of -0.8 Gt CO_2 yr^{-1}. The FAOSTAT data allow for regional and country level analyses that help further specify the global forest emission/removals dynamics. The next paragraphs focus on the most recent period 2021-2025 (Fig. 3).

Emissions/removals on forest land. The world total removals of -3.6 Gt CO_2 yr^{-1} in 2021-2025 were evenly distributed between Annex I and non-Annex I (AI/NAI) parties of the UNFCCC, with larger heterogeneities at regional level. Specifically, Europe had the largest sink (−1.4 Gt CO_2 yr^{-1}), followed by Asia (-1.2 Gt CO_2 yr^{-1}) and the Americas, at −0.8 Gt CO_2. With respect to a decade earlier, removals increased in Asia by nearly 50%, while they decreased in the Americas by a similar proportion. Africa (-130 Mt CO_2 yr^{-1}) and Oceania Africa (-30 Mt CO_2 yr^{-1}) had small carbon removal on forest land.
Finally, during 2021-2025 the global carbon sink on forest land was homogeneously distributed among the four climate zones considered within the FRA 2025. Specifically, 60% of the forest land removals were located in boreal forests (1.2 Gt CO_2 yr^{-1}) and temperate zone forests (1.0 Gt CO_2 yr^{-1}). About 40% were located in tropical (0.8 Gt CO_2 yr^{-1}) and semi-tropical (0.7 Gt CO_2 yr^{-1}) zones.

Emissions from net forest conversion. The world total emissions of 2.8 Gt CO_2 yr^{-1} in 2021-2025 were very unevenly split between NAI countries, where most of the deforestation was recorded (more than 90% of the world total flux, or 2.7 Gt CO_2 yr^{-1}), and AI countries, where net forest conversion losses were just over 150 Mt CO_2 yr^{-1}. Regionally, the Americas had the largest emissions, reaching 1.8 Gt CO_2 yr^{-1}, an increase of 30% compared to a decade earlier (1.4 Gt CO_2 yr^{-1} in 2011-2015) Africa had the second largest emissions from net forest conversion at 0.7 Gt CO_2 yr^{-1}, a decrease of 40% compared to a decade earlier (1.2 Gt CO_2 yr^{-1} in 2011-2015). Asia saw its emissions from net forest conversion sharply reduced over time, to 0.3 Gt CO_2 per year in 2021–2025, 15% less than in 2011-2015 but nearly 90% lower compared to the period 2001-2010. The FAOSTAT data show that Europe and Oceania both had only minor contributions to the world total.
Nearly all (94%) of the global emissions from net forest conversion were concentrated in the tropics, with tropical forests responsible for 2.6 Gt CO_2 yr^{-1} in 2021-2025

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Overall net emissions/removals from forests. When combining emissions/removals on forest land and net forest conversion, the FAOSTAT data show large differences between NAI and AI countries. Notwithstanding the global net sink of -0.8 Gt CO_2 yr^{-1}, in 2021-2025 forests in NAI countries were a net source of carbon to the atmosphere in 2021-2025 (0.9 Gt CO_2 yr^{-1}), whereas forests in AI countries acted as a strong net atmospheric carbon sink (-1.7 Gt CO_2 yr^{-1}). Among regions, the Americas were the largest net emitter (1.0 Gt CO_2 yr^{-1}), followed by Africa (0.6 Gt CO_2 yr^{-1}), whereas forests were net overall sinks in Europe (-1.4 Gt CO_2 yr^{-1}) and Asia (-0.9 Gt CO_2 yr^{-1}). Forests in Oceania functioned as small net sinks in 2021-2015, oscillating between being a small carbon sink or source throughout the study period.

The overall net forest emissions/removals were likewise very unevenly distributed. Boreal and temperate forests contributed equally to a combined net sink of -2.0 Gt CO_2 yr^{-1} in 2021-2025, followed by semi-tropical countries contributing an additional net carbon sink of -0.6 Gt CO_2 yr^{-1}. Conversely, tropical forests were a net emission source in the same period, totalling 1.8 Gt CO_2 yr^{-1}.

3.2 Country results

Forest land. The top countries with the largest mean annual carbon sinks on forest land in 2021–2025 (Fig. 4) were the Russian Federation (−1 150 Mt CO_2 per year), China (−840 Mt CO_2 per year), the United States of America (−410 Mt CO_2 per year) and Brazil (−340 Mt CO_2 per year). India and Belarus both had sinks of −150 Mt CO_2 per year, followed by South Africa, Ghana, the Republic of Korea, and Honduras, with forest sinks ranging between −75 Mt CO_2 per year and −35 Mt CO_2 per year (Figure 2). Together, they were responsible for nearly 90% of world total carbon sequestration on forest land.

Net forest conversion. In 2021–2025, top emitters from net forest conversion (Fig. 5) were Brazil (1 240 Mt CO_2 per year), the Democratic Republic of the Congo (160 Mt CO_2 per year), Peru (130Mt CO_2 per year), Canada (90 Mt CO_2 per year) and Cambodia (70 Mt CO_2 per year) (Figure 3). Together, the top ten emitters were responsible for more than 70% of world total deforestation. Comparisons of the FAO estimates and NGHGI data available in FAOSTAT provided mixed results, depending on periods and country groupings considered. In reference to the last decade 2016-2025, for which the most country values were present, FAO and NGHGI data were highly correlated in terms of both net forest conversion (r=0.98, n=71) and forestland (r=0.93, n=90) fluxes. AI parties data were similarly highly correlated, with high agreement with respect to forestland removals, resulting in aggregated FAO estimates for AI countries within 25% of the UNFCCC data (Fig. 6), whereas for net forest conversion the FAO estimates were on average half of the UNFCCC values. We did not compute similar statistics for the AI comparisons, since the UNFCCC AI aggregates lacked two-thirds of their countries.

We additionally made comparisons of the top 10 countries for both forest removals and net forest conversion. For forest removals (Fig. 3), representing as noted 90% of the world total, the agreement between FAO and NGHGI data was high (r=0.96, n=10), with mean removals respectively of -308 and 346 Mt CO_2 yr^{-1}, with a statistically non-significant difference of 36 Mt CO_2 yr^{-1} (or 15% in relative terms). In addition, within this list, the difference between FAO and NGHGI data was small, in particular for the Russian Federation (85 Mt CO_2 yr^{-1}, 8%), China (43 Mt CO_2 yr^{-1}, 5%), Brazil (3 Mt CO_2 yr^{-1}, -1%).

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The difference was larger for the USA (260 Mt CO_2 yr^{-1}, 31%), though it was still within the uncertainty in the FAO estimates. At the same time, such discrepancy arose for the USA only in relation to data relative to the most recent years after 2020, whereas the relative error between FAO and NGHGI was around 5% in previous periods. Sparser data for non-Annex I countries did not allow for complete comparisons. For net forest conversion top 10 country data for 2021-2025, FAO and NGHGI data were in agreement for Brazil (within 30% of country data).

4. Discussion

The recent release of the new FRA 2025 data allowed for a revision and update of FAO estimates of forest emission and removals of CO_2 to and from the atmosphere, highlighting that forests were net sinks of atmospheric CO_2 (Tab. 1), in particularly removing on average more than -1 Gt CO_2 yr^{-1} during 2001-2025 (-0.4 Gt CO_2 yr^{-1} since 1990). This overall net forest sink was the combination of consistent removals on forest land, averaging about -4.0 Gt CO_2 yr^{-1} (-3.6 Gt CO_2 yr^{-1} during 2021-2025), counterbalancing emissions from net forest conversion averaging 3.6 Gt CO_2 yr^{-1} over the entire study period (decreased to 2.8 Gt CO_2 yr^{-1} during 2021-2025). The FAO estimates disseminated in this FAOSTAT update based on the FRA 2025 are therefore much better aligned with published estimates of the anthropogenic forest sink (IPCC, 2022; Friedlingstein et al., 2025; Grassi et al., 2018) than previous versions (Tubiello et al., 2020).

Finally using the new data, our estimates allow to make the first assessment of trends in both deforestation and forest emissions/removals over the last twenty-five years (i.e., 2016-2025 compared to 2001-2020). Results indicate a decrease of emissions from net forest conversion by 15% and a 8% decrease in removals one forest land, albeit both are statistically not significant in light of the underlying uncertainties.

5. Conclusions

The new FAO estimates of CO_2 emissions/removals from forest land were updated based on the most recent FRA 2025 data. Over the period 1990-2025, they confirmed well-known country, regional and global trends, providing additional detail to specific dynamics while extending information to the period 2021-2025. Importantly, they allowed for the first complete analysis of trends in the most recent decade, 2016-2025. The new estimates confirm and further quantify decreases over time in global deforestation emissions, to below 3 Gt CO_2 yr^{-1} globally, albeit with a small reversal during 2021-2025 in the second half of the decade, largely due to trends in Latin America. At the same time, the FAO estimates have identified a consistent strong carbon sink on remaining forest land of about -4 Gt CO_2 yr^{-1} during the entire period 1990-2025, consistent with country reporting but never previously detected with this magnitude. Overall, the new FAOSTAT estimates confirm and extend current knowledge (Nabuurs et L., 2022; Friedlingstein et al., 2025). Our findings confirm that forests retain a significant role for mitigating climate change.

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Authors' contributions. FT led the development of the FAOSTAT data and wrote this manuscript. AP and AB provided the FRA 2025 and contributed to data analysis. GO, NR, MP and GC contributed data analysis and helped develop the FAOSTAT database.

Competing interests. Author Francesco N. Tubiello is a member of the editorial board of the journal.

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Data Availability. Full dataset is available on zenodo (Tubiello et al., 2025) at: 10.5281/zenodo.17395879.

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References

FAO, 2025a: Global Forest Resources Assessment 2020, FAO Forestry Paper 163, Rome. Available at https://www.fao.org/forest-resources-assessment/en . FAO, Rome, Italy.

FAO, 2025b: FAOSTAT Emissions from Forests. Available at http://www.fao.org/faostat/en/#data/GF. FAO, Rome, Italy.

Friedlingstein, P. et al., 2025: Global Carbon Budget 2024, Earth Syst. Sci. Data, 17, 965–1039, https://doi.org/10.5194/essd-17-965-2025 , 2025

Grassi, G., House, J., Kurz, W.A. *et al.* 2018: Reconciling global-model estimates and country reporting of anthropogenic forest CO_2 sinks. *Nature Clim Change* 8, 914–920 (2018). https://doi.org/10.1038/s41558-018-0283-x

Nabuurs, G-J., R. Mrabet, A. Abu Hatab, M. Bustamante, H. Clark, P. Havlík, J. House, C. Mbow, K.N. Ninan, A. Popp, S. Roe, B. Sohngen, S. Towprayoon, 2022: Agriculture, Forestry and Other Land Uses (AFOLU). In IPCC, 2022: Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change[P.R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, J. Malley, (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA. doi: 10.1017/9781009157926.009

Tubiello, F.N., 2025: FAOSTAT emissions from forests, available at Zenodo, DOI 10.5281/zenodo.17395879..

Tubiello, F.N., Conchedda, G., Casse, L. *et al.* Measuring the world's cropland area. *Nat Food* **4**, 30–32 (2023). https://doi.org/10.1038/s43016-022-00667-9 .

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Table 1. FAO estimates of total forest fluxes (FL_Tot), deforestation (NFC) and emissions/removals on forest land (FL), in Gt CO_2 yr^{-1}, for the period 1991-2025, for global, Annex I and non-Annex I, and region totals.

		FAOSTAT					
	Period	**1991-2000**	**2001-2010**	**2011-2015**	**2016-2020**	**2021-2025**	***1991-2025***
Global	**World**						
	NFC	5.2	3.2	3.0	2.7	2.8	***3.6***
	Forest land	-4.1	-4.0	-4.4	-3.8	-3.6	***-4.0***
	FL	**1.1**	**-0.8**	**-1.4**	**-1.1**	**-0.8**	***-0.4***
Special grouping	**Annex I countries**						
	NFC	0.3	0.1	0.1	0.2	0.2	***0.2***
	Forest land	-2.7	-2.6	-2.5	-2.0	-1.8	***-2.4***
	FL	**-2.4**	**-2.5**	**-2.4**	**-1.8**	**-1.7**	***-2.2***
	Non-Annex I countries						
	NFC	4.9	3.1	3.0	2.5	2.7	***3.5***
	Forest land	-1.4	-1.4	-1.9	-1.8	-1.8	***-1.6***
	FL	**3.5**	**1.7**	**1.0**	**0.7**	**0.9**	***1.9***
Region	**Africa**						
	NFC	1.0	1.0	1.2	0.8	0.7	***0.9***
	Forest land	0.0	0.0	0.0	0.1	-0.1	***0.0***
	FL	**1.0**	**0.9**	**1.2**	**0.9**	**0.6**	***0.9***
	Americas						
	NFC	2.9	2.0	1.4	1.6	1.8	***2.1***
	Forest land	-1.5	-1.3	-1.6	-1.0	-0.8	***-1.3***
	FL	**1.4**	**0.7**	**-0.2**	**0.6**	**1.0**	***0.8***
	Asia						
	NFC	1.2	0.2	0.3	0.2	0.3	***0.5***
	Forest land	-0.8	-0.9	-1.3	-1.6	-1.2	***-1.1***
	FL	**0.4**	**-0.7**	**-0.9**	**-1.4**	**-0.9**	***-0.6***
	Europe						
	NFC	0.03	0.04	0.04	0.05	0.04	***0.04***
	Forest land	-1.7	-1.8	-1.5	-1.2	-1.4	***-1.6***
	FL	**-1.6**	**-1.7**	**-1.5**	**-1.2**	**-1.4**	***-1.5***
	Oceania						
	NFC	**0.07**	0.08	0.01	0.02	0.00	***0.05***
	Forest land	**-0.04**	-0.04	-0.05	-0.05	-0.03	***-0.04***
	FL	**0.03**	**0.04**	**-0.05**	**-0.03**	**-0.02**	***0.01***

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Figures Legends

Figure 1. The three main fluxes considered in this paper, consisting of overall forest fluxes to and from the atmosphere (FL_Tot), deforestation (NFC) and emissions/removals on forest land (FL). Photo copyright: Francesco N Tubiello.

Figure 2. Global forest emissions/removals corresponding to the FRA 2025.

Figure 3. Regional net forest emissions/removals corresponding to the FRA 2025.

Figure 4: Top countries with largest removals on forest land during 2021–2025 in FAOSTAT. FAO data estimated using FRA 2025. NGHGI data are averages of country emissions/removals submitted to UNFCCC published during the same period.

Figure 5: Top countries with largest emissions from net forest conversion during 2021–2025 in FAOSTAT. FAO data estimated using FRA 2025. NGHGI data are averages of country emissions/removals submitted to UNFCCC published during the same period.

Figure 6. Emissions/removals on forest land in the FAOSTAT database. Comparison of FAO estimates and country NGHGI data, 1991-2025

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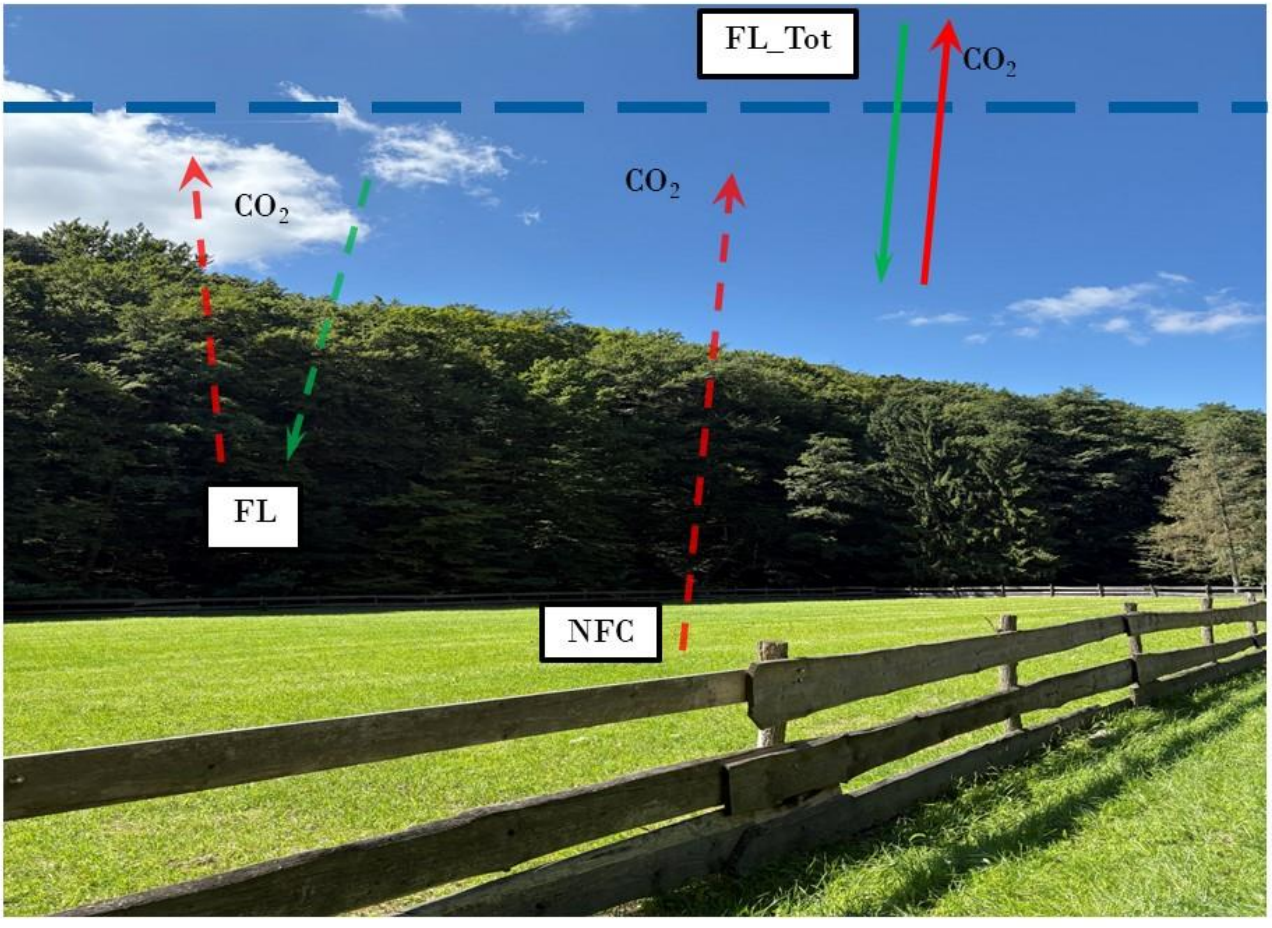
FIGURES



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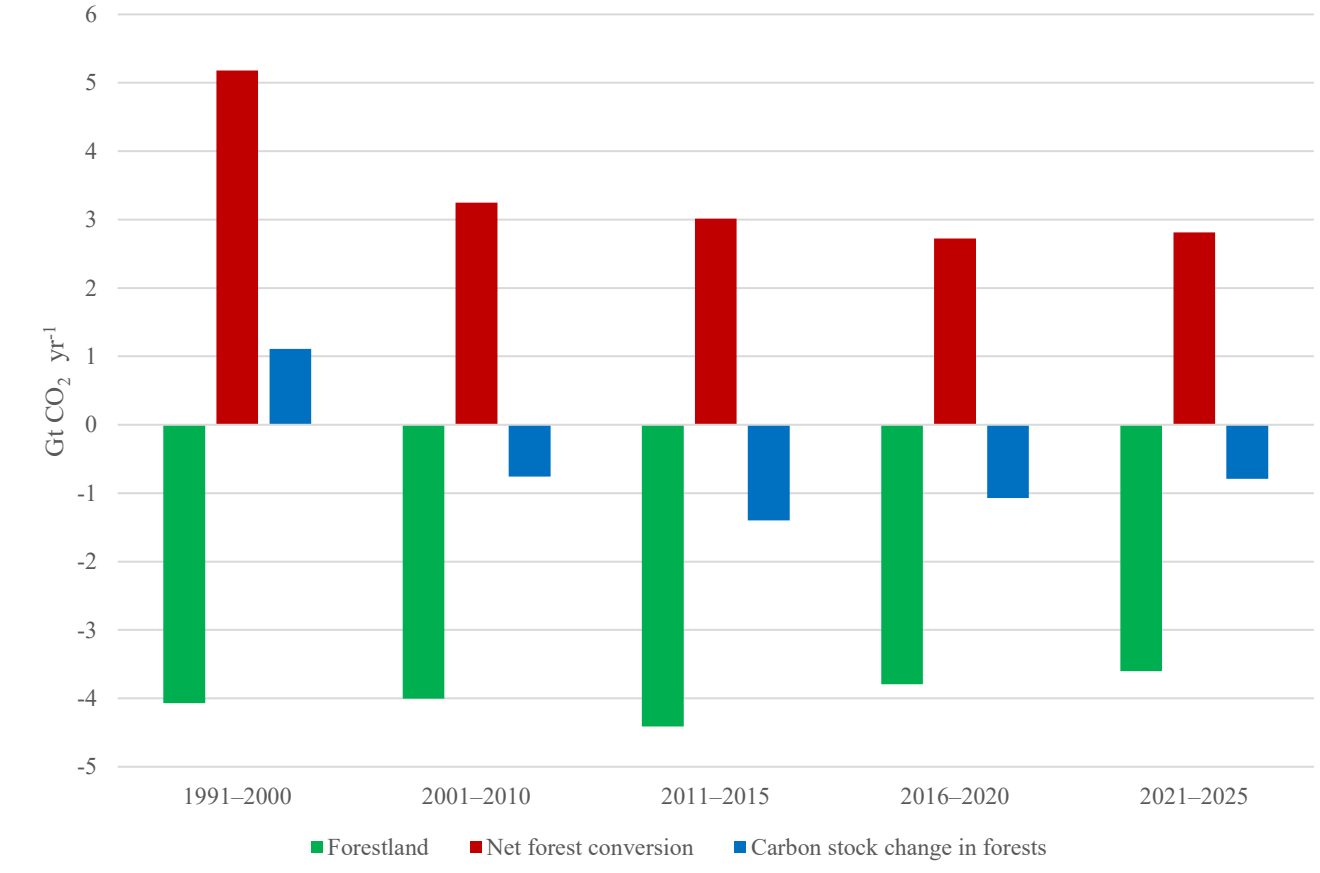

Figure 2. Global forest emissions/removals corresponding to the FRA 2025.

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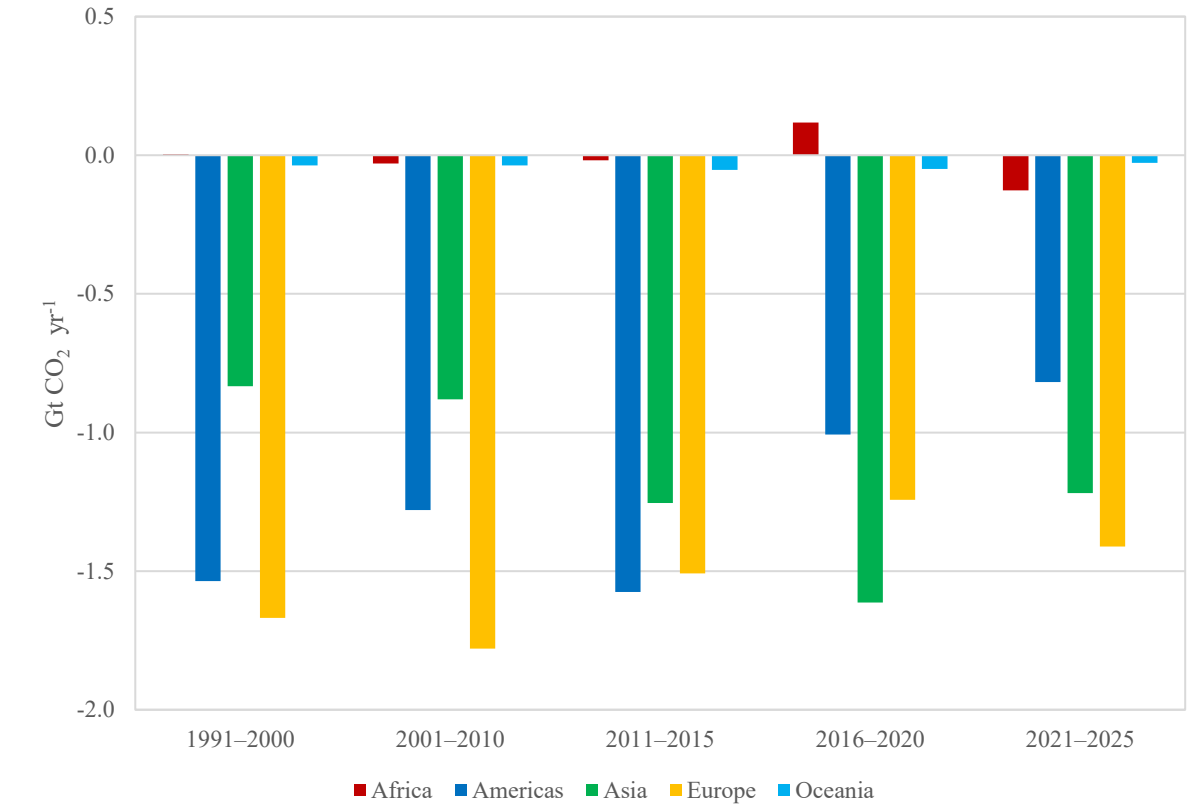

Figure 3. Regional net forest emissions/removals corresponding to the FRA 2025.

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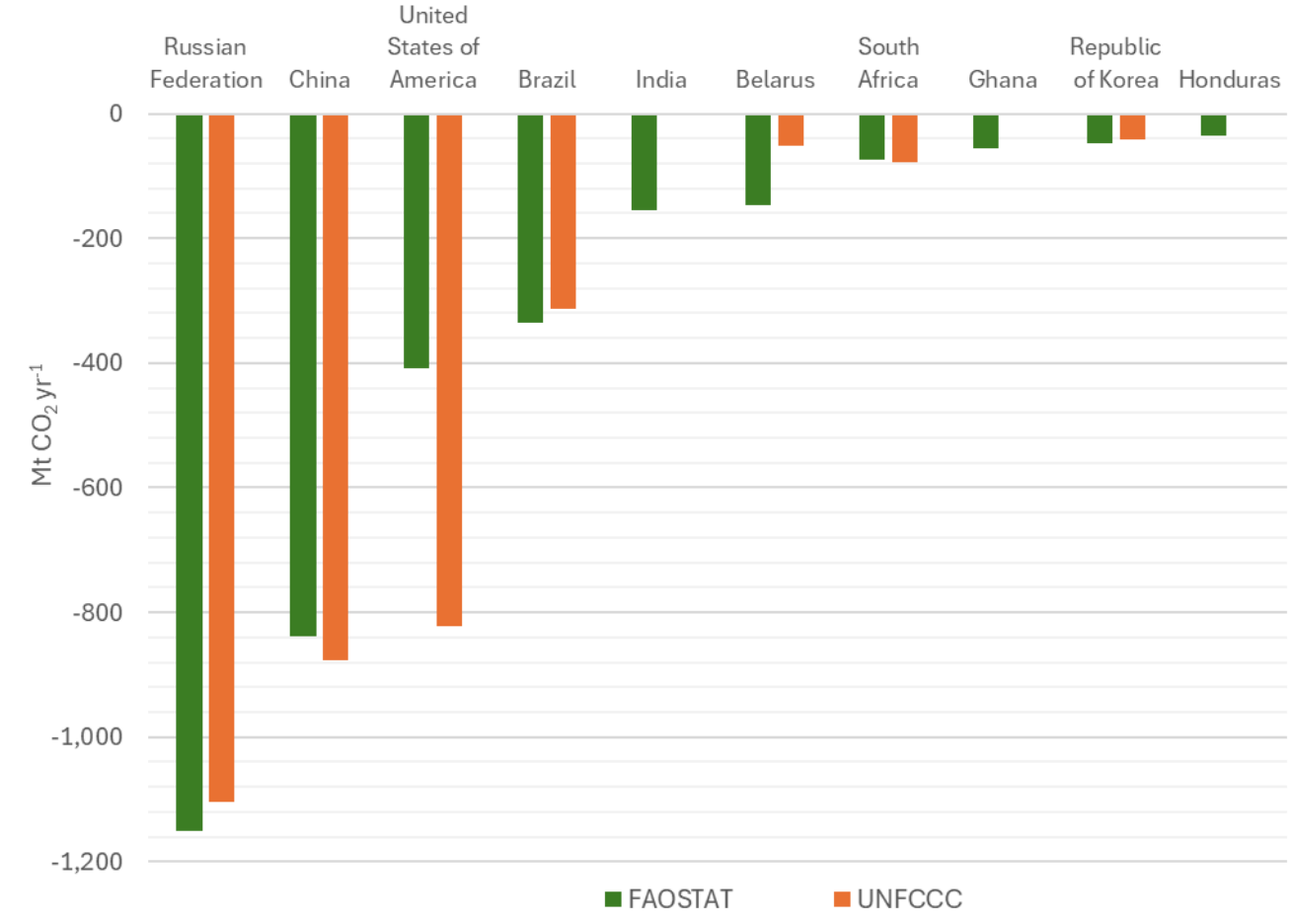

Figure 4: Top countries with largest removals on forest land during 2021–2025 in FAOSTAT. FAO data estimated using FRA 2025. NGHGI data are averages of country emissions/removals submitted to UNFCCC published during the same period.

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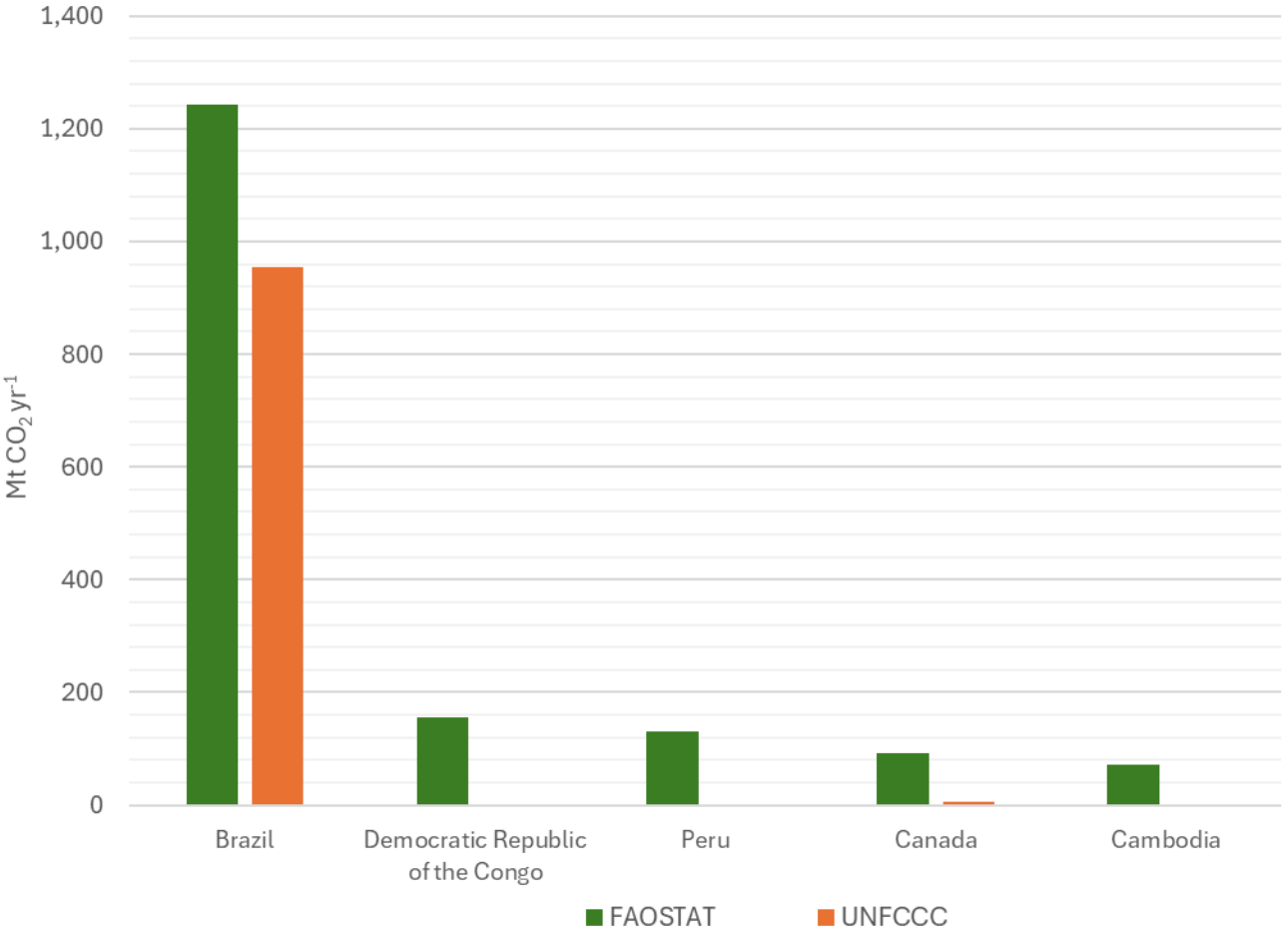

255 **Figure 5: Top countries with largest emissions from net forest conversion during 2021–2025 in FAOSTAT. FAO data estimated using FRA 2025. NGHGI data are averages of country emissions/removals submitted to UNFCCC published during the same period.**

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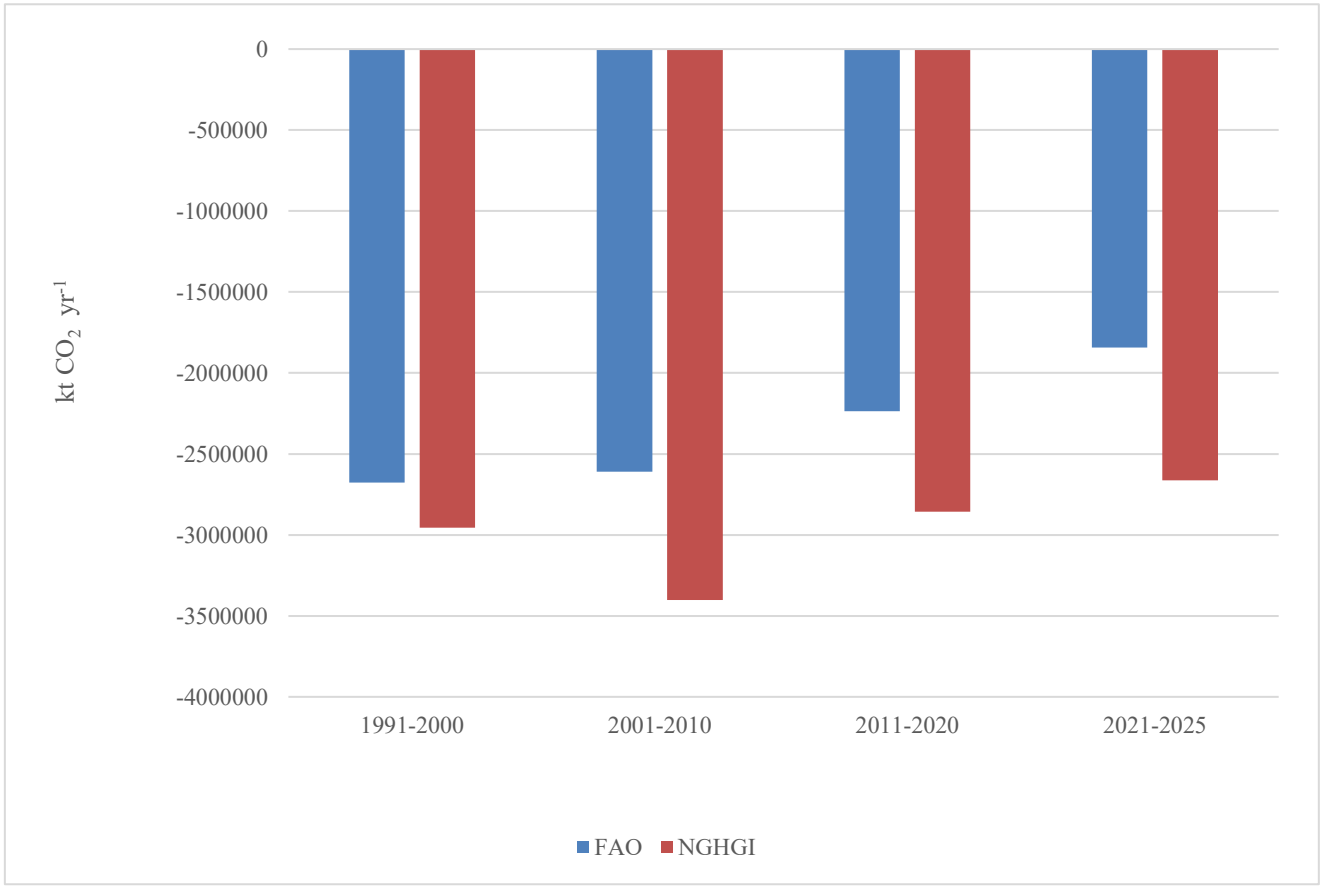

Figure 6. Emissions/removals on forest land in the FAOSTAT database. Comparison of FAO estimates and country NGHGI data, 1991-2025