Supplementary information

Carbon fluxes from land 2000-2020: bringing clarity on countries' reporting

Giacomo Grassi[1]*, Giulia Conchedda[2], Sandro Federici[3], Raul Abad Viñas[1], Anu Korosuo[1], Joana Melo[4], Simone Rossi[5], Marieke Sandker[6], Zoltan Somogyi[7], Francesco N. Tubiello[2]

1 Joint Research Centre (JRC), European Commission, Ispra, 21027, Italy.
2 Statistics Division, FAO, Rome, 00153, Italy
3 Institute for Global Environmental Strategies, IGES, Hayama, 240-0112, Japan
4 School of Geography, University of Leeds, Leeds, LS2 9JT, UK
5 Joint Research Centre (JRC) Consultant, ARCADIA SIT s.r.l., Vigevano (PV), 27029, Italy
6 Forestry Division, FAO, Rome, 00153, Italy
7 University of Sopron, Forest Research Institute, Sopron, H-9400, Hungary

Correspondence to: Giacomo Grassi (giacomo.grassi@ec.europa.eu)

Data from this study are openly available via the Zenodo portal (Grassi G, Federici S, Abad Viñas R, Korosuo A, Rossi S (version March 2022). LULUCF data based on National GHG inventories (NGHGI DB), at https://doi.org/10.5281/zenodo.6390739 .

Acronyms:

AI: Annex I countries

NAI: non-Annex I countries

GHG: Greenhouse Gas

NGHGI DB: National GHG Inventories DataBase (this study)

UNFCCC GHGDI: UNFCCC GHG Data Interface

NC: National Communications

BUR: Biennial Update Reports

REDD+ submissions: submissions under the United Nations climate change mitigation framework "Reducing Emissions from Deforestation and forest Degradation in developing countries" (REDD+). DEF: reducing emissions from deforestation. DEG: reducing emissions from forest degradation. CCS: conservation of forest-carbon stocks. ECS: enhancement of forest-carbon stock. SFM: sustainable management of forests.

NDC: Nationally Determined Contributions

FL: Forest land; NF: Non Forest Land; CL: Cropland; GL: Grassland

TABLES

Supplementary table 1. Sources of data analyzed and selected for the NGHGI database. For each submission type, the year of the latest submission is indicated (for NDC, generally only submissions after 2020 are considered). Typically, the most recent source is selected in the NGHGI database, except when a clearly more complete dataset is available (e.g. NC/BUR are often more complete/disaggregated than NDC). In this case, an explanation is given under 'relevant observations'. These exceptions typically do not significantly impact the carbon flux estimates (except for Central African Republican and, to a lesser extent, Mali).

	Annex I (AI) or non-Annex I	SOURCES analysed (yr of last submission)					Source selected in the NGHGI dataset	Relevant observations	
		GHGI	NC	BUR	REDD+	NDC		On the source	On the data
Afghanistan	NAI		2019	2019			NC/BUR (2019)		
Albania	NAI		2016	2021		2021	NC/BUR (2021)		
Algeria	NAI		2020				NC/BUR (2020)		
Andorra	NAI		2021	2021			NC/BUR (2021)		
Angola	NAI		2021			2021	NC/BUR (2021)	NC2 2021 used (Tab. 2) because more recent that NC1 (2012)	
Antigua and Barbuda	NAI		2016	2020		2021	NC/BUR (2020)	BUR more complete than NDC (but broadly consistent)	
Argentina	NAI		2015	2021	2019	2021	NC/BUR (2021)		Share between categories in the period 2000-2017 done using data from 2018, assuming all categories constant except Deforestation
Armenia	NAI		2020	2020		2021	NC/BUR (2020)	No LULUCF data in the NDC	
Australia	AI	2021					GHGI (2021)		All lands considered managed
Austria	AI	2021					GHGI (2021)		
Azerbaijan	NAI		2021	2018			NC/BUR (2018)		
Bahamas	NAI		2015				NC/BUR (2015)		
Bahrain	NAI		2020			2021	NC/BUR (2020)	No historical LULUCF data in the NDC	
Bangladesh	NAI			2018	2019	2021	REDD+ (2019)	REDD+ (including DEF, DEG, ECS) more complete than NDC	
Barbados	NAI		2018			2021	NC/BUR (2018)	No historical LULUCF data in the NDC	
Belarus	AI	2021					GHGI (2021)		
Belgium	AI	2021					GHGI (2021)		
Belize	NAI		2016	2021	2020	2021	NC/BUR (2021)		
Benin	NAI		2019	2019		2021	NC/BUR (2019)	NC more complete than NDC (but broadly consistent)	
Bhutan	NAI		2021		2020	2021	NC/BUR (2021)		
Bolivia	NAI		2020				NC/BUR (2020)		
Bosnia and Herzegovina	NAI		2017	2017		2021	NC/BUR (2017)	No historical LULUCF data in the NDC	
Botswana	NAI		2019	2019			NC/BUR (2019)		
Brazil	NAI		2020	2020		2021	NC/BUR (2020)	NC4 2020 used (Appendix I) because more disaggregated and rich in information than BUR4 2020, even if not fully consistent (BUR4 has lower emission values).	Data on C fluxes are from Appendix I of NC4 (2020). Data on forest area are from table 3.109 of NC3, for the year 2010. The area of managed forest includes primary forests in conservation areas.
Brunei Darussalam	NAI		2017				NC/BUR (2017)		
Bulgaria	AI	2021					GHGI (2021)		
Burkina Faso	NAI		2015	2021	2020	2021	NC/BUR (2021)		
Burundi	NAI		2019			2021	NC/BUR (2019)	NC more complete than NDC (but broadly consistent)	
Cape Verde	NAI		2018			2021	NC/BUR (2018)	NC more complete than NDC (but broadly consistent)	
Cambodia	NAI		2016	2020	2021		REDD+ (2021)	REDD+ (including DEF, ECS) used because more recent than the NC2 (2016)	
Cameroon	NAI		2016			2021	NC/BUR (2016)	No LULUCF data in the NDC	
Canada	AI	2021					GHGI (2021)		
Central African Rep.	NAI		2015			2016, 2021	NDC (2016)	NDC 2016 used (Fig. 1, including both emissions and removals) because more recent than NC2 (2015). Note that a more recent NDC (2021) was ignored because the reported sink (-0.7 GtCO2/yr) is biophysically impossible	Although not impossible, the forest sink in the NDC 2016 (-0.2 Gt CO2/yr) is considered implausible
Chad	NAI		2013			2021	NDC (2021)		
Chile	NAI		2021	2021	2016		NC/BUR (2021)		
China	NAI		2019	2019		2021	NC/BUR (2019)	No historical LULUCF data in the NDC. Note that BUR 4 (2020) reports slightly lower emission values than NC4. We used NC4 because more disaggregated and rich in information.	Values from BUR2, tab 2.10, 2.14, 2.15, 2.16. The values for 2005 and 2012 are not disaggregatd into land use categories: here are assumed to represent the total LULUCF and allocated to different categories proportionally to the allocation reported in 2010. No explicit estimate of DEF is reported. The value of forest area found in BUR2 is taken, but slighly different values are reported in NC3.
Colombia	NAI		2017	2019	2020		NC/BUR (2019)	BUR more complete than REDD+ (but broadly consistent)	C fluxes are not estimated on all the forest area, but the extent of managed area is not clear. Here we computed the area of managed land from the info that bosque natural (considered C neutral) is 52% of total forest area.
Comoros	NAI		2013			2021	NDC (2021)		
Congo	NAI		2009		2016	2021	NDC (2021)	NDC 2021 used (Tabs. 7 and 8) because more recent than	
Cook Islands	NAI		2020				NC/BUR (2020)		
Costa Rica	NAI		2021	2019	2016		NC/BUR (2021)		
Cote d'Ivoire	NAI		2017	2018	2017		REDD+ (2017)	REDD+ (including DEF, ECS) more complete than BUR	
Croatia	AI	2021					GHGI (2021)		
Cuba	NAI		2020	2020			NC/BUR (2020)		
Cyprus	AI	2021					GHGI (2021)		
Czech Republic	AI	2021					GHGI (2021)		
Dem. Rep. Korea	NAI		2013				NC/BUR (2013)		
Dem. Rep. Congo (DRC)	NAI		2015		2018	2021	NDC (2021)	NDC 2021 used (Fig. 1) because more recent than the NC3 (2015) and broadly consistent with REDD+ (2018). However, this source does not report any carbon sink from forest.	All emissions are assumed to come from deforestation. We assume that all the forest area mentioned in NDC is managed. Both C fluxes and managed forest area are very uncertain.
Denmark	AI	2021					GHGI (2021)		
Djibouti	NAI		2021				NC/BUR (2021)		
Dominica	NAI		2020		2022		NC/BUR (2020)	REDD+ fluxes are heavily affected by emissions from natural disturbances. Therefore NC3 (2020) is used	
Dominican Republic	NAI		2017	2020	2020		REDD+ (2020)	REDD+ (including DEF, DEG, ECS) more complete than BUR	
Ecuador	NAI		2017	2017	2020		NC/BUR (2017)	NIR 2017 far more complete than REDD+ 2020 (which covers only DEF)	The area of managed forest (5Mha), i.e. for which C fluxes are estimated, was derived from the NC3 (2017). Since REDD+ reports a total forest area of 15 Mha (broadly similar to total area under FAO-FRA 2020), we inferred about 10 Mha as "unmanaged" forest
Egypt	NAI		2016	2019			No estimate		
El Salvador	NAI		2018	2018	2021	2021	REDD+ (2021)	REDD+ (including DEF, DEG, ECS) more complete than NDC	
Equatorial Guinea	NAI		2019		2020		REDD+ (2020)	REDD+ includes DEF, DEG	
Eritrea	NAI		2021	2021			NC/BUR (2021)		
Estonia	AI	2021					GHGI (2021)		

Supplementary table 1. (continues)

	Annex I (AI) or non-Annex I (NAI)	SOURCES analysed (yr of last submission)					Source selected in the NGHGI dataset	Relevant observations	
		GHGI	NC	BUR	REDD+	NDC		On the source	On the data
Ethiopia	NAI		2016		2017	2021	NC/BUR (2016)	NC used because much more complete, disaggreted and informative than the more recent NDC or REDD+ (and broadly consistent with)	Numbers are from tab 3-30, and are in CO2-eq. Based on information that most of emissions are from deforestation in the year 2013 (p. 138 of the NC2), here all emissions from CL and GL are assumed to come from Deforestation for the whole time series. This is a simplification of the information in the NC.
Fiji	NAI		2020				NC/BUR (2020)		
Finland	AI	2021					GHGI (2021)		
France	AI	2021					GHGI (2021)		
Gabon	NAI		2022	2021	2021		NC/BUR (2021)	BUR 2021 is broadly consistent with REDD+ and NC3	
Gambia	NAI		2020			2021	NC/BUR (2020)	NC used because more complete than (and consistent with) NDC	
Georgia	NAI		2021	2019		2021	NC/BUR (2021)		
Germany	AI	2021					GHGI (2021)		
Ghana	NAI		2020	2021	2021	2021	NC/BUR (2021)	NC used because more complete than REDD+ (but not entriely consistent). No LULUCF data in the NDC.	
Greece	AI	2021					GHGI (2021)		
Grenada	NAI		2019				NC/BUR (2019)		
Guatemala	NAI		2016		2022		REDD+ (2022)	REDD+ includes DEF, DEG, ECS	
Guinea	NAI		2018			2021	NDC (2021)	NDC 2021 used (Tab. 7) because more recent than the NC2 (2018), even if no sink is reported. Note that the sink in the NC2 is biophisically impossible (-0.4 GtCO2/y over 5 Mha forest)	
Guinea Bissau	NAI		2018	2020	2019	2021	NC/BUR (2020)	BUR more complete than NDC	
Guyana	NAI		2012		2015		REDD+ (2015)	REDD+ (covering DEF, DEG), used because more recent	No estimate for forest land
Haiti	NAI		2013				NC/BUR (2013)		
Honduras	NAI		2020	2020	2020	2021	NC/BUR (2020)	BUR more complete than NDC	
Hungary	AI	2021					GHGI (2021)		
Iceland	AI	2021					GHGI (2021)		
India	NAI		2012	2021	2018		NC/BUR (2021)	BUR3 2021 used because more recent than NC3 2018.	Emissions from GL assumed to be due to Deforestation. Fluxes include non-CO2 gases. C fluxes (table 2.35) and forest area (yr 2015, tab 2.26) are from BUR 3. We assume that all the forest area reported is managed.
Indonesia	NAI		2018	2021	2022	2021	NC/BUR (2021)	BUR3 2021 used (Tab. 2.17) because more recent than NC3 2018 and more complete than REDD+ (2022).	Peat fires and peat decomposition are under Org soils. C fluxes (tab 2-17) and forest area (yr 2015, tab 1-8) are from BUR 3. We assume that all the forest area reported is managed
Iran	NAI		2018				NC/BUR (2018)		
Iraq	NAI		2017			2021			
Ireland	AI	2021					GHGI (2021)		
Israel	NAI		2018	2016		2021	NC/BUR (2016)	No LULUCF data in the NDC	
Italy	AI	2021					GHGI (2021)		
Jamaica	NAI		2019	2016			NC/BUR (2019)		
Japan	AI	2021					GHGI (2021)		
Jordan	NAI		2014	2021		2021	NC/BUR (2021)		
Kazakhstan	AI	2021					GHGI (2021)		
Kenya	NAI		2015		2020		REDD+ (2020)	REDD+ covers DEF, DEG, SMF, ECS	
Kiribati	NAI		2013						
Kuwait	NAI		2019	2019		2021	NDC (2021)		
Kyrgyzstan	NAI		2017			2021	NDC (2021)		
Lao People's Dem. Rep.	NAI		2013	2020	2018	2021	NDC (2021)		
Latvia	AI	2021					GHGI (2021)		
Lebanon	NAI		2016	2021		2021	NC/BUR (2021)	No historical LULUCF data in the NDC	
Lesotho	NAI		2021	2021			NC/BUR (2021)		
Liberia	NAI		2013	2021	2020	2021	NC/BUR (2021)	No historical LULUCF data in the NDC	
Libya	NAI								
Liechtenstein	AI	2021					GHGI (2021)		
Lithuania	AI	2021					GHGI (2021)		
Luxembourg	AI	2021					GHGI (2021)		
Malaysia	NAI		2018	2018	2019	2021	NC/BUR (2018)	BUR 2018 (tab 2.9) more complete than REDD+ (but consistent). No LULUCF data in the NDC	The sink is very high and here considered "implausible", but is consistently reported in various documents
Maldives	NAI		2018	2020					
Mali	NAI		2018			2021	NC/BUR (2018)	NC3 2018 used (tab. 42) because more complete than the more recent NDC 2021. The latter report include contraddictory numbers between text and tables, and refer to a BUR 2019 that apparently does not exist. This choice has an impact of the net sink (for 2000-2020: -0.2 GtCO2/y in NC3 vs -0.3 GtCO2/y in NDC)	The sink in the NC is very high and here considered "implausible"
Malta	AI	2021					GHGI (2021)		
Marshall Islands	NAI								
Mauritania	NAI		2019	2021		2021	NC/BUR (2021)		
Mauritius	NAI		2017	2021		2021	NC/BUR (2021)		
Mexico	NAI		2019	2019	2020		NC/BUR (2019)	NIR 2019 used (Tabs. 5.23-5.32) because more recent than the NC5 (2012) and more complete than REDD+ (2020)	C fluxes (tab 5.23) and forest area (yr 2015, tab 5.25) are from NC 6. We assume that all the forest area reported in NIR is managed
Micronesia	NAI		2015				NC/BUR (2015)		
Monaco	AI	2021					GHGI (2021)		
Mongolia	NAI		2018	2017	2018		NC/BUR (2018)	NC used because more complete than REDD+	
Montenegro	NAI		2015	2022		2021	NC/BUR (2022)		
Morocco	NAI		2021	2019		2021	NC/BUR (2021)		
Mozambique	NAI		2006		2018	2021	REDD+ (2018)	REDD+ covers only DEF. NC (2017) not taken also because it reports an implausible sink. No LULUCF data	
Myanmar	NAI		2012		2018	2021	REDD+ (2018)	REDD+ (covering DEF, ECS) used because NDC 2021 confirmed it as the correct source to look at.	
Namibia	NAI		2020	2021		2021	NC/BUR (2021)	NIR 2019 used (Tab. 6.18) because more recent the NC3 (2015) and more complete than NDC 2021	The sink is very high and here considered "implausible".
Nauru	NAI		2015			2021			
Nepal	NAI		2021		2017		NC/BUR (2021)		
Netherlands	AI	2021					GHGI (2021)		
New Zealand	AI	2021					GHGI (2021)		
Nicaragua	NAI		2018		2019		REDD+ (2019)	REDD+ includes DEF, DEG, ECS	
Niger	NAI		2017			2021	NC/BUR (2017)	NC used because more complete than NDC	
Nigeria	NAI		2020	2021	2019	2021	NC/BUR (2021)	BUR2 2021 used (Tab. 2.11) because more recent than the NC2 2014. Note that numbers in the NDC 2021 and BUR2 2021 report different numbers. Here the BUR is used because much more detailed	

	Annex I (AI) or non-Annex I (NAI)	SOURCES analysed (yr of last submission)					Source selected in the NGHGI dataset	Relevant observations	
		GHGI	NC	BUR	REDD+	NDC		On the source	On the data
Niue	NAI		2016				NC/BUR (2016)		
Norway	AI	2021					GHGI (2021)		
Oman	NAI		2019	2019		2021			
Pakistan	NAI		2019		2020	2021	NC/BUR (2019)	NC used because more complete than REDD+ (only DEF) and of NDC	
Palau	NAI		2019				NC/BUR (2019)		
Panama	NAI		2018	2021	2022		REDD+ (2022)		
Papua New Guinea	NAI		2015	2019	2017		NC/BUR (2019)	BUR1 2019 used (Fig. 2.11) because more recent than the NC2 2015	According to the BUR "The distinction between managed and unmanaged lands has not been carried out yet and it is assumed that all land areas in PNG are managed"
Paraguay	NAI		2017	2021	2022	2021	NC/BUR (2021)	BUR more complete than REDD+ (which includes only DEF)	
Peru	NAI		2016	2019	2021		NC/BUR (2019)	NIR 2019 (tab. 86) more complete than REDD+ (which includes only DEF)	The forest area is taken from NC 3 (74 Mha, broadly consistent with NIR 2019 and REDD+). Since the NIR specifies that the C flux is reported only for Secondary forest, FL-FL is a source and a sink is reported only for L-FL, here we use data on Bosques de Producción Permanente (18 Mha) from the NC3, which appears to be the area for which C fluxes are estimated. Based on this information, we then inferred the area of unmanaged forest as 74-18 = 56 Mha
Philippines	NAI		2014			2021	NC/BUR (2014)	Data from NC2 2014 (tab 2.7). No historical LULUCF data in the NDC	The sink is very high and here considered "implausible"
Poland	AI	2021					GHGI (2021)		
Portugal	AI	2021					GHGI (2021)		
Qatar	NAI		2011			2021			
Republic of Korea	NAI		2019	2021			NC/BUR (2021)		
Republic of Moldova	NAI		2018	2016			NC/BUR (2018)		
Romania	AI	2021					GHGI (2021)		
Russian Federation	AI	2021					GHGI (2021)		
Rwanda	NAI		2018	2021			NC/BUR (2021)		
Saint Kitts and Nevis	NAI		2017			2021	NC/BUR (2017)	BUR more complete than NDC	
Saint Lucia	NAI		2017		2021	2021	REDD+ (2021)	REDD+ (DEF, DEG, ECS) more complete than NDC	
Saint Vincent and Grenad.	NAI		2016				NC/BUR (2016)		
Samoa	NAI		2010			2021	NDC (2021)		
San Marino	NAI		2013				NC/BUR (2013)		
Sao Tome and Principe	NAI		2019			2021	NC/BUR (2019)	NC more complete than NDC	
Saudi Arabia	NAI		2016	2018		2021	NC/BUR (2018)	BUR more complete than NDC	
Senegal	NAI		2016			2020	NDC (2020)		No estimate for deforestation
Serbia	NAI		2017	2016			NC/BUR (2016)		
Seychelles	NAI		2013			2021	NC/BUR (2013)	No historical LULUCF data in the NDC	
Sierra Leone	NAI		2012			2021	No estimate ( )		
Singapore	NAI		2018	2016			NC/BUR (2016)		
Slovakia	AI	2021					GHGI (2021)		
Slovenia	AI	2021					GHGI (2021)		
Solomon Islands	NAI		2017		2019	2021	REDD+ (2019)	REDD+ (DEF, DEG, ECS) more complete than NDC	
Somalia	NAI		2019			2021	NC/BUR (2019)	BUR more complete than NDC (where LULUCF values seem unclear)	
South Africa	NAI		2018	2021		2021	NC/BUR (2021)	No historical LULUCF data in the NDC	
South Sudan	NAI		2019			2021	NC/BUR (2019)	BUR more complete than NDC (where LULUCF values seem unclear)	
Spain	AI	2021					GHGI (2021)		
Sri Lanka	NAI		2012		2017	2021	REDD+ (2017)	REDD+ (DEF, ECS) more complete than NDC	
Sudan	NAI		2013		2020	2021	NC/BUR (2013)	NC more complete than NDC. REDD+ (DEF) not taken because sub-national.	
Suriname	NAI		2016		2021		REDD+ (2021)		
Swaziland	NAI		2016				NC/BUR (2016)		
Sweden	AI	2021					GHGI (2021)		
Switzerland	AI	2021					GHGI (2021)		
Syrian Arab Republic	NAI		2010				NC/BUR (2010)		
Tajikistan	NAI		2014	2019		2021	NDC (2021)		
Thailand	NAI		2018	2020	2021		REDD+ (2021)	REDD+ 2021 (including DEF, DEG, ECS) used because more recent and complete than the NC3 (2018)	
Macedonia	NAI					2021	NDC (2021)		
Timor-Leste	NAI		2020	2020			NC/BUR (2020)		
Togo	NAI		2015	2017	2020	2021	REDD+ (2020)	REDD+ (DEF, ECS) more complete than NDC	
Tonga	NAI		2020				NC/BUR (2020)		
Trinidad and Tobago	NAI		2021				NC/BUR (2021)		
Tunisia	NAI		2019	2016		2021	NC/BUR (2019)	No historical LULUCF data in the NDC	
Turkey	AI	2021					GHGI (2021)		
Turkmenistan	NAI		2016				NC/BUR (2016)		
Tuvalu	NAI		2018				NC/BUR (2018)		
Uganda	NAI		2014	2019	2018	2021	NC/BUR (2019)	No historical LULUCF data in the NDC	
Ukraine	AI	2021					GHGI (2021)		
United Arab Emirates	NAI		2019				NC/BUR (2019)		
United Kingdom	AI	2021					GHGI (2021)		
United Rep. of Tanzania	NAI		2015		2017	2021	NDC (2021)		
United States of America	AI	2021					GHGI (2021)		
Uruguay	NAI		2019	2021			NC/BUR (2021)		
Uzbekistan	NAI		2017	2021		2021	NC/BUR (2021)	BUR more complete than NDC.	
Vanuatu	NAI		2021	2021		2021	NC/BUR (2021)	No historical LULUCF data in the NDC	
Venezuela	NAI		2018			2021	NC/BUR (2018)	No historical LULUCF data in the NDC	We assume that all the forest area reported in NC2 is managed
Viet Nam	NAI		2019	2021	2016		NC/BUR (2021)		
Yemen	NAI		2018	2018			NC/BUR (2018)		
Zambia	NAI		2020	2020	2021	2021	NC/BUR (2020)	NC more complite than REDD+, but not consistent (REDD+ has smaller emissions) . No historical LULUCF data in the NDC	
Zimbabwe	NAI		2017	2021		2021	NC/BUR (2021)	BUR1 2021 used (based on Fig. 2.18) because more recent than the NC3 (2017) and more complete than NDC 2021 (where LULUCF values seem unclear)	

Supplementary table 2. Completeness of LULUCF reporting in terms of land categories uses in our NGHGI DB.

	Completeness of reporting in our NGHGI DB				
	LULUCF	Forest land	Deforest.	Org. soils	Other
Afghanistan	x	x	x		
Albania	x	x	x		x
Algeria	x	x			
Andorra	x	x			
Angola	x	x	x		
Antigua and Barbuda	x	x			
Argentina	x	x	x		x
Armenia	x	x	x		x
Australia	x	x	x	x	x
Austria	x	x	x	x	x
Azerbaijan	x	x			
Bahamas	x	x			
Bahrain	x	x			
Bangladesh	x	x	x		
Barbados	x	x			
Belarus	x	x		x	x
Belgium	x	x	x	x	
Belize	x	x	x		x
Benin	x	x	x		x
Bhutan	x	x	x		
Bolivia	x	x	x		x
Bosnia and Herzegovina	x	x			
Botswana	x	x	x		
Brazil	x	x	x		x
Brunei Darussalam	x	x	x		x
Bulgaria	x	x	x		x
Burkina Faso	x	x	x		
Burundi	x	x			
Cape Verde	x	x			
Cambodia	x	x	x		
Cameroon	x	x	x		x
Canada	x	x	x	x	x
Central African Rep.	x	x	x		x
Chad	x	x			x
Chile	x	x	x		x
China	x	x			x
Colombia	x	x	x		
Comoros	x	x			x
Congo	x	x	x		x
Cook Islands	x	x			
Costa Rica	x	x	x		
Cote d'Ivoire	x	x	x		
Croatia	x	x	x	x	x
Cuba	x	x			
Cyprus	x	x	x		x
Czech Republic	x	x	x		x
Dem. Rep. Korea	x	x	x		
Dem. Rep. Congo (DRC)	x	x			
Denmark	x	x	x	x	x
Djibouti	x	x			
Dominica	x	x			
Dominican Republic	x	x	x		
Ecuador	x	x	x		
Egypt					x
El Salvador	x	x	x		x
Equatorial Guinea	x	x	x		x
Eritrea	x	x			
Estonia	x	x	x	x	x
Ethiopia	x	x	x		x
Fiji	x	x			
Finland	x	x	x	x	x
France	x	x	x		x
Gabon	x	x	x		x
Gambia	x	x	x		
Georgia	x	x			x
Germany	x	x	x	x	x
Ghana	x	x	x		
Greece	x	x	x	x	x
Grenada	x	x			
Guatemala	x	x	x		
Guinea	x	x	x		x
Guinea Bissau	x	x			x
Guyana	x		x		
Haiti	x	x	x		
Honduras	x	x	x		
Hungary	x	x	x	x	x
Iceland	x	x	x	x	x
India	x	x			x
Indonesia	x	x	x	x	x
Iran	x	x	x		
Iraq					x
Ireland	x	x	x	x	x
Israel	x	x			
Italy	x	x	x	x	x
Jamaica	x	x	x		
Japan	x	x	x	x	x
Jordan	x	x			
Kazakhstan	x	x			x
Kenya	x	x	x		
Kiribati					x
Kuwait	x	x			
Kyrgyzstan	x	x			x
Lao People's Dem. Rep.	x	x	x		
Latvia	x	x	x	x	x
Lebanon	x	x	x		x
Lesotho	x	x			x
Liberia	x	x	x		
Libya					x

	Completeness of reporting in our NGHGI DB				
	LULUCF	Forest land	Deforest.	Org. soils	Other
Liechtenstein	x	x	x	x	
Lithuania	x	x	x		x
Luxembourg	x	x	x		
Madagascar	x		x		
Malawi	x	x	x		
Malaysia	x	x	x		
Maldives					
Mali	x	x	x		
Malta	x				
Marshall Islands					x
Mauritania	x	x			
Mauritius	x	x			
Mexico	x	x	x		x
Micronesia	x	x			
Monaco	x				
Mongolia	x	x			
Montenegro	x	x			
Morocco	x	x			
Mozambique	x		x		
Myanmar	x	x	x		
Namibia	x	x	x		
Nauru					x
Nepal	x	x			
Netherlands	x	x	x	x	x
New Zealand	x	x	x	x	x
Nicaragua	x	x	x		
Niger	x	x	x		x
Nigeria	x	x	x		
Niue	x	x			
Norway	x	x	x	x	
Oman					
Pakistan	x	x	x		
Palau	x	x			
Panama	x	x	x		
Papua New Guinea	x	x	x		
Paraguay	x	x	x		
Peru	x	x	x		
Philippines	x	x			
Poland	x	x	x	x	x
Portugal	x	x	x		x
Qatar					x
Republic of Korea	x	x			x
Republic of Moldova	x	x	x		x
Romania	x	x	x	x	x
Russian Federation	x	x	x	x	x
Rwanda	x	x			
Saint Kitts and Nevis	x	x			
Saint Lucia	x	x	x		
Saint Vincent and Grenad.	x	x			
Samoa	x	x			x
San Marino	x	x			
Sao Tome and Principe	x	x			
Saudi Arabia	x	x			
Senegal	x	x			x
Serbia	x	x			
Seychelles	x	x			
Sierra Leone					x
Singapore	x	x			
Slovakia	x	x	x		x
Slovenia	x	x	x	x	x
Solomon Islands	x	x	x		
Somalia	x	x	x		
South Africa	x	x			x
South Sudan	x		x		
Spain	x	x	x		x
Sri Lanka	x	x	x		
Sudan	x	x	x		
Suriname	x	x	x		
Swaziland	x	x			x
Sweden	x	x	x	x	x
Switzerland	x	x	x	x	
Syrian Arab Republic	x	x			
Tajikistan	x	x			x
Thailand	x	x	x		
Macedonia	x	x			x
Timor-Leste	x	x	x		
Togo	x	x			
Tonga	x	x			
Trinidad and Tobago	x	x			
Tunisia	x	x	x		x
Turkey	x	x	x	x	x
Turkmenistan	x	x			
Tuvalu	x	x			
Uganda	x	x	x		
Ukraine	x	x	x	x	x
United Arab Emirates	x	x			
United Kingdom	x	x	x	x	x
United Rep. of Tanzania	x		x		
United States of America	x	x	x	x	x
Uruguay	x	x	x		x
Uzbekistan	x	x	x		
Vanuatu	x	x			
Venezuela	x	x	x		
Viet Nam	x	x	x		x
Yemen	x	x	x		
Zambia	x	x	x		
Zimbabwe	x	x	x		

Supplementary table 3. Forest area (Mha) for the year 2015, from NGHGIs (managed and unmanaged forest) and from FRA 2020 (secondary forest + plantations and primary forest). The notation "F" indicates when FRA data (FAO, 2020) for secondary forest + plantations is used to fill the gaps in managed forest area within our NGHGI DB.

Forest area, gap-filled data (Mha, yr 2015)

Country	Managed	F	Unmanag.	Total	Sec.+plant.	Primary	Total
Afghanistan	2			2	1	0	1
Albania	1			1	1	0	1
Algeria	2			2	2	0	2
Andorra	0			0	0	0	0
Angola	53			53	43	27	69
Antigua and Barbuda	0			0	0	0	0
Argentina	49			49	29	0	29
Armenia	0			0	0	0	0
Australia	133			133	129	5	133
Austria	4			4	4	0	4
Azerbaijan	1			1	1	0	1
Bahamas	1	F		1	1	0	1
Bahrain	0	F		0	0	0	0
Bangladesh	3			3	2	0	2
Barbados	0	F		0	0	0	0
Belarus	9			9	8	0	9
Belgium	1			1	1	0	1
Belize	1	F		1	1	0	1
Benin	4			4	3	0	3
Bhutan	1			1	2	0	3
Bolivia	53			53	52	0	52
Bosnia and Herzegovina	2			2	2	0	2
Botswana	6			6	16	0	16
Brazil	235		258	494	287	217	504
Brunei Darussalam	0	F		0	0	0	0
Bulgaria	4			4	3	1	4
Burkina Faso	6	F		6	6	0	6
Burundi	1			1	0	0	0
Cape Verde	0			0	0	0	0
Cambodia	9			9	9	0	9
Cameroon	20			20	21	0	21
Canada	226		121	347	142	205	347
Central African Rep.	20	F		20	20	2	22
Chad	5	F		5	5	0	5
Chile	18			18	12	5	18
China	214			214	199	11	210
Colombia	28		31	59	60	0	60
Comoros	0			0	0	0	0
Congo	24			24	22	0	22
Cook Islands	0	F		0	0	0	0
Costa Rica	2			2	3	0	3
Cote d'Ivoire	3			3	2	1	3
Croatia	2			2	2	0	2
Cuba	3			3	3	0	3
Cyprus	0			0	0	0	0
Czech Republic	3			3	3	0	3
Dem. Rep. Korea	9			9	6	0	6
Dem. Rep. Congo (DRC)	152			152	45	86	132
Denmark	1			1	1	0	1
Djibouti	0	F		0	0	0	0
Dominica	0			0	0	0	0
Dominican Republic	2			2	2	0	2
Ecuador	5		10	15	13	0	13
Egypt	0	F		0	0	0	0
El Salvador	1			1	1	0	1
Equatorial Guinea	2			2	2	0	2
Eritrea	2			2	1	0	1
Estonia	2			2	2	0	2
Ethiopia	17			17	17	0	17
Fiji	1	F		1	1	0	1
Finland	22			22	22	0	22
France	24		1	24	17	0	17
Gabon	18			18	11	13	24
Gambia	0	F		0	0	0	0
Georgia	3			3	2	1	3
Germany	11			11	11	0	11
Ghana	9			9	7	0	8
Greece	1		2	3	4	0	4
Grenada	0	F		0	0	0	0
Guatemala	4			4	3	1	4
Guinea	5			5	6	0	6
Guinea Bissau	2			2	2	0	2
Guyana	18			18	9	9	18
Haiti	0	F		0	0	0	0
Honduras	6			6	6	0	6
Hungary	2			2	2	0	2
Iceland	0			0	0	0	0
India	71			71	55	16	71
Indonesia	121			121	50	45	95
Iran	14			14	10	0	11
Iraq	1	F		1	1	0	1
Ireland	1			1	1	0	1
Israel	0			0	0	0	0
Italy	9			9	9	0	9
Jamaica	0			0	0	0	1
Japan	25			25	20	5	25
Jordan	0			0	0	0	0
Kazakhstan	19			19	3	0	3
Kenya	5			5	4	0	4
Kiribati	0	F		0	0	0	0
Kuwait	0	F		0	0	0	0
Kyrgyzstan	1			1	1	0	1
Lao People's Dem. Rep.	23			23	17	0	17
Latvia	3			3	3	0	3
Lebanon	0	F		0	0	0	0
Lesotho	0	F		0	0	0	0
Liberia	5			5	8	0	8
Libya	0	F		0	0	0	0

Forest area, gap-filled data (Mha, yr 2015)

Country	Managed	F	Unmanag.	Total	Sec.+plant.	Primary	Total
Liechtenstein	0			0	0	0	0
Lithuania	2			2	2	0	2
Luxembourg	0			0	0	0	0
Madagascar	9			9	10	3	12
Malawi	9			9	2	1	2
Malaysia	18			18	18	1	19
Maldives	0	F		0	0	0	0
Mali	13	F	0		13	0	13
Malta	0			0	0	0	0
Marshall Islands	0	F		0	0	0	0
Mauritania	3			3	0	0	0
Mauritius	0			0	0	0	0
Mexico	98			98	34	32	66
Micronesia	0	F		0	0	0	0
Monaco	0			0	0	0	0
Mongolia	15			15	14	0	14
Montenegro	1			1	0	0	1
Morocco	6			6	6	0	6
Mozambique	34			34	38	0	38
Myanmar	40			40	27	3	30
Namibia	7			7	7	0	7
Nauru	0	F		0	0	0	0
Nepal	6			6	5	1	6
Netherlands	0			0	0	0	0
New Zealand	10			10	8	2	10
Nicaragua	3			3	4	0	4
Niger	1			1	1	0	1
Nigeria	14			14	22	0	22
Niue	0	F		0	0	0	0
Norway	12			12	12	0	12
Oman	0	F		0	0	0	0
Pakistan	5			5	4	0	4
Palau	0	F		0	0	0	0
Panama	4			4	4	0	4
Papua New Guinea	36			36	9	0	9
Paraguay	7			7	17	0	17
Peru	18		56	74	73	0	73
Philippines	7			7	7	0	7
Poland	9			9	9	0	9
Portugal	4			4	3	0	3
Qatar	0	F		0	0	0	0
Republic of Korea	6			6	6	0	6
Republic of Moldova	0			0	0	0	0
Romania	7			7	7	0	7
Russian Federation	687		211	898	551	264	815
Rwanda	0			0	0	0	0
Saint Kitts and Nevis	0	F		0	0	0	0
Saint Lucia	0			0	0	0	0
Saint Vincent and Grenad.	0	F		0	0	0	0
Samoa	0	F		0	0	0	0
San Marino	0	F		0	0	0	0
Sao Tome and Principe	0	F		0	0	0	0
Saudi Arabia	1	F		1	1	0	1
Senegal	14			14	6	2	8
Serbia	2			2	3	0	3
Seychelles	0	F		0	0	0	0
Sierra Leone	3	F		3	3	0	3
Singapore	0			0	0	0	0
Slovakia	2			2	2	0	2
Slovenia	1			1	1	0	1
Solomon Islands	3			3	1	2	3
Somalia	6	F		6	6	0	6
South Africa	23			23	17	0	17
South Sudan	7	F		7	7	0	7
Spain	16			16	19	0	19
Sri Lanka	2			2	2	0	2
Sudan	70			70	18	1	19
Suriname	15			15	0	15	15
Swaziland	0	F		0	0	0	0
Sweden	28			28	26	2	28
Switzerland	1			1	1	0	1
Syrian Arab Republic	1	F		1	1	0	1
Tajikistan	0			0	0	0	0
Thailand	17			17	20	0	20
Macedonia	0	F		0	0		
Timor-Leste	1			1	1	0	1
Togo	1			1	1	0	1
Tonga	0	F		0	0	0	0
Trinidad and Tobago	0	F		0	0	0	0
Tunisia	1	F		1	1	0	1
Turkey	23			23	22	0	22
Turkmenistan	4			4	4	0	4
Tuvalu	0	F		0	0	0	0
Uganda	3	F		3	3	0	3
Ukraine	11			11	10	0	10
United Arab Emirates	1			1	0	0	0
United Kingdom	4			4	3	0	3
United Rep. of Tanzania	48			48	20	29	48
USA	280		8	288	235	75	310
Uruguay	2			2	2	0	2
Uzbekistan	3			3	3	0	4
Vanuatu	0			0	0	0	0
Venezuela	47			47	1	45	47
Viet Nam	15			15	14	0	14
Yemen	2			2	1	0	1
Zambia	48			48	46	0	46
Zimbabwe	16			16	18	0	18

	Managed		Unmanag.	Total	Sec.+plant.	Primary	Total
World	3589		699	4275	2910	1134	4044
Annex I	1599		344	1943	1299	560	1858
Non Annex I	1990		356	2332	1611	575	2186

Supplementary table 4. Net LULUCF CO$_2$ flux from the original country documents selected in our NGHGI DB, not gap-filled. The sources are indicated in Suppl. Table 1.

	LULUCF, original not gap-filled data, Mt CO2/yr																				
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Afghanistan						9															
Albania	4	4	3	3	3	3	3	3	3	2											
Algeria	-8																				
Andorra	0										0	0	0	0	0	0	0	0	0	0	
Angola						40	40	40	40	40	40	71	70	70	70	70	70	70	70		
Antigua and Barbuda																					
Argentina	85	83	97	99	105	94	110	115	91	68	69	57	93	89	62	40	31	41	39		
Armenia	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2				
Australia	32	56	46	58	44	67	63	75	59	56	43	13	0	-3	-10	-19	-42	-53	-40	-43	
Austria	-17	-20	-15	-5	-10	-11	-5	-5	-4	-4	-6	-6	-6	-5	-4	-4	-4	-5	-5	-5	
Azerbaijan	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3							
Bahamas	-4																				
Bahrain						0															
Bangladesh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Barbados	0	0	0	0	0	0	0	0	0	0	0										
Belarus	-41	-40	-38	-36	-38	-40	-42	-45	-45	-48	-50	-49	-47	-49	-47	-45	-41	-37	-39	-32	
Belgium	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-1	-1	-1	-2	-2	-2	-2	-2	-1	-1	
Belize	-8		-12			-11				-10				-8		-6		-7			
Benin	-3						-1				-5	-4	-4	-4	-4	-4					
Bhutan	-7	-8	-8	-9	-9	-8	-8	-6	-8	-9	-8	-8	-8	-8	-6	-8					
Bolivia							41		36												
Bosnia and Herzegovina		-7	-5	-5	-7	-7	-7	-8	-7	-8	-6	-6	-8	-6	-6						
Botswana																-3					
Brazil	1110	1058	1257	2297	2482	1480	1134	794	899	284	220	300	155	354	214	335	365				
Brunei Darussalam											-3	-3	-3	-3	-3						
Bulgaria	-18	-15	-15	-14	-15	-17	-14	-15	-13	-14	-13	-10	-10	-9	-10	-10	-10	-10	-10	-10	
Burkina Faso								34	34	37	37	37	38	38	38	44	44	44			
Burundi						-4					-1					-1					
Cape Verde	0					0					0										
Cambodia												71	71	71	71	56	56	40	40		
Cameroon	-77																				
Canada	-23	-39	-22	-26	2	7	-5	-9	-14	-25	-8	-8	-11	-5	-5	3	-1	0	7	9	
Central African Rep.											-229										
Chad											-5									-1	-1
Chile	-73	-75	-62	-78	-73	-73	-77	-63	-64	-67	-77	-76	-68	-78	-66	-57	-75	-12	-68		
China						-803					-1030		-576		-1151						
Colombia	98	78	78	89	89	88	75	81	75	68	69	73	71	60	64						
Comoros	-2					-2											-2				-2
Congo	-15																-19		-22		-21
Cook Islands							0														
Costa Rica	19	5	5	4	5	5	5	6	2	2	2	2	5	5	-1	0	-1	-3			
Cote d'Ivoire	41	40	38	37	35	34	32	31	29	28	26	25	24	22	21	21					
Croatia	-7	-8	-8	-7	-8	-8	-8	-7	-7	-7	-7	-6	-6	-6	-6	-6	-5	-6	-6	-6	
Cuba	18										-24			-24		-26		-27	-27	-27	-27
Cyprus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Czech Republic	-9	-9	-9	-8	-8	-8	-6	-5	-8	-8	-8	-9	-9	-8	-8	-7	-6	-4	4	14	
Dem. Rep. Korea	-17		-17																		
Dem. Rep. Congo (DRC)	484	484	484	484	484	484	484	484	484	484	484	831	831	831	831	529	529	529	529		
Denmark	4	3	4	4	4	4	5	5	4	3	2	1	1	1	1	0	1	1	3	2	
Djibouti	-2																				
Dominica	0	0	0	0	0	0												-3			
Dominican Republic							2	2	2	2	2	2	2	2	2	2					
Ecuador	41						34				24		20								
Egypt																					
El Salvador		2	2	2	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0		
Equatorial Guinea						9	9	9	9	9	9	9	9	9	9						
Eritrea	0										0						0				
Estonia	-4	-4	-4	-5	-4	-2	-3	-3	-4	-4	-5	-5	-4	-4	-2	-3	-3	-2	-1	-1	
Ethiopia	103	118	109	112	62	61	62	62	77	72	77	102	30	33							
Fiji							0	0	1	0	1	1									
Finland	-19	-20	-21	-22	-23	-24	-29	-20	-24	-36	-24	-24	-27	-20	-23	-21	-20	-18	-11	-17	
France	-22	-34	-42	-45	-48	-49	-50	-50	-50	-39	-40	-40	-42	-45	-39	-35	-38	-36	-35	-35	
Gabon	-98					-105					-121	-117	-118	-115	-114	-115	-113	-109	-109		
Gambia											1										
Georgia	-5	-5	-5	-4	-4	-4	-4	-4	-4	-5	-5	-5	-5	-5	-5	-5	-5	-5			
Germany	-23	-27	1	0		-3	-6	-2	-13	-20	-13	-12	-21	-24	-23	-23	-24	-22	-20		
Ghana	13	13	14	13	13	13	13	13	13	13	13	13	13	13	13	13	13				
Greece	-2	-2	-3	-3	-2	-3	-2	-3	-3	-3	-3	-3	-3	-2	0	-4	-4	-3	-4	-4	
Grenada	0	0	0	0	1	1	0	0	0	0	0										
Guatemala	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
Guinea																34	34	34	34	34	34
Guinea Bissau																-1					
Guyana		46	46	46	46	46	46	46	46	46	46	46	46	46							
Haiti	1																				
Honduras							-8	-8	-5	-5	-5	-5	-5	-5	-5	-5					
Hungary	-1	-3	-2	-4	-4	-6	-4	-4	-6	-4	-5	-4	-5	-4	-5	-6	-5	-5	-5	-6	
Iceland	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
India												-211	-364	-365	-301	-296	-308				
Indonesia	532	-48	174	-25	350	400	1145	300	229	607	160	258	647	503	862	1566	508	489	724	925	
Iran												22									
Iraq																					
Ireland	5	6	6	6	5	5	6	5	4	4	5	5	4	4	5	5	4	5	4	4	
Israel	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Italy	-22	-32	-37	-29	-35	-36	-37	-15	-32	-37	-43	-35	-27	-41	-42	-44	-41	-22	-37	-42	
Jamaica							-2	-2	-2	-2	-2	-2	-2								
Japan	-85	-86	-87	-98	-95	-89	-84	-80	-69	-66	-70	-68	-70	-63	-61	-57	-53	-57	-56	-50	
Jordan																		-1			
Kazakhstan	95	77	58	39	24	6	-7	-7	-7	-8	-10	-11	-12	-12	-7	-2	2	7	12	10	
Kenya		63	63	63	63	63	38	38	38	38	50	50	50	50	57	57	57	57			
Kiribati																					
Kuwait																	0				
Kyrgyzstan	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10			
Lao People's Dem. Rep.	45						33	33	33	33	33	33	33	33	33	26					
Latvia	-13	-13	-12	-11	-7	-7	-8	-7	-8	-5	-3	-3	-5	-4	0	-1	-3	-4	-2	-3	
Lebanon	-2	-3	-3	-2	-3	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-3	-3	-3			
Lesotho						8	8	8	7	7	7										
Liberia															-21						
Libya																					

	LULUCF, original not gap-filled data, Mt CO2/yr																				
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Liechtenstein	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lithuania	-10	-7	-6	-6	-5	-4	-4	-6	-7	-8	-11	-11	-10	-10	-9	-8	-7	-7	-7	-6	
Luxembourg	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	-1	0	0	-1	0	0	0	
Madagascar							34	34	34	34	34	34	34	34	34	34					
Malawi												-1									
Malaysia	-182					-199						-241				-265		-242			
Maldives																					
Mali	-259							-259	-255	-213	-245	-272	-241	-259	-155						
Malta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Marshall Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mauritania	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1		
Mauritius	0	0	0	0	0	0	0														
Mexico						-151					-147					-148					
Micronesia											-1										
Monaco	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Mongolia	-25	-26	-26	-25	-26	-26	-25	-25	-25	-25	-25	-25	-25	-25	-25						
Montenegro	-2	-3	-3	-3	-3	-2	-2	-2	-2	-3	-3	-1	-2	-2	-3	-2	-2	-2	-2	-3	
Morocco	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2						
Mozambique				39	39	39	39	39	39	39	39	39	39	39	39						
Myanmar							52	52	51	51	51	50	50	50	49	49	49				
Namibia	-100	-100	-104	-105	-107	-104	-101	-98	-107	-95	-99	-96	-95	-113	-110	-112	-117				
Nauru																					
Nepal												-16									
Netherlands	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4	
New Zealand	-27	-27	-25	-26	-26	-26	-24	-23	-30	-29	-30	-26	-25	-24	-26	-27	-26	-26	-27	-28	
Nicaragua							17	16	16	15	15	14	14	13	13	12					
Niger	-35									-35											
Nigeria	251	254	257	261	265	269	272	276	278	283	287	290	295	298	303	308	311	315			
Niue										0											
Norway	-20	-22	-23	-25	-24	-21	-23	-24	-25	-28	-25	-26	-22	-23	-19	-15	-15	-16	-17	-19	
Oman																					
Pakistan	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Palau	0	0	0	0	0	0															
Panama	-10	-10	-10	-10	-10	-10	-10	-22	-18	-15	-26	-22	-20	-25	-25	-22					
Papua New Guinea	-22	-22	-13	-14	-11	-18	-13	-10	-9	-5	0	2	-2	4	1	2					
Paraguay	36	31	30	30	30	32	37	38	42	35	35	35	47	46	17	16					
Peru	107					121					90			87		76					
Philippines	-105																				
Poland	-38	-30	-39	-41	-52	-51	-45	-39	-38	-37	-35	-42	-41	-43	-35	-31	-33	-37	-38	-17	
Portugal	-6	-9	-9	2	-8	1	-9	-13	-14	-14	-10	-11	-9	-8	-10	-9	-5	8	-7	-8	
Qatar																					
Republic of Korea	-60	-59	-57	-56	-57	-55	-56	-57	-58	-57	-55	-55	-49	-45	-43	-43	-45	-45	-45		
Republic of Moldova	1	1	1	2	2	2	1	-1	2	1	2	2	2	2	2	2					
Romania	-30	-31	-29	-29	-29	-30	-30	-29	-30	-30	-31	-29	-33	-33	-33	-33	-33	-31	-29	-33	
Russian Federation	-508	-568	-598	-603	-573	-570	-582	-595	-640	-693	-749	-690	-713	-707	-628	-646	-643	-636	-576		
Rwanda							-6	-5	-6	-6	-6	-6	-6	-6	-7	-7	-7	-7	-7		
Saint Kitts and Nevis										0											
Saint Lucia		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Saint Vincent and Grenad.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Samoa	-1							-1													
San Marino								0			0										
Sao Tome and Principe						0								0							
Saudi Arabia	-6										-9		-9								
Senegal											-13					-12					
Serbia	-14					-11					-17	-17	-15	-16	-18						
Seychelles	-1																				
Sierra Leone																					
Singapore														0							
Slovakia	-10	-9	-10	-9	-9	-6	-9	-8	-7	-7	-6	-7	-8	-8	-6	-7	-7	-7	-6	-6	
Slovenia	-6	-6	-8	-7	-7	-7	-7	-8	-8	-7	-7	-7	-7	-6	0	1	1	1	1	0	
Solomon Islands		2	3	2	3	6	5	6	7	6	7	7	9	9	13	14	15	16			
Somalia	-9	-4	-5	-5	7	8	10	8	8	10	14	19	19	31	37						
South Africa	-12	-6	-12	-18	-13	0	-3	-6	0	-14	-11	-11	-11	-19	-17	-23	-33	-31	-31		
South Sudan	0					0					0						0				
Spain	-40	-41	-40	-39	-39	-39	-41	-39	-38	-36	-38	-38	-36	-35	-37	-39	-39	-39	-39	-38	
Sri Lanka	4	4	4	4	4	4	4	4	4	4	4	4									
Sudan	10																				
Suriname	4	4	4	4	4	4	4	4	4	8	8	8	8	16	11	12	13	14	14		
Swaziland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sweden	-44	-45	-44	-42	-35	-34	-44	-37	-38	-38	-40	-40	-41	-39	-39	-37	-41	-39	-37	-37	
Switzerland	5	-1	-3	-3	-3	-3	-2	-1	-2	-3	-3	-1	-2	-2	0	-2	-2	-2	-1	-2	
Syrian Arab Republic	0	0	0	0	0	0															
Tajikistan	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2				
Thailand						-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16			
Macedonia						-2					-1					-2					-4
Timor-Leste						0	2	-5	-4	-2	0	-3	-2	-2	2	-1					
Togo		1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Tonga	-2						-2														
Trinidad and Tobago							-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2		
Tunisia	3										4	3	4								
Turkey	-62	-65	-73	-75	-74	-75	-75	-75	-70	-73	-73	-77	-75	-77	-78	-97	-96	-100	-95	-84	
Turkmenistan	-1				-1																
Tuvalu		0														0					
Uganda	29										41					53					
Ukraine	-46	-42	-40	-48	-37	-34	-36	-38	-22	-26	-32	-16	-20	-7	-5	-7	-2	-11	1	0	
United Arab Emirates	-10					-13										-8					
United Kingdom	5	4	3	2	2	1	1	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-2	-1	-1	
United Rep. of Tanzania															77						
United States of America	-865	-862	-838	-855	-755	-805	-860	-822	-804	-772	-796	-813	-829	-800	-815	-792	-856	-792	-825	-813	
Uruguay	-12		-13		-13		-13		-11		-11		-18		-15		-13	-12			
Uzbekistan	-6	-7	-8	-8	-9	-10	-10	-11	-12	-12	-13	-13	-13	-11	-13	-12	-11	-9			
Vanuatu	-7							-7	-7	-7	-7	-7	-7	-7	-7	-7					
Venezuela											-30										
Viet Nam																			-39		
Yemen											-2										
Zambia	25					29					41	42	42	43	45	46	47				
Zimbabwe	-3										16										

Supplementary table 5. Net LULUCF CO$_2$ flux in the NGHGI DB, gap-filled through linear interpolation between two data, and/or extrapolation backward (from 2000) and forward (until 2020) using the nearest available data.

	LULUCF, gap-filled data in our NGHGI DB, Mt CO2/yr																					Aver. 2000-2020
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Afghanistan	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Albania	4	4	3	3	3	3	3	3	3	3	2	2	5	6	2	2	2	2	2	2	2	3
Algeria	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
Andorra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Angola	40	40	40	40	40	40	40	40	40	40	40	71	70	70	70	70	70	70	70	70	70	55
Antigua and Barbuda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argentina	85	83	97	99	105	94	110	115	91	68	69	57	93	89	62	40	31	41	39	39	39	74
Armenia	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
Australia	32	56	46	58	44	67	63	75	59	56	43	13	0	-3	-10	-19	-42	-53	-40	-43	-43	17
Austria	-17	-20	-15	-5	-10	-11	-5	-5	-4	-4	-6	-6	-6	-5	-4	-4	-4	-5	-5	-5	-5	-7
Azerbaijan	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3
Bahamas	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4
Bahrain	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bangladesh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Barbados	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Belarus	-41	-40	-38	-36	-38	-40	-42	-45	-45	-48	-50	-49	-47	-49	-47	-45	-41	-37	-39	-32	-32	-42
Belgium	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-1	-1	-1	-2	-2	-2	-2	-2	-1	-1	-1	-2
Belize	-8	-12	-12	-12	-11	-11	-11	-10	-10	-10	-8	-8	-8	-8	-6	-6	-7	-7	-7	-7	-7	-9
Benin	-3	-3	-3	-3	-3	-1	-1	-1	-1	-1	-5	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-3
Bhutan	-7	-8	-8	-9	-9	-8	-8	-6	-8	-9	-8	-8	-8	-8	-6	-8	-8	-8	-8	-8	-8	-8
Bolivia	41	41	41	41	41	41	41	43	36	36	36	36	36	36	36	36	36	36	36	36	36	38
Bosnia and Herzegovina	-7	-7	-5	-5	-7	-7	-7	-8	-7	-8	-6	-6	-8	-6	-6	-6	-6	-6	-6	-6	-6	-7
Botswana	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3
Brazil	1110	1058	1257	2297	2482	1480	1134	794	899	284	220	300	155	354	214	335	365	365	365	365	365	771
Brunei Darussalam	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3
Bulgaria	-18	-15	-15	-14	-15	-17	-14	-15	-13	-14	-13	-10	-10	-9	-10	-10	-10	-10	-10	-10	-10	-12
Burkina Faso	34	34	34	34	34	34	34	34	34	37	37	37	38	38	38	44	44	44	44	44	44	38
Burundi	-4	-4	-4	-4	-4	-4	-4	-3	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-2
Cape Verde	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cambodia	71	71	71	71	71	71	71	71	71	71	71	71	71	71	56	56	40	40	40	40	40	63
Cameroon	-77	-77	-77	-77	-77	-77	-77	-77	-77	-77	-77	-77	-77	-77	-77	-77	-77	-77	-77	-77	-77	-77
Canada	-23	-39	-22	-26	2	7	-5	-9	-14	-25	-8	-8	-11	-5	-5	3	-1	0	7	9	9	-8
Central African Rep.	-229	-229	-229	-229	-229	-229	-229	-229	-229	-229	-229	-229	-229	-229	-229	-229	-229	-229	-229	-229	-229	-229
Chad	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-4	-3	-3	-2	-2	-1	-1	-1	-4
Chile	-73	-75	-62	-78	-73	-73	-77	-63	-64	-67	-77	-76	-68	-78	-66	-57	-75	-12	-68	-69	-69	-68
China	-803	-803	-803	-803	-803	-803	-848	-894	-939	-984	-1030	-803	-576	-863	-1151	-1151	-1151	-1151	-1151	-1151	-1151	-943
Colombia	98	78	78	89	89	88	75	81	75	68	69	73	71	60	64	64	64	64	64	64	64	73
Comoros	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
Congo	-15	-16	-16	-17	-17	-18	-18	-19	-16	-16	-17	-17	-18	-18	-19	-19	-18	-22	-21	-21	-21	-18
Cook Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Costa Rica	19	5	5	4	5	5	5	6	2	2	2	2	5	5	-1	0	-1	-3	-3	-3	-3	3
Cote d'Ivoire	41	40	38	37	35	34	32	31	29	28	26	25	24	22	21	21	21	21	21	21	21	28
Croatia	-7	-8	-8	-7	-8	-8	-8	-7	-7	-7	-7	-6	-6	-6	-6	-6	-6	-5	-6	-6	-6	-7
Cuba	18	18	18	18	18	18	18	18	18	18	-24	-24	-24	-24	-26	-26	-26	-27	-27	-27	-27	-5
Cyprus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Czech Republic	-9	-9	-9	-8	-8	-8	-8	-6	-5	-8	-8	-9	-9	-8	-7	-6	-4	-4	4	14	14	-5
Dem. Rep. Korea	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17
Dem. Rep. Congo (DRC)	484	484	484	484	484	484	484	484	484	484	484	831	831	831	831	529	529	529	529	529	529	563
Denmark	4	3	4	4	4	4	3	5	5	4	3	2	1	1	1	1	0	1	3	2	2	3
Djibouti	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-4
Dominica	0	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-3	-3	-3	-3	-1
Dominican Republic	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Ecuador	41	40	38	37	35	34	34	32	29	27	24	20	20	20	20	20	20	20	20	20	20	27
Egypt																						
El Salvador	2	2	2	2	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0	1
Equatorial Guinea	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Eritrea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Estonia	-4	-4	-4	-5	-4	-2	-3	-3	-4	-4	-5	-4	-4	-2	-3	-3	-2	-2	-1	-1	-1	-3
Ethiopia	103	118	109	112	62	61	62	62	77	72	77	102	30	33	33	33	33	33	33	33	33	62
Fiji	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	1	1	1	1	0
Finland	-19	-20	-21	-22	-23	-24	-29	-20	-24	-36	-24	-24	-27	-20	-23	-21	-20	-18	-11	-17	-17	-22
France	-22	-34	-42	-45	-48	-49	-50	-50	-50	-39	-40	-40	-42	-45	-39	-35	-38	-36	-35	-35	-35	-40
Gabon	-98	-99	-101	-102	-104	-105	-108	-112	-115	-118	-121	-117	-118	-115	-114	-115	-113	-109	-109	-109	-109	-110
Gambia	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Georgia	-5	-5	-5	-4	-4	-4	-4	-4	-4	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5
Germany	-23	-27	1	0	-2	-3	-6	-2	-13	-20	-13	-12	-21	-21	-24	-23	-23	-24	-22	-20	-20	-15
Ghana	13	13	14	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
Greece	-2	-2	-3	-3	-2	-3	-3	-2	-3	-3	-3	-3	-3	-2	0	-4	-4	-3	-4	-4	-4	-3
Grenada	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Guatemala	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
Guinea	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
Guinea Bissau	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
Guyana	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46
Haiti	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Honduras	-8	-8	-8	-8	-8	-8	-8	-8	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-6
Hungary	-1	-3	-2	-4	-4	-6	-4	-4	-6	-4	-5	-4	-5	-4	-5	-6	-5	-5	-5	-6	-6	-4
Iceland	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
India	-211	-211	-211	-211	-211	-211	-211	-211	-211	-211	-211	-211	-364	-365	-301	-296	-308	-308	-308	-308	-308	-257
Indonesia	532	-48	174	-25	350	400	1145	300	229	607	160	258	647	503	862	1566	508	489	724	925	925	535
Iran	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
Iraq																						
Ireland	5	6	6	6	5	5	6	6	4	4	5	4	4	5	5	4	5	4	4	4	4	5
Israel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Italy	-22	-32	-37	-29	-35	-36	-37	-15	-32	-37	-43	-35	-27	-41	-44	-41	-22	-37	-42	-42		-35
Jamaica	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
Japan	-85	-86	-87	-98	-95	-89	-84	-80	-69	-66	-70	-68	-70	-63	-61	-57	-53	-57	-50	-50	-50	-71
Jordan	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
Kazakhstan	95	77	58	39	24	6	-7	-7	-7	-8	-10	-11	-12	-12	-7	-2	2	7	12	10	10	12
Kenya	63	63	63	63	63	63	38	38	38	38	50	50	50	50	57	57	57	57	57	57	57	54
Kiribati																						
Kuwait	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kyrgyzstan	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10
Lao People's Dem. Rep.	45	42	40	38	36	33	33	33	33	33	33	33	33	33	33	33	26	26	26	26	26	33
Latvia	-13	-13	-12	-11	-7	-7	-8	-7	-8	-5	-3	-3	-5	-4	0	-1	-3	-4	-2	-3	-3	-6
Lebanon	-2	-3	-3	-2	-3	-2	-2	-2	-2	-2	-2	-2	-2	-2	-3	-3	-3	-3	-3	-3	-3	-2
Lesotho	8	8	8	8	8	8	8	8	7	7	7	7	7	7	7	7	7	7	7	7	7	8
Liberia	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21
Libya																						

Supplementary table 5 (continues)

	LULUCF, gap-filled data in our NGHGI DB, Mt CO2/yr																					Aver. 2000-2020
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Liechtenstein	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lithuania	-10	-7	-6	-6	-5	-4	-4	-6	-7	-8	-11	-11	-10	-10	-9	-8	-7	-7	-7	-6	-6	-7
Luxembourg	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	-1	0	0	0	0	0	0	0
Madagascar	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
Malawi	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
Malaysia	-182	-186	-189	-193	-196	-199	-206	-213	-220	-227	-234	-241	-249	-257	-265	-250	-242	-242	-242	-242	-242	-225
Maldives																						
Mali	-259	-259	-259	-259	-259	-259	-259	-259	-255	-213	-245	-272	-241	-259	-155	-155	-155	-155	-155	-155	-155	-221
Malta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Marshall Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mauritania	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
Mauritius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mexico	-153	-153	-154	-154	-155	-151	-149	-146	-143	-141	-147	-143	-140	-137	-135	-148	-148	-148	-148	-148	-148	-147
Micronesia	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
Monaco	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mongolia	-25	-26	-26	-25	-26	-26	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25
Montenegro	-2	-3	-3	-3	-3	-2	-2	-2	-2	-2	-3	-3	-1	-2	-2	-3	-2	-2	-2	-3	-3	-2
Morocco	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
Mozambique	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
Myanmar	52	52	52	52	52	52	52	52	51	51	51	50	50	50	49	49	49	49	49	49	49	50
Namibia	-100	-100	-104	-105	-107	-104	-101	-98	-107	-95	-99	-96	-95	-113	-110	-112	-117	-117	-117	-117	-117	-106
Nauru																						
Nepal	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16
Netherlands	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4	4	5
New Zealand	-27	-27	-25	-26	-26	-26	-24	-23	-30	-29	-30	-26	-25	-24	-26	-27	-26	-26	-27	-28	-28	-27
Nicaragua	17	17	17	17	17	17	17	16	16	15	15	14	14	13	13	12	12	12	12	12	12	15
Niger	-35	-35	-35	-35	-35	-35	-35	-35	-35	-35	-35	-35	-35	-35	-35	-35	-35	-35	-35	-35	-35	-35
Nigeria	251	254	257	261	265	269	272	276	278	283	287	290	295	298	303	308	311	315	315	315	315	287
Niue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Norway	-20	-22	-23	-25	-24	-21	-23	-24	-25	-28	-25	-26	-22	-23	-19	-15	-15	-16	-17	-19	-19	-22
Oman																						
Pakistan	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Palau	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Panama	-10	-10	-10	-10	-10	-10	-10	-22	-18	-15	-26	-22	-20	-25	-25	-22	-22	-22	-22	-22	-22	-18
Papua New Guinea	-22	-22	-13	-14	-11	-18	-13	-10	-9	-5	0	2	-2	4	1	2	2	2	2	2	2	-6
Paraguay	36	31	30	30	30	32	37	38	42	35	35	35	47	46	17	16	13	13	13	13	13	29
Peru	107	110	113	116	118	121	115	109	102	96	90	88	87	81	76	76	76	76	76	76	76	94
Philippines	-105	-105	-105	-105	-105	-105	-105	-105	-105	-105	-105	-105	-105	-105	-105	-105	-105	-105	-105	-105	-105	-105
Poland	-38	-30	-39	-41	-52	-51	-45	-39	-38	-37	-35	-42	-41	-43	-35	-31	-33	-37	-38	-17	-17	-37
Portugal	-6	-9	-9	2	-8	1	-9	-13	-14	-14	-10	-11	-9	-8	-10	-9	-5	8	-7	-8	-8	-7
Qatar																						
Republic of Korea	-60	-59	-57	-56	-57	-55	-56	-57	-58	-57	-55	-55	-49	-45	-43	-43	-45	-45	-45	-45	-45	-52
Republic of Moldova	1	1	1	2	2	1	1	-1	2	1	2	2	2	2	2	2	2	2	2	2	2	2
Romania	-30	-31	-29	-29	-29	-30	-30	-29	-30	-30	-31	-29	-33	-33	-33	-33	-33	-31	-29	-33	-33	-31
Russian Federation	-508	-568	-598	-603	-573	-570	-582	-595	-640	-693	-749	-690	-713	-647	-707	-628	-646	-643	-636	-576	-576	-626
Rwanda	-6	-6	-6	-6	-6	-6	-5	-6	-6	-6	-6	-6	-6	-7	-7	-7	-7	-7	-7	-7	-7	-6
Saint Kitts and Nevis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Saint Lucia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Saint Vincent and Grenad.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Samoa	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
San Marino	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sao Tome and Principe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Saudi Arabia	-6	-6	-6	-7	-7	-7	-8	-8	-8	-9	-9	-9	-9	-9	-9	-9	-9	-9	-9	-9	-9	-8
Senegal	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-12	-12	-12	-12	-12	-12	-12	-13
Serbia	-14	-14	-13	-12	-12	-11	-12	-13	-14	-15	-17	-17	-15	-16	-18	-18	-18	-18	-18	-18	-18	-15
Seychelles	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
Sierra Leone																						
Singapore	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Slovakia	-10	-9	-10	-9	-9	-6	-9	-8	-7	-7	-6	-7	-8	-8	-6	-7	-7	-7	-6	-6	-6	-7
Slovenia	-6	-6	-8	-7	-7	-7	-7	-8	-8	-7	-7	-7	-7	-6	0	1	1	1	1	0	0	-5
Solomon Islands	2	2	3	2	3	6	5	6	7	6	7	7	9	9	13	14	15	16	16	16	16	9
Somalia	-9	-4	-5	-5	7	8	10	8	8	10	14	19	19	31	37	37	37	37	37	37	37	18
South Africa	-12	-6	-12	-18	-13	0	-3	-6	0	-14	-11	-11	-11	-19	-17	-23	-33	-31	-31	-31	-31	-16
South Sudan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spain	-40	-41	-40	-39	-39	-39	-41	-39	-38	-36	-36	-38	-38	-36	-35	-37	-39	-39	-39	-38	-38	-39
Sri Lanka	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Sudan	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Suriname	4	4	4	4	4	4	4	4	4	8	8	8	8	16	11	12	13	14	14	14	14	9
Swaziland	-4	-4	-4	-4	-4	-4	-4	-4	-4	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-4
Sweden	-44	-45	-44	-42	-35	-34	-44	-37	-38	-38	-40	-40	-41	-39	-39	-37	-41	-39	-37	-37	-37	-39
Switzerland	5	-1	-3	-3	-3	-3	-2	-1	-2	-3	-3	-1	-2	-2	0	-2	-2	-2	-1	-2	-2	0
Syrian Arab Republic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tajikistan	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
Thailand	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16
Macedonia	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-1	-1	-1	-1	-2	-2	-2	-3	-3	-4	-2	-2
Timor-Leste	0	0	0	0	0	0	2	-5	-4	-2	0	-3	-2	-2	2	-1	-1	-1	-1	-1	-1	-1
Togo	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Tonga	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
Trinidad and Tobago	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
Tunisia	3	3	2	2	2	2	2	1	1	4	3	4	4	4	4	4	4	4	4	4	4	3
Turkey	-62	-65	-73	-75	-74	-75	-75	-75	-70	-73	-73	-77	-75	-77	-78	-97	-96	-100	-95	-84	-84	-79
Turkmenistan	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
Tuvalu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Uganda	29	29	29	29	29	29	31	34	36	39	41	43	46	48	51	53	53	53	53	53	53	41
Ukraine	-46	-42	-40	-48	-37	-34	-36	-38	-22	-26	-32	-16	-20	-7	-5	-7	-2	-11	1	0	0	-22
United Arab Emirates	-10	-10	-11	-11	-12	-13	-13	-12	-12	-11	-11	-10	-10	-9	-8	-8	-8	-8	-8	-8	-8	-10
United Kingdom	5	4	3	2	2	1	1	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-2	-1	-1	-1	0
United Rep. of Tanzania	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77
United States of America	-865	-862	-838	-855	-755	-805	-860	-822	-804	-772	-796	-813	-829	-800	-815	-792	-856	-792	-825	-813	-813	-818
Uruguay	-12	-13	-13	-13	-13	-13	-13	-12	-11	-11	-11	-14	-18	-17	-15	-14	-13	-12	-12	-12	-12	-13
Uzbekistan	-6	-7	-8	-8	-9	-10	-10	-11	-12	-12	-13	-13	-13	-11	-13	-12	-11	-9	-9	-9	-9	-10
Vanuatu	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7
Venezuela	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30
Viet Nam	-39	-39	-39	-39	-39	-39	-39	-39	-39	-39	-39	-39	-39	-39	-39	-39	-39	-39	-39	-39	-39	-39
Yemen	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
Zambia	25	27	30	32	35	29	31	34	36	39	41	42	42	43	45	46	47	47	47	47	47	39
Zimbabwe	-3	-1	3	5	7	9	10	12	14	16	16	16	16	16	16	16	16	16	16	16	16	11
World	-982	-1736	-1309	-509	143	-827	-605	-1745	-1846	-2182	-2892	-2080	-1806	-1971	-1970	-1353	-2524	-2377	-2187	-1886	-1886	-1647
Annex I	-1864	-1962	-1972	-2001	-1888	-1908	-2022	-1937	-2004	-2060	-2136	-2102	-2164	-2052	-2100	-2005	-2094	-2007	-1995	-1894	-1894	-2004
Non Annex I	882	225	664	1493	2031	1082	1417	193	159	-122	-757	22	358	80	130	652	-430	-369	-192	8	8	358

Supplementary table 6. CO_2 flux from Forest land (including Harvested Wood Products), Deforestation, Organic soils (including peat fires) and Other (including Cropland, Grassland Wetland, Settlement, and Other Land), as included in our NGHGI DB, both grouped for different periods and averaged for 2000-2020. Data are gap-filled through linear interpolation between two data, and/or extrapolation backward (from 2000) and forward (until 2020), using the nearest available data.

	Forest Land, Mt CO2/yr					Deforestation, Mt CO2/yr					Organic soils, Mt CO2/yr					Other, Mt CO2/yr				
	2000-2005	2006-2010	2011-2015	2016-2020	2000-2020	2000-2005	2006-2010	2011-2015	2016-2020	2000-2020	2000-2005	2006-2010	2011-2015	2016-2020	2000-2020	2000-2005	2006-2010	2011-2015	2016-2020	2000-2020
Afghanistan	1	1	1	1	1	9	9	9	9	9	0	0	0	0	0	0	0	0	0	0
Albania	-2	-2	-2	-2	-2	4	4	5	4	4	0	0	0	0	0	2	1	1	1	1
Algeria	-8	-8	-8	-8	-8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Andorra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Angola	-2	-2	7	7	2	42	42	63	63	52	0	0	0	0	0	0	0	0	0	0
Antigua and Barbuda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argentina	-11	-11	-11	-11	-11	99	96	74	44	79	0	0	0	0	0	5	5	5	5	5
Armenia	0	-1	-1	-1	-1	0	0	0	0	0	0	0	0	0	0	-2	-1	-1	-2	-1
Australia	-27	-28	-53	-67	-43	82	75	47	38	62	0	0	0	0	0	-8	11	1	-15	-3
Austria	-14	-6	-6	-6	-8	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0
Azerbaijan	-3	-3	-3	-3	-3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bahamas	-4	-4	-4	-4	-4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bahrain	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bangladesh	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Barbados	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Belarus	-43	-50	-52	-41	-46	0	0	0	0	0	4	4	4	4	4	0	0	0	1	0
Belgium	-2	-2	-2	-2	-2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Belize	-13	-14	-13	-11	-13	1	3	4	3	3	0	0	0	0	0	1	2	2	1	1
Benin	-31	-27	-23	-22	-26	20	19	14	14	17	0	0	0	0	0	8	7	5	5	6
Bhutan	-8	-8	-8	-8	-8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bolivia	24	14	10	10	15	16	26	28	28	24	0	0	0	0	0	0	-1	-2	-2	-1
Bosnia and Herzegovina	-6	-7	-6	-7	-7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Botswana	-18	-18	-18	-18	-18	15	15	15	15	15	0	0	0	0	0	0	0	0	0	0
Brazil	-236	-397	-397	-400	-352	1851	1057	668	770	1123	0	0	0	0	0	27	6	1	-4	8
Brunei Darussalam	-3	-3	-3	-3	-3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bulgaria	-14	-12	-10	-10	-11	0	0	0	0	0	0	0	0	0	0	-2	-2	0	0	-1
Burkina Faso	25	27	31	36	29	8	8	9	8	8	0	0	0	0	0	0	0	0	0	0
Burundi	-4	-2	-1	-1	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cape Verde	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cambodia	0	0	0	0	0	72	72	66	41	63	0	0	0	0	0	0	0	0	0	0
Cameroon	-87	-87	-87	-87	-87	0	0	0	0	0	0	0	0	0	0	10	10	10	10	10
Canada	-19	-6	-1	5	-6	8	7	7	7	7	0	0	0	0	0	-10	-14	-11	-8	-11
Central African Rep.	-333	-333	-333	-333	-333	104	104	104	104	104	0	0	0	0	0					
Chad	-7	-5	-3	-1	-4	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1
Chile	-77	-74	-72	-60	-71	3	2	2	3	3	0	0	0	0	0	1	2	1	-1	1
China	-682	-798	-753	-950	-790	0	0	0	0	0	0	0	0	0	0	-121	-141	-156	-201	-153
Colombia	-16	-22	-23	-22	-20	103	95	89	86	94	0	0	0	0	0	0	0	0	0	0
Comoros	-2	-2	-2	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Congo	-15	-21	-24	-32	-23	2	4	5	11	5	0	0	0	0	0	-3	0	0	0	-1
Cook Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Costa Rica	-3	-3	-5	-5	-4	11	7	7	2	7	0	0	0	0	0	0	0	0	0	0
Cote d'Ivoire	-3	-12	-19	-21	-13	41	41	41	41	41	0	0	0	0	0	0	0	0	0	0
Croatia	-8	-8	-7	-6	-7	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
Cuba	18	10	-25	-27	-5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyprus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Czech Republic	-9	-7	-8	4	-5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dem. Rep. Korea	-19	-19	-19	-19	-19	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0
Dem. Rep. Congo (DRC)	0	0	0	0	0	484	484	770	529	563	0	0	0	0	0	0	0	0	0	0
Denmark	-2	-2	-4	-3	-3	0	0	0	0	0	5	5	5	5	5	0	0	0	0	0
Djibouti	-2	-3	-7	-7	-4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dominica	0	0	-1	-2	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dominican Republic	-2	-2	-2	-2	-2	4	4	4	4	4	0	0	0	0	0	0	0	0	0	0
Ecuador	-11	-13	-19	-19	-15	49	42	39	39	43	0	0	0	0	0	0	0	0	0	0
Egypt											0	0	0	0	0					
El Salvador	0	0	-2	-2	-1	2	2	1	1	2	0	0	0	0	0	0	0	0	0	0
Equatorial Guinea	5	5	5	5	5	3	3	3	3	3	0	0	0	0	0	0	0	0	0	0
Eritrea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Estonia	-6	-6	-6	-4	-5	0	1	0	0	0	1	1	1	1	1	0	0	1	1	1
Ethiopia	-91	-85	-87	-87	-88	192	155	133	120	152	0	0	0	0	0	0	0	0	0	0
Fiji	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Finland	-41	-46	-41	-33	-40	3	4	4	3	3	15	15	13	12	14	2	2	1	1	1
France	-57	-71	-60	-53	-60	9	15	10	10	11	0	0	0	0	0	9	10	9	7	9
Gabon	-103	-121	-127	-121	-117	3	6	11	12	8	0	0	0	0	0	0	0	0	0	0
Gambia	-1	-1	-1	-1	-1	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0
Georgia	-6	-5	-6	-6	-6	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
Germany	-59	-56	-65	-66	-61	1	1	1	1	1	42	41	41	40	41	6	3	3	3	4
Ghana	-5	-5	-5	-5	-5	18	18	18	18	18	0	0	0	0	0	0	0	0	0	0
Greece	-2	-2	-2	-2	-2	0	0	0	0	0	0	0	0	0	0	-1	-1	0	-2	-1
Grenada	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Guatemala	1	1	1	1	1	16	16	16	16	16	0	0	0	0	0	0	0	0	0	0
Guinea	12	15	15	15	14	19	19	19	19	19	0	0	0	0	0	3	0	0	0	1
Guinea Bissau	-20	-20	-20	-20	-20	0	0	0	0	0	0	0	0	0	0	19	19	19	19	19
Guyana	0	0	0	0	0	46	46	46	46	46	0	0	0	0	0	0	0	0	0	0
Haiti	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Honduras	-13	-13	-13	-12	-13	5	7	7	7	7	0	0	0	0	0	0	0	0	0	0
Hungary	-3	-4	-5	-5	-4	0	0	0	0	0	0	0	0	0	0	1	-1	-1	0	-2
Iceland	0	0	0	0	0	0	0	0	0	0	7	8	8	8	8	-1	-2	-2	-2	-2
India	-71	-71	-70	-75	-72	0	0	0	0	0	0	0	0	0	0	-139	-139	-237	-232	-185
Indonesia	-489	-415	-344	-345	-402	282	296	375	456	349	446	648	771	617	620	-42	-40	-35	-14	-33
Iran	-68	-68	-68	-68	-68	89	89	89	89	89	0	0	0	0	0	0	0	0	0	0
Iraq											0	0	0	0	0					
Ireland	-5	-6	-6	-6	-6	0	1	0	0	0	8	8	9	9	8	2	2	2	1	2
Israel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Italy	-32	-31	-35	-34	-33	0	2	2	2	1	1	1	1	1	1	-1	-4	-5	-6	-4
Jamaica	-2	-2	-2	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Japan	-92	-81	-71	-59	-77	2	2	2	2	2	1	1	1	1	1	-1	3	4	3	2
Jordan	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kazakhstan	-9	-8	-9	-8	-9	0	0	0	0	0	0	0	0	0	0	67	0	0	16	23
Kenya	8	0	4	7	5	55	41	49	50	49	0	0	0	0	0	0	0	0	0	0
Kiribati											0	0	0	0	0					
Kuwait	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kyrgyzstan	-8	-10	-10	-10	-10	0	0	0	0	0	0	0	0	0	0	-2	0	0	0	-1
Lao People's Dem. Rep.	-3	-8	-8	-8	-6	43	41	40	33	40	0	0	0	0	0	0	0	0	0	0
Latvia	-16	-11	-7	-8	-11	0	1	1	1	1	4	3	3	3	3	1	1	0	1	1
Lebanon	-2	-2	-2	-2	-2	1	1	1	1	1	0	0	0	0	0	-1	-1	-1	-1	-1
Lesotho	5	5	5	5	5	0	0	0	0	0	0	0	0	0	0	3	3	3	3	3
Liberia	-21	-21	-21	-21	-21	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Libya											0	0	0	0	0					

	Forest Land, Mt CO2/yr					Deforestation, Mt CO2/yr					Organic soils, Mt CO2/yr					Other, Mt CO2/yr				
	2000-2005	2006-2010	2011-2015	2016-2020	**2000-2020**	2000-2005	2006-2010	2011-2015	2016-2020	**2000-2020**	2000-2005	2006-2010	2011-2015	2016-2020	**2000-2020**	2000-2005	2006-2010	2011-2015	2016-2020	**2000-2020**
Liechtenstein	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Lithuania	-8	-9	-11	-8	**-9**	0	0	0	0	**0**	0	0	0	0	**0**	1	2	2	2	**2**
Luxembourg	-1	-1	-1	0	**-1**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Madagascar	0	0	0	0	**0**	34	34	34	34	**34**	0	0	0	0	**0**	0	0	0	0	**0**
Malawi	-3	-3	-3	-3	**-3**	2	2	2	2	**2**	0	0	0	0	**0**	0	0	0	0	**0**
Malaysia	-236	-240	-259	-259	**-248**	47	20	6	18	**24**	0	0	0	0	**0**	0	0	0	0	**0**
Maldives											0	0	0	0	**0**					
Mali	-277	-264	-234	-173	**-239**	18	18	18	18	**18**	0	0	0	0	**0**	0	0	0	0	**0**
Malta	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Marshall Islands																				**0**
Mauritania	-1	-1	-1	-1	**-1**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Mauritius	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Mexico	-140	-138	-135	-140	**-138**	17	18	19	20	**18**	0	0	0	0	**0**	-30	-24	-25	-29	**-27**
Micronesia	-1	-1	-1	-1	**-1**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Monaco	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Mongolia	-26	-25	-25	-25	**-25**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Montenegro	-3	-2	-2	-2	**-2**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Morocco	-2	-2	-2	-2	**-2**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Mozambique	0	0	0	0	**0**	39	39	39	39	**39**	0	0	0	0	**0**	0	0	0	0	**0**
Myanmar	-2	-3	-4	-5	**-3**	54	54	54	54	**54**	0	0	0	0	**0**	0	0	0	0	**0**
Namibia	-112	-109	-115	-127	**-115**	9	9	10	10	**9**	0	0	0	0	**0**	0	0	0	0	**0**
Nauru											0	0	0	0	**0**					
Nepal	-16	-16	-16	-16	**-16**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Netherlands	-2	-2	-2	-2	**-2**	1	1	1	1	**1**	6	6	5	5	**6**	1	1	1	0	**1**
New Zealand	-31	-38	-33	-31	**-33**	3	8	6	3	**5**	2	2	2	2	**2**	-1	0	0	0	**0**
Nicaragua	2	1	-1	-2	**0**	14	14	14	14	**14**	0	0	0	0	**0**	0	0	0	0	**0**
Niger	-56	-56	-56	-56	**-56**	2	2	2	2	**2**	0	0	0	0	**0**	19	19	19	19	**19**
Nigeria	-6	-5	-5	-5	**-5**	263	284	304	319	**291**	0	0	0	0	**0**	0	0	0	0	**0**
Niue	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Norway	-28	-30	-26	-23	**-27**	3	3	3	3	**3**	3	3	3	3	**3**	0	0	0	0	**0**
Oman											0	0	0	0	**0**					
Pakistan	-12	-12	-12	-12	**-12**	15	15	15	15	**15**	0	0	0	0	**0**	0	0	0	0	**0**
Palau	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Panama	-28	-30	-31	-31	**-30**	18	12	8	9	**12**	0	0	0	0	**0**	0	0	0	0	**0**
Papua New Guinea	-19	-11	-10	-11	**-13**	3	4	11	13	**8**	0	0	0	0	**0**	0	0	0	0	**0**
Paraguay	-15	-15	-21	-24	**-18**	46	52	54	37	**47**	0	0	0	0	**0**	0	0	0	0	**0**
Peru	18	18	9	14	**15**	95	84	73	62	**79**	0	0	0	0	**0**	0	0	0	0	**0**
Philippines	-105	-105	-105	-105	**-105**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Poland	-42	-41	-42	-33	**-40**	0	0	0	1	**1**	2	2	2	2	**2**	0	0	1	1	**0**
Portugal	-9	-14	-12	-6	**-10**	3	2	2	2	**2**	0	0	0	0	**0**	1	0	1	1	**1**
Qatar											0	0	0	0	**0**					
Republic of Korea	-61	-61	-51	-49	**-56**	0	0	0	0	**0**	0	0	0	0	**0**	3	4	4	4	**4**
Republic of Moldova	-2	-2	-2	-2	**-2**	2	2	2	2	**2**	0	0	0	0	**0**	2	1	2	2	**2**
Romania	-34	-35	-34	-32	**-34**	6	6	4	3	**5**	0	0	0	0	**0**	-1	-1	-3	-4	**-2**
Russian Federation	-621	-699	-721	-671	**-675**	8	6	8	8	**8**	125	118	115	115	**118**	-83	-76	-79	-66	**-76**
Rwanda	-6	-6	-6	-7	**-6**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Saint Kitts and Nevis	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Saint Lucia	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Saint Vincent and Grenad.	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Samoa	-1	-1	-1	-1	**-1**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
San Marino	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Sao Tome and Principe	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Saudi Arabia	-6	-8	-9	-9	**-8**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Senegal	-10	-13	-12	-12	**-12**	0	0	0	0	**0**	0	0	0	0	**0**	-3	0	0	0	**-1**
Serbia	-13	-14	-17	-18	**-15**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Seychelles	-1	-1	-1	-1	**-1**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Sierra Leone											0	0	0	0	**0**					
Singapore	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Slovakia	-8	-6	-6	-5	**-7**	0	0	0	0	**0**	0	0	0	0	**0**	-1	-1	-1	-1	**-1**
Slovenia	-7	-7	-4	1	**-5**	0	0	0	0	**0**	0	0	0	0	**0**	-1	0	0	0	**0**
Solomon Islands	2	6	10	16	**8**	0	1	0	0	**0**	0	0	0	0	**0**					
Somalia	-1	-2	-2	-2	**-2**	-2	12	31	39	**19**	0	0	0	0	**0**	0	0	0	0	**0**
South Africa	-12	-7	-18	-31	**-17**	16	16	16	15	**16**	0	0	0	0	**0**	-16	-16	-14	-15	**-15**
South Sudan	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Spain	-40	-38	-37	-36	**-38**	1	1	1	1	**1**	0	0	0	0	**0**	-1	-1	-1	-3	**-1**
Sri Lanka	0	0	0	0	**0**	4	4	4	4	**4**	0	0	0	0	**0**	0	0	0	0	**0**
Sudan	-14	-14	-14	-14	**-14**	24	24	24	24	**24**	0	0	0	0	**0**	0	0	0	0	**0**
Suriname	2	2	4	7	**4**	3	4	7	7	**5**	0	0	0	0	**0**	0	0	0	0	**0**
Swaziland	-4	-4	-4	-4	**-4**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Sweden	-55	-52	-52	-51	**-53**	2	3	3	3	**3**	9	9	8	8	**9**	1	1	1	2	**1**
Switzerland	-2	-3	-3	-3	**-3**	1	1	1	1	**1**	1	1	1	1	**1**	0	0	0	0	**0**
Syrian Arab Republic	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Tajikistan	-1	-2	-2	-2	**-2**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Thailand	-32	-32	-32	-32	**-32**	15	15	15	15	**15**	0	0	0	0	**0**	0	0	0	0	**0**
Macedonia	-1	-1	-1	-3	**-2**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Timor-Leste	0	-2	-2	-1	**-1**	1	1	1	1	**1**	0	0	0	0	**0**	0	0	0	0	**0**
Togo	0	0	0	0	**0**	1	1	1	1	**1**	0	0	0	0	**0**	0	0	0	0	**0**
Tonga	-2	-2	-2	-2	**-2**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Trinidad and Tobago	-2	-2	-2	-2	**-2**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Tunisia	-2	-2	-3	-3	**-2**	8	9	11	11	**10**	0	0	0	0	**0**	-4	-4	-4	-4	**-4**
Turkey	-70	-75	-83	-94	**-80**	1	2	2	2	**1**	0	0	0	0	**0**	0	0	1	1	**0**
Turkmenistan	-1	-1	-1	-1	**-1**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Tuvalu	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Uganda	16	23	35	40	**28**	13	13	13	13	**13**	0	0	0	0	**0**	0	0	0	0	**0**
Ukraine	-62	-55	-53	-52	**-56**	0	0	0	0	**0**	5	3	3	3	**3**	15	21	39	47	**29**
United Arab Emirates	-11	-12	-9	-8	**-10**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
United Kingdom	-22	-22	-21	-20	**-21**	0	0	0	0	**0**	13	12	12	12	**12**	11	8	7	6	**8**
United Rep. of Tanzania	0	0	0	0	**0**	77	77	77	77	**77**	0	0	0	0	**0**	0	0	0	0	**0**
United States of America	-790	-778	-779	-794	**-785**	122	124	125	125	**124**	44	43	44	45	**44**	-211	-200	-201	-196	**-202**
Uruguay	-17	-15	-20	-15	**-17**	4	4	4	3	**4**	0	0	0	0	**0**	0	0	0	0	**0**
Uzbekistan	-11	-19	-19	-13	**-15**	3	8	6	4	**5**	0	0	0	0	**0**	0	0	0	0	**0**
Vanuatu	-7	-7	-7	-7	**-7**	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**
Venezuela	-90	-90	-90	-90	**-90**	60	60	60	60	**60**	0	0	0	0	**0**	0	0	0	0	**0**
Viet Nam	-55	-55	-55	-55	**-55**	16	16	16	16	**16**	0	0	0	0	**0**	-1	-1	-1	-1	**-1**
Yemen	-12	-12	-12	-12	**-12**	10	10	10	10	**10**	0	0	0	0	**0**	0	0	0	0	**0**
Zambia	-71	-71	-71	-71	**-71**	101	107	114	118	**110**	0	0	0	0	**0**	0	0	0	0	**0**
Zimbabwe	-27	-25	-11	-11	**-17**	28	28	28	28	**28**	0	0	0	0	**0**	0	0	0	0	**0**
World	**-6199**	**-6482**	**-6422**	**-6454**	**-6380**	**5039**	**4220**	**4168**	**4032**	**4397**	**745**	**935**	**1052**	**896**	**907**	**-464**	**-527**	**-635**	**-646**	**-563**
Annex I	**-2292**	**-2349**	**-2367**	**-2269**	**-2318**	**259**	**267**	**232**	**220**	**245**	**299**	**287**	**281**	**279**	**286**	**-204**	**-237**	**-230**	**-208**	**-219**
Non Annex I	**-3907**	**-4133**	**-4055**	**-4186**	**-4062**	**4780**	**3953**	**3936**	**3812**	**4152**	**446**	**648**	**771**	**617**	**620**	**-260**	**-290**	**-405**	**-438**	**-344**

Supplementary table 7. Non-Annex I countries: LULUCF in NCs and BURs (original, not gap-filled data) in our NGHGI DB**.** Data refer to the latest NC or BUR submission available on February 2022.

	Non-Annex I countries: LULUCF in National Comm. and Biennial Update Reports, original not gap-filled data in our NGHGI DB, Mt CO2/yr																					Aver. 2000-2020	year of subm.
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020		
Afghanistan						9																9	2019
Albania	4	4	3	3	3	3	3	3	3	2												3	2021
Algeria	-8																					-8	2020
Andorra	0					0					0	0	0	0	0	0	0	0	0	0		0	2021
Angola						40	40	40	40	40	40	71	70	70	70	70	70	70	70			57	2021
Antigua and Barbuda																							2020
Argentina	85	83	97	99	105	94	110	115	91	68	69	57	93	89	62	40	31	41	39			77	2021
Armenia	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2					-2	2020
Azerbaijan	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3								-3	2021
Bahamas	-4																					-4	2015
Bahrain						0																0	2020
Bangladesh	33					23							11									22	2018
Barbados	0	0	0	0	0	0	0	0	0	0	0											0	2018
Belize	-8		-12			-11				-10							-6		-7			-9	2021
Benin	-3					-1					-5	-4	-4	-4	-4	-4						-4	2019
Bhutan	-7	-8	-8	-9	-9	-8	-8	-6	-8	-9	-8	-8	-8	-8	-6	-8						-8	2021
Bolivia							41		36													38	2020
Bosnia and Herzegovina		-7	-5	-5	-7	-7	-7	-8	-7	-8	-6	-6	-8	-6	-6							-7	2017
Botswana																-3						-3	2019
Brazil	1110	1058	1257	2297	2482	1480	1134	794	899	284	220	300	155	354	214	335	365					867	2020
Brunei Darussalam												-3	-3	-3	-3							-3	2017
Burkina Faso								34	34	37	37	37	38	38	38	44	44	44				39	2021
Burundi						-4					-1					-1						-2	2019
Cambodia	27					27					131					131	131					89	2020
Cameroon	-77																					-77	2016
Cape Verde	0					0					0											0	2018
Central African Republic				-1674	-1736	-1736	-1736	-1736	-1736	-1736	-1736											-1729	2015
Chad	-24	-23	-21	-14																		-20	2013
Chile	-73	-75	-62	-78	-73	-73	-77	-63	-64	-67	-77	-76	-68	-78	-66	-57	-75	-12	-68			-67	2021
China						-803					-1030		-576		-1151							-890	2019
Colombia	98	78	78	89	89	88	75	81	75	68	69	73	71	60	64							77	2019
Comoros	-4																					-4	2013
Congo	-82																					-82	2009
Cook Islands						0																0	2020
Costa Rica	19	5	5	4	5	5	5	6	2	2	2	2	5	5	-1	0	-1	-3				4	2021
Cote d'Ivoire	49					7					20	22	27	35	31							27	2018
Cuba	18										-24		-24		-26			-27	-27	-27	-27	-20	2020
Dem. Rep. Korea	-17		-17																			-17	2013
Dem. Rep. Congo (DRC)	-120	-109	-97	-85	-73	-77	-76	-63	-38	-25	-11											-70	2015
Djibouti	-2																					-2	2021
Dominica	0	0	0	0	0	0												-3				-1	2020
Dominican Republic	19										-3											8	2020
Ecuador	41							34			24		20									30	2017
Egypt																							2019
El Salvador															9							9	2018
Equatorial Guinea															-9							-9	2019
Eritrea	0					0					0					0						0	2021
Ethiopia	103	118	109	112	62	61	62	62	77	72	77	102	30	33								77	2016
Fiji							0	0	1	0	1	1										0	2020
Gabon	-98					-105					-121	-117	-118	-115	-114	-115	-113	-109	-109			-112	2022
Gambia												1										1	
Georgia	-5	-5	-5	-4	-4	-4	-4	-4	-4	-5	-5	-5	-5	-5	-5	-5	-5	-5				-5	2021
Ghana	13	13	14	13	13	13	13	13	13	13	13	13	13	13	13	13	13					13	2021
Grenada	0	0	0	0	1	1	0	0	0	0	0											0	2019
Guatemala	-24					-8																-16	2016
Guinea	-437					-435					-434					-432						-434	2018
Guinea Bissau														-1								-1	2020
Guyana	-56	-56	-56	-55	-55																	-56	2012
Haiti	1																					1	2013
Honduras							-8	-8	-5	-5	-5	-5	-5	-5	-5	-5						-6	2020
India												-211	-364	-365	-301	-296	-308					-307	2021
Indonesia	532	-48	174	-25	350	400	1145	300	229	607	160	258	647	503	862	1566	508	489	724	925		515	2021
Iran												22										22	2018
Iraq																							2017
Israel	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				0	2018
Jamaica							-2	-2	-2	-2	-2	-2	-2									-2	2019
Jordan																		-1				-1	2021
Kenya	17	16	16	16	16	16	20	20	20	20	20											18	2015
Kiribati																							2013
Kuwait																							2019
Kyrgyzstan	0	0	0	0	0	0	0	0	0	0	0											0	2017
Lao People's Dem. Rep.															9							9	2020
Lebanon	-2	-3	-3	-2	-3	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-3	-3	-3			-2	2021
Lesotho						8	8	8	7	7	7											8	2021
Liberia															-21							-21	2021
Libya																							
Madagascar						-158	-169	-174	-171	-167	-96											-156	2017

Supplementary table 7 (continues)

	Non-Annex I countries: LULUCF in National Comm. and Biennial Update Reports, original not gap-filled data in our NGHGI DB, Mt CO2/yr																					Aver. 2000-2020	year of subm.
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020		
Malawi											-1											-1	2021
Malaysia	-182					-199						-241			-265		-242					-226	2018
Maldives																							2020
Mali	-259							-259	-255	-213	-245	-272	-241	-259	-155							-240	2018
Marshall Islands																							2015
Mauritania	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1			-1	2021
Mauritius	0	0	0	0	0	0	0															0	2021
Mexico						-151					-147					-148						-149	2019
Micronesia											-1											-1	2015
Mongolia	-25	-26	-26	-25	-26	-26	-25	-25	-25	-25	-25	-25	-25	-25	-25							-25	2018
Montenegro	-2	-3	-3	-3	-3	-2	-2	-2	-2	-3	-3	-1	-2	-2	-3	-2	-2	-2	-2	-3		-2	2022
Morocco	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2							-2	2021
Mozambique																							2006
Myanmar	-102	-101	-99	-98	-97	-96																-99	2012
Namibia	-100	-100	-104	-105	-107	-104	-101	-98	-107	-95	-99	-96	-95	-113	-110	-112	-117					-104	2021
Nauru																							2015
Nepal												-16										-16	2021
Nicaragua	43					9					2											18	2018
Niger	-35								-35													-35	2017
Nigeria	251	254	257	261	265	269	272	276	278	283	287	290	295	298	303	308	311	315				282	2021
Niue										0												0	2016
Oman																							2019
Pakistan	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2019
Palau	0	0	0	0	0	0																0	2019
Panama						-5					-5											-5	2021
Papua New Guinea	-22	-22	-13	-14	-11	-18	-13	-10	-9	-5	0	2	-2	4	1	2						-8	2019
Paraguay	36	31	30	30	30	32	37	38	42	35	35	35	47	46	17	16						33	2021
Peru	107					121					90		87		76							96	2019
Philippines	-105																					-105	2014
Qatar																							2011
Republic of Korea	-60	-59	-57	-56	-57	-55	-56	-57	-58	-57	-55	-55	-49	-45	-43	-43	-45	-45	-45			-53	2021
Republic of Moldova	1	1	1	2	2	2	1	-1	2	1	2	2	2	2	2	2						2	2018
Rwanda						-6	-5	-6	0	-6	-6	-6	-6	-6	-7	-7	-7	-7	-7			-6	2021
Saint Kitts and Nevis									0													0	2017
Saint Lucia											0											0	2017
Saint Vincent and Grenad.	0				0																	0	2016
Samoa	-1	-1	-1	-1	-1	-1	-1	-1														-1	2010
San Marino									0		0											0	2013
Sao Tome and Principe						0								0								0	2019
Saudi Arabia	-6										-9			-9								-8	2018
Senegal	-11					-11																-11	2016
Serbia	-14					-11					-17	-17	-15	-16	-18							-15	2017
Seychelles	-1																					-1	2013
Sierra Leone																							2012
Singapore														0								0	2018
Solomon Islands																							2017
Somalia	-9	-4	-5	-5	7	8	10	8	8	10	14	19	19	31	37							10	2019
South Africa	-12	-6	-12	-18	-13	0	-3	-6	0	-14	-11	-11	-11	-19	-17	-23	-33	-31	-31			-14	2021
Sri Lanka	-6																					-6	2012
South Sudan	0					0					0					0						0	2019
Sudan	10																					10	2013
Suriname									3													3	2016
Swaziland	-4										-3											-4	2016
Syrian Arab Republic	0	0	0	0	0	0																0	2010
Tajikistan					-1	-1	-1	-1	-2	-1	-2	-2	-2	-2	-2							-2	2019
Thailand	-62	-55	-45	-48	-56	-50	-53	-60	-64	-66	-62	-68	-81	-82	-103	-90	-91					-67	2020
Macedonia				-5	-1	-1	-1	-1	1	-1			2	-2	-3							-1	1900
Timor-Leste						0	2	-5	-4	-2	0	-3	-2	-2	2	-1						-1	2020
Togo	14	15	16	16	16	16	17	17	18	18	19	17	17	17	17	17						17	2017
Tonga	-2						-2															-2	2020
Trinidad and Tobago								-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2			-2	2021
Tunisia	3										4	3	4									4	2019
Turkmenistan	-1				-1																	-1	2016
Tuvalu			0													0						0	2018
Uganda						29					41						53					41	2019
United Arab Emirates	-10					-13									-8							-10	2019
United Rep. of Tanzania	180		183																			181	2015
Uruguay	-12		-13		-13		-13		-11		-11		-18		-15		-13	-12				-13	2021
Uzbekistan	-6	-7	-8	-8	-9	-10	-10	-11	-12	-12	-13	-13	-13	-11	-13	-12	-11	-9				-10	2021
Vanuatu	-7							-7	-7	-7	-7	-7	-7	-7	-7	-7						-7	2021
Venezuela											-30											-30	2018
Viet Nam																	-39					-39	2021
Yemen											-2											-2	2018
Zambia	25					29					41	42	42	43	45	46	47					40	2020
Zimbabwe	-3										16											7	2021
TOTAL																						**-2714**	

Supplementary table 8. Non-Annex I countries: LULUCF in NCs and BUR (original, not gap-filled data) in the UNFCCC NGHGI DB (https://di.unfccc.int/flex_non_annex1, downloaded on 28 February 2022).

	Non-Annex I countries: LULUCF in National Comm. and Biennial Update Reports, original not gap-filled data in the UNFCCC GHG Data Interface, Mt CO2/yr																					Aver. 2000-2020
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Afghanistan						9								11								10
Albania	3	3	2	2	2	2	2	2	1	1												2
Algeria	-8																					-8
Andorra																						
Angola	-3					1																-1
Antigua and Barbuda	0																					0
Argentina	-44										108		85									50
Armenia	0						-1				-1											-1
Azerbaijan	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-6								-5
Bahamas	-3																					-3
Bahrain																						
Bangladesh		28				18																23
Barbados																						
Belize	8			4			4			5												5
Benin	-15																					-15
Bhutan	-6																-8					-7
Bolivia	26		32		36																	31
Bosnia and Herzegovina	-7	-7												-6	-6							-7
Botswana	-43															-28						-35
Brazil	1134	1130	1339	2218	2407	1456	1065	782	882	295	261	176	48	231	104	214	269					824
Brunei Darussalam											-3											-3
Burkina Faso																						
Burundi							-4				-2					-1						-3
Cambodia	-25																					-25
Cameroon	-77																					-77
Cape Verde	0																					0
Central African Republic				-1767	-1767	-1767	-1767	-1767	-1767	-1767	-1767											-1767
Chad	-45	-45	-44	-38																		-43
Chile	-73						-21				-77			-78			-75		-64			-65
China						-803					-1030		-576		-1151							-890
Colombia	30				26																	28
Comoros	-3																					-3
Congo	-83																					-83
Cook Islands																						
Costa Rica	-3					-4																-3
Cote d'Ivoire	-20																					-20
Cuba	-13		-13																			-13
Dem. Rep. Korea	-17		-17																			-17
Dem. Rep. Congo (DRC)	-349	-356	-179	-182																		-266
Djibouti	-7																					-7
Dominica	0	0	0	0	0	0													-3			-1
Dominican Republic	-19										-3											-11
Ecuador											24		20									22
Egypt																						
El Salvador						3																3
Equatorial Guinea	8																					8
Eritrea																						
Ethiopia	103	118	109	112	62	61	62	62	77	72	77	102	30	26								77
Fiji					-8																	-8
Gabon	-64																					-64
Gambia	0																					0
Georgia	-6						-5	-4	-4	-4	-4	-4	-4	-4				-5				-5
Ghana	-4	-1	3	4	7	4	3															2
Grenada																						
Guatemala	-25					-16																-21
Guinea	-444																					-444
Guinea Bissau							4				-13											-5
Guyana	-57	-56	-56	-55	-55																	-56
Haiti	1																					1
Honduras	3					-10										-7						-5
India	-236										-256						-309					-267
Indonesia	821																					821
Iran	9																					9
Iraq																						
Israel	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0
Jamaica							-2	-2	-2	-2	-2		-2									-2
Jordan	1							1									-1					0
Kenya	21					18					21											20
Kiribati																						
Kuwait																	0					0
Kyrgyzstan	0	0	0	0	0	0	0	0	0	0	0											0
Lao People's Dem. Rep.	41																					41
Lebanon	0											-3	-3	-3								-2
Lesotho	-1																					-1
Liberia	-97															-20						-59
Libya																						
Madagascar	-234					-158	-169	-175	-171	-168	-97											-167

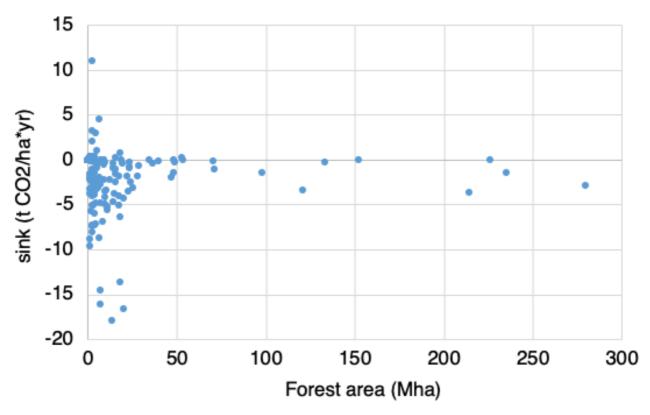
Supplementary table 8 (continues)

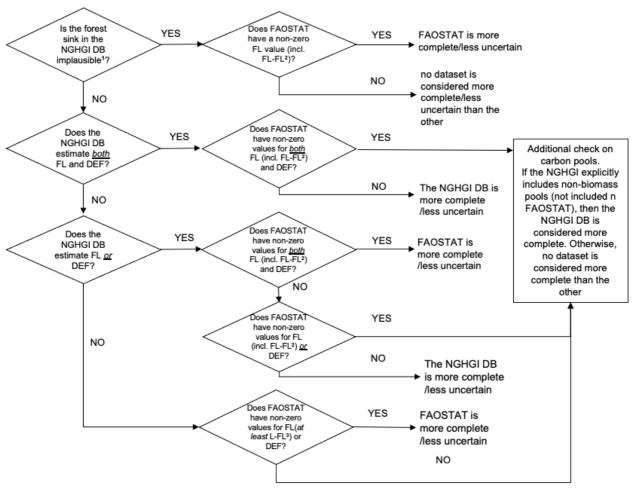
	Non-Annex I countries: LULUCF in National Comm. and Biennial Update Reports, original not gap-filled data in the UNFCCC GHG Data Interface, Mt CO2/yr																					Aver. 2000-2020
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Malawi																						
Malaysia	-229	-235	-256	-261	-246	-232	-257	-231	-256	-251	-263	-260										-248
Maldives																						
Mali	-66										-245											-155
Marshall Islands																						
Mauritania	-1																					-1
Mauritius	0	0	0	0	0	0	-1							0								0
Mexico	49	46	46	48	42	47	46	27	29	31	26	51	31	31								39
Micronesia	-1																					-1
Mongolia							-2															-2
Montenegro	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2										-2
Morocco	4										5			4								4
Mozambique																						
Myanmar	-109	-101	-99	-98	-97	-96																-100
Namibia	11																					11
Nauru																						
Nepal	-13																					-13
Nicaragua	45																					45
Niger	-17								-35													-26
Nigeria	98																					98
Niue										0												0
Oman	-1	-2	-3	-1	-1	-1	-1	0	-1	-1												-1
Pakistan																						
Palau	0					0																0
Panama	-7																					-7
Papua New Guinea	-181																					-181
Paraguay	66					73						87	120			16		15				63
Peru	57										41		83									60
Philippines	-105																					-105
Qatar																						
Republic of Korea	-60	-59	-57	-56	-57	-55	-56	-57	-58	-57	-55	-55	-49	-45	-43	-43	-45					-53
Republic of Moldova	-1	-1	-1	-2	0	-1	-1	-3	0	-1	-1	0	-2	0								-1
Rwanda			-7			-9																-8
Saint Kitts and Nevis																						
Saint Lucia	0					0					0											0
Saint Vincent and Grenad.	0				0																	0
Samoa																						
San Marino							0				0											0
Sao Tome and Principe													0									0
Saudi Arabia	-14										-9		-9									-11
Senegal	-11					-11																-11
Serbia																						
Seychelles	-1																					-1
Sierra Leone																						
Singapore													0									0
Solomon Islands																						
Somalia																						
South Africa													3		3	3	3					3
Sri Lanka	-6																					-6
South Sudan											0											0
Sudan	8																					8
Suriname				1																		1
Swaziland																						
Syrian Arab Republic	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2											-2
Tajikistan																						
Thailand														-87								-87
Macedonia																						
Timor-Leste											0											0
Togo																						
Tonga	-2						-2															-2
Trinidad and Tobago																						
Tunisia	-2																					-2
Turkmenistan					-1																	-1
Tuvalu																0						0
Uganda	9																					9
United Arab Emirates	-10					-13									-8							-10
United Rep. of Tanzania																						
Uruguay	-12		-11		-11		-9		-5		-7		-9		-4		-8	1				-7
Uzbekistan	-1	0	0	-1	-1	0	0	1	-2	-3	-3	-3	-3									-1
Vanuatu	-8																					-8
Venezuela																						
Viet Nam	12										-20			-34								-14
Yemen	-2										-2		-2									-2
Zambia	34																					34
Zimbabwe	-88					-83																-86
TOTAL																						**-3284**

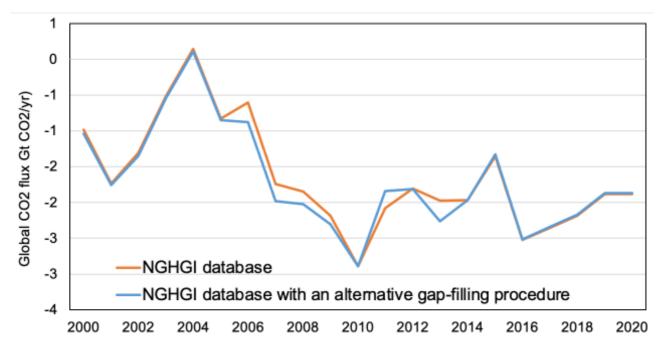
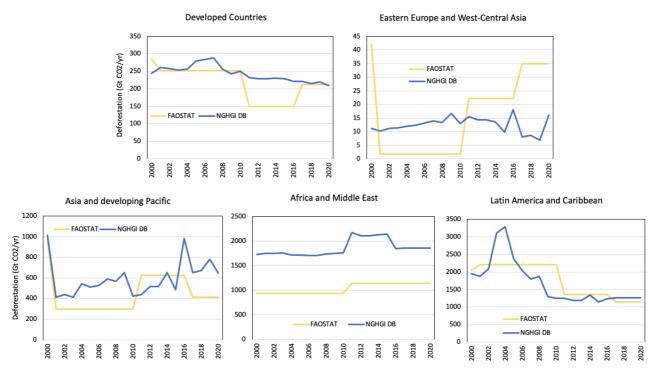
Supplementary table 9. Non-Annex I countries: net CO₂ flux from all elected activities under REDD+ (original data not gap-filled). Data refer to the latest submissions available in February 2022.

	Non-Annex I countries: CO2 flux from all elected activities under REDD+, original not gap-filled data in our NGHGI DB, Mt CO2/yr																					year of subm.	Activities
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020		
Afghanistan																							
Albania																							
Algeria																							
Andorra																							
Angola																							
Antigua and Barbuda																							
Argentina			109	109	109	109	122	134	111	76	74	66	99	97	57	42	39					2019	DEF
Armenia																							
Azerbaijan																							
Bahamas																							
Bahrain																							
Bangladesh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						2019	DEF, DEG, ECS
Barbados																							
Belize		3	4	1	0	0	1	1	1	2	0	8	4	7	2	5						2020	DEF, DEG, CCS, ECS, SMF
Benin																							
Bhutan						-8	-8	-8	-8	-8	-8	-8	-8	-8	-8							2020	DEF, DEG, SMF, CCS, ECS
Bolivia																							
Bosnia and Herzegovina																							
Botswana																							
Brazil (Amazon)	980	909	1334	1375	1380	1164	576	609	669	373	363	286	237	302	274	288						2018	DEF
Brazil (Cerrado)	468	468	478	478	306	306	223	223	158	158												2017	DEF
Brunei Darussalam																							
Burkina Faso	13	12	13	12	11	12	10	10	9	9	9	9	8	8	8	8	7	7				2020	DEF, DEG, ECS (NF-F and F-F)
Burundi																							
Cambodia											71	71	71	71	56	56	40	40				2021	DEF, ECS
Cameroon																							
Cape Verde																							
Central Arican Republic																							
Chad																							
Chile	0	0	0	0	0	0	0	0	0	0	0	0	0	0								2016	DEF, DEG, ECS
China																							
Colombia										94	94	94	94	94	94	94	94	94				2020	DEF
Comoros																							
Congo	35	35	35	35	35	35	35	35	35	35	35	35	35									2016	DEF, DEG
Cook Islands																							
Costa Rica	17	17	17	17	17	17	17	17	17	17	9	9	9	9	9	9						2016	DEF, ECS
Cote d'Ivoire	41	40	38	37	35	34	32	31	29	28	26	25	24	22	21	21						2017	DEF, ECS
Cuba																							
Dem. Rep. Korea																							
Dem. Rep. Congo (DRC)	484	484	484	484	484	484	484	484	484	484	831	831	831	831	831							2018	DEF
Djibouti																							
Dominica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	2022	
Dominican Republic							2	2	2	2	2	2	2	2	2	2						2020	DEF, DEG, ECS (NF-F and F-F)
Ecuador	26	26	26	26	26	26	26	26	26	26	22	22	22	22	22	22						2020	DEF
Egypt																							
El Salvador		2	2	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0				2021	DEF, DEG, ECS (NF-F and F-F)
Equatorial Guinea					9	9	9	9	9	9	9	9	9	9	9	9						2020	DEF, DEG
Eritrea																							
Ethiopia	18	18	18	18	18	18	18	18	18	18	18	18	18	18								2017	DEF, ECS
Fiji																							
Gabon	-107	-107	-107	-107	-107	-107	-107	-107	-107	-107												2021	DEF, DEG, SMF, CCS, ECS
Gambia																							
Georgia																							
Ghana	0	1	0	0	1	1	1	1	1	1	1	4	2	4	4	0						2021	DEF, DEG, ECS (NF-F)
Grenada																							
Guatemala	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	2022	
Guinea																							
Guinea Bissau							0	0	0	0	0	0	0	0	0							2019	DEF
Guyana		46	46	46	46	46	46	46	46	46	46	46	46									2015	DEF, DEG
Haiti																							
Honduras	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8				2020	DEF, DEG, ECS
India	-50	-50	-50	-50	-50	-50	-50	-50	-50	-50	-50	-50	-50	-50	-50	-50	-50	-50	-50	-50	-50	2018	SMF
Indonesia	268	268	268	268	268	268	268	268	268	268	268	268	268									2022	DEF, DEG, ECS
Iran																							
Iraq																							
Israel																							
Jamaica																							
Jordan																							
Kenya			63	63	63	63	38	38	38	38	50	50	50	50	57	57	57	57				2020	DEF, DEG, SMF, ECS (NF-F)
Kiribati																							
Kuwait																							
Kyrgyzstan																							
Lao People's Dem. Rep.						29	29	29	29	29	29	40	40	40	40							2018	DEF, DEG, ECS
Lebanon																							
Lesotho																							
Liberia											42	42	42	42	42	42	42	42	42	42		2020	DEF, DEG
Libya																							
Madagascar							34	34	34	34	34	34	34	34	34	34						2018	DEF

Supplementary table 9 (continues)

	Non-Annex I countries: CO2 flux from all elected activities under REDD+, original not gap-filled data in our NGHGI DB, Mt CO2/yr																					year of subm.	Activities
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020		
Malawi							4	4	4	4	4	4	4	4	4	4	4					2020	DEF, DEG, ECS
Malaysia						-206	-206	-206	-206	-206	-206	-206	-206	-206	-206	-206						2019	DEF, SMF, ECS
Maldives																							
Mali																							
Marshall Islands																							
Mauritania																							
Mauritius																							
Mexico							10	13	16	13	22	19	22	24	32	32						2020	DEF, DEG
Micronesia																							
Mongolia						3	3	3	3	3	3	3	3	3	3	3						2018	DEF, DEG. ECS (NF-F)
Montenegro																							
Morocco																							
Mozambique				39	39	39	39	39	39	39	39	39	39	39								2018	DEF
Myanmar							52	52	51	51	51	50	50	50	49	49	49					2018	DEF, ECS
Namibia																							
Nauru																							
Nepal	1	1	1	1	1	1	1	1	1	1	1											2017	DEF, DEG, ECS
Nicaragua							17	16	16	15	15	14	14	13	13	12						2019	DEF, DEG, ECS (NF-F)
Niger																							
Nigeria							32	32	32	32	32	32	32	32	32	32	32					2019	DEF
Niue																							
Oman																							
Pakistan					1	1	1	1	1	1	1	1	1	1								2020	DEF
Palau																							
Panama	-10	-10	-10	-10	-10	-10	-10	-22	-18	-15	-26	-22	-20	-25	-25	-22						2022	DEF, DEG, ECS (NF-F)
Papua New Guinea	20	20	27	27	28	23	27	31	31	35	39	42	37	42								2017	DEF, DEG. ECS
Paraguay	49	49	49	49	49	49	49	49	49	49	49	49	49	49	78	78						2022	DEF
Peru	70											70	74	77	95	73	66	88	63	63	89	2021	DEF
Philippines																							
Qatar																							
Republic of Korea																							
Republic of Moldova																							
Rwanda																							
Saint Kitts and Nevis																							
Saint Lucia		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		2021	DEF, DEG, ECS (NF-F and F-F)
Saint Vincent and Grenad.																							
Samoa																							
San Marino																							
Sao Tome and Principe																							
Saudi Arabia																							
Senegal																							
Serbia																							
Seychelles																							
Sierra Leone																							
Singapore																							
Solomon islands		2	3	2	3	6	5	6	7	6	7	7	9	9	13	14	15	16				2019	DEF, DEG, ECS
Somalia																							
South Africa																							
Sri Lanka	4	4	4	4	4	4	4	4	4	4	4											2017	DEF, ECS
South Sudan	0	0	0	0	0	0	0	0	0	0	0												
Sudan							1	1	1	1	1	1	1	1	1	1	1	1				2020	DEF, ECS
Suriname	4	4	4	4	4	4	4	4	4	8	8	8	8	16	11	12	13	14	14			2021	DEF, DEG
Eswatini																							
Syrian Arab Republic																							
Tajikistan																							
Thailand						-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16					2021	DEF, DEG, ECS (NF-F and F-F)
Macedonia							0	0	0	0	0	0	0	0	0	0	0						
Timor-Leste																							
Togo			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			2020	DEF, ECS
Tonga																							
Trinidad and Tobago																							
Tunisia																							
Turkmenistan																							
Tuvalu																							
Uganda	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8						2018	DEF
United Arab Emirates																							
United Rep. of Tanzania			44	44	44	44	44	44	44	44	44	44	44	44								2017	DEF
Uruguay																							
Uzbekistan																							
Vanuatu																							
Venezuela																							
Viet Nam	20	20	20	20	20	20	20	20	20	20	20											2016	DEF, DEG, ECS
Yemen																							
Zambia										24	24	24	24	24	24	24	24	24	24			2021	DEF, DEG
Zimbabwe																							

Supplementary table 10. LULUCF in NDCs (original data not gap-filled). Only submissions in 2020 or 2021 are shown here. In some case, no LULUCF estimate was available in the NDCs.

	Non-Annex I countries: LULUCF in Nationally Determined Contributions, original not gap-filled data in our NGHGI DB, Mt CO2/yr																					year of subm.
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Afghanistan																						
Albania											1	4	5	1	1	1	1	3	1	1	1	2021
Algeria																						
Andorra																						
Angola																70						2021
Antigua and Barbuda																0						2021
Argentina																						2021
Armenia																						2021
Azerbaijan																						
Bahamas																						
Bahrain																						2021
Bangladesh													0									2021
Barbados																						2021
Belize													-8			-6		-7				2021
Benin																			-7			2021
Bhutan																						2021
Bolivia																						
Bosnia and Herzegovina																						2021
Botswana																						
Brazil																						2021
Brunei Darussalam																						
Burkina Faso																						2021
Burundi						-4					-2					-1					0	2021
Cambodia																						
Cameroon																						2021
Cape Verde	0				0	0					0					0					0	2021
Central African Republic											-229											2016
Chad											-5								-1		-1	2021
Chile																						
China																						2021
Colombia																						
Comoros	-2					-2										-2					-2	2021
Congo	-15															-19		-22			-21	2021
Cook Islands																						
Costa Rica																						
Cote d'Ivoire																						
Cuba																						
Dem. Rep. Korea																						
Dem. Rep. Congo (DRC)	484	484	484	484	484	484	484	484	484	484	484	831	831	831	831	529	529	529	529			2021
Djibouti																						
Dominica																						
Dominican Republic																						
Ecuador																						
Egypt																						
El Salvador															12							2021
Equatorial Guinea																						
Eritrea																						
Ethiopia											120									125	125	2021
Fiji																						
Gabon																						
Gambia												1	1	2	2	2	1	2	2	1	1	2021
Georgia																						2021
Ghana																						2021
Grenada																						
Guatemala																						
Guinea																34	34	34	34	34	34	2021
Guinea Bissau								0	0	0	0	0	0	4	4	4	4	4	4	4	4	2021
Guyana																						
Haiti																						
Honduras																						2021
India																						
Indonesia											647											2021
Iran																						
Iraq																						2021
Israel																						2021
Jamaica																						
Jordan													0									2021
Kenya																						
Kiribati																						
Kuwait																		0				2021
Kyrgyzstan	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10				2021
Lao People's Dem. Rep.	45					33	33	33	33	33	33	33	33	33	33	26						2021
Lebanon																						2021
Lesotho																						
Liberia																						2021
Libya																						
Madagascar																						

	Non-Annex I countries: LULUCF in Nationally Determined Contributions, original not gap-filled data in our NGHGI DB, Mt CO2/yr																					year of subm.
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Malawi																		-7				2021
Malaysia																						2021
Maldives																						
Mali																-318	-322	-325	-325	-325	-325	2021
Marshall Islands																						
Mauritania																						2021
Mauritius																						2021
Mexico																						
Micronesia																						
Mongolia																						
Montenegro																						2021
Morocco																						2021
Mozambique																						2021
Myanmar						50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	2021
Namibia											17	19	20	16	17	17						2021
Nauru																						2021
Nepal																						
Nicaragua																						
Niger	17							21							15							2021
Nigeria											28	28	28	29	29	29	31	31	33	33	34	2021
Niue																						
Oman																						2021
Pakistan																			25			2021
Palau																						
Panama																						
Papua New Guinea																						
Paraguay															42	43	43	43	42	41	43	2021
Peru																						
Philippines																						2021
Qatar																						2021
Republic of Korea																						
Republic of Moldova																						
Rwanda																						
Saint Kitts and Nevis															0							2021
Saint Lucia											0											2021
Saint Vincent and Grenad.																						
Samoa	-1							-1														2021
San Marino																						
Sao Tome and Principe																						2021
Saudi Arabia																						2021
Senegal											-13					-12						2020
Serbia																						
Seychelles																						2021
Sierra Leone																						2021
Singapore																						
Solomon Islands																13						2021
Somalia																						2021
South Africa																						2021
Sri Lanka																				-3		2021
South Sudan																						2021
Sudan	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2021
Suriname																						
Eswatini																						2021
Syrian Arab Republic																						
Tajikistan	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2					2021
Thailand																						
Macedonia						-2					-1					-2					-4	2021
Timor-Leste																						
Togo											12					11					13	2021
Tonga																						
Trinidad and Tobago																						
Tunisia																						2021
Turkmenistan																						
Tuvalu																						
Uganda																						2021
United Arab Emirates																						
United Rep. of Tanzania															77							2021
Uruguay																						
Uzbekistan											-13								-9			2021
Vanuatu																						2021
Venezuela																						2021
Viet Nam																						
Yemen																						
Zambia																						2021
Zimbabwe											13	4	8	14	18	21	18	18				2021

FIGURES

Supplementary figure 1. Sink per unit of area in forest land, compared to the total managed forest area. Each dot is a country, and only countries with forest area >1 Mha are displayed. Sink values greater than -10 tCO_2/ha*yr are considered "implausible" in this study. To help readability, the x-axis is displayed only up to 300 Mha. This does not allow displaying Russia, which has about 700 Mha of managed forest and a sink of about -1 tCO_2/ha*yr.

1. When the forest sink is greater than 10 tCO2/ha*yr over >1Mha.

2. FAOSTAT does not distinguish FL-FL from land converted to forest (L-FL). Here, we performed an additional analysis based on the original country reports to FRA (FAO, 2020): if the country report includes a constant value of carbon stock/ha over time, then it is assumed that FL-FL is zero and that any value computed by FAOSTAT for FL comes from L-FL only.

3. When a value for FL is reported in FAOSTAT but the C stock/ha in the country report to FRA is constant.

Supplementary figure 2. Decision tree to assess the completeness/uncertainty of carbon fluxes by each NAI countries for Forest land (FL) and Deforestation (DEF), in the NGHGI DB and in FAOSTAT. While the assessment above is essentially on completeness (with the exception on the first step on the plausibility of NGHGIs), according to the IPCC (2006) *lack of completeness* is a source of *uncertainty*; hence, here we speak of "completeness/uncertainty".

Supplementary figure 3. Comparison of two gap-filling procedures: linear interpolation between two data points (the NGHGI database presented in this study, orange line) and interpolation between two data done taking the most recent data to fill the missing years (NGHGI database with an alternative gap-filling procedures, blue line). In both cases, extrapolation backward (from 2000) and forward (until 2020) is done using the single closest available data. See methods for details.

Supplementary figure 4. Trends of emissions from deforestation in the NGHGI DB and in FAOSTAT, for five global regions.