

FAO Emissions Database

Integrating national statistics with geospatial information

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FAO Objectives

- Identify mitigation strategies that are consistent with food security, resilience and rural development goals
- Improve data and support member countries assess and report their GHG emissions from, agriculture, forestry and the land use sector –BURs, NAMAs
- Collaborate with relevant international programmes towards coherent frameworks, focusing on improved rural statistical data



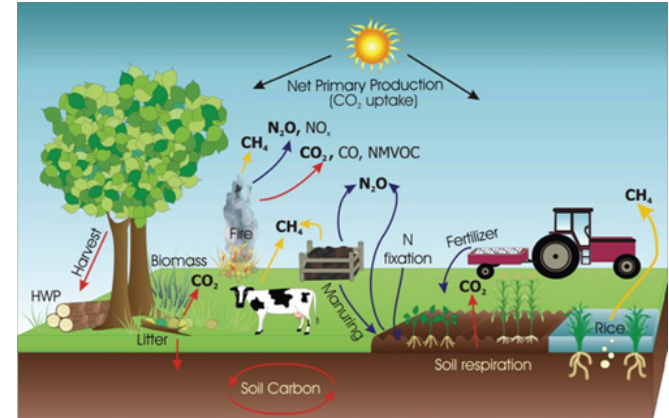
FAOSTAT Emissions Database



& geo-reference data



IPCC 2006 Guidelines



FAOSTAT Emissions - Agriculture

From Year: 1990 To Year: 2010 Aggregation: Average

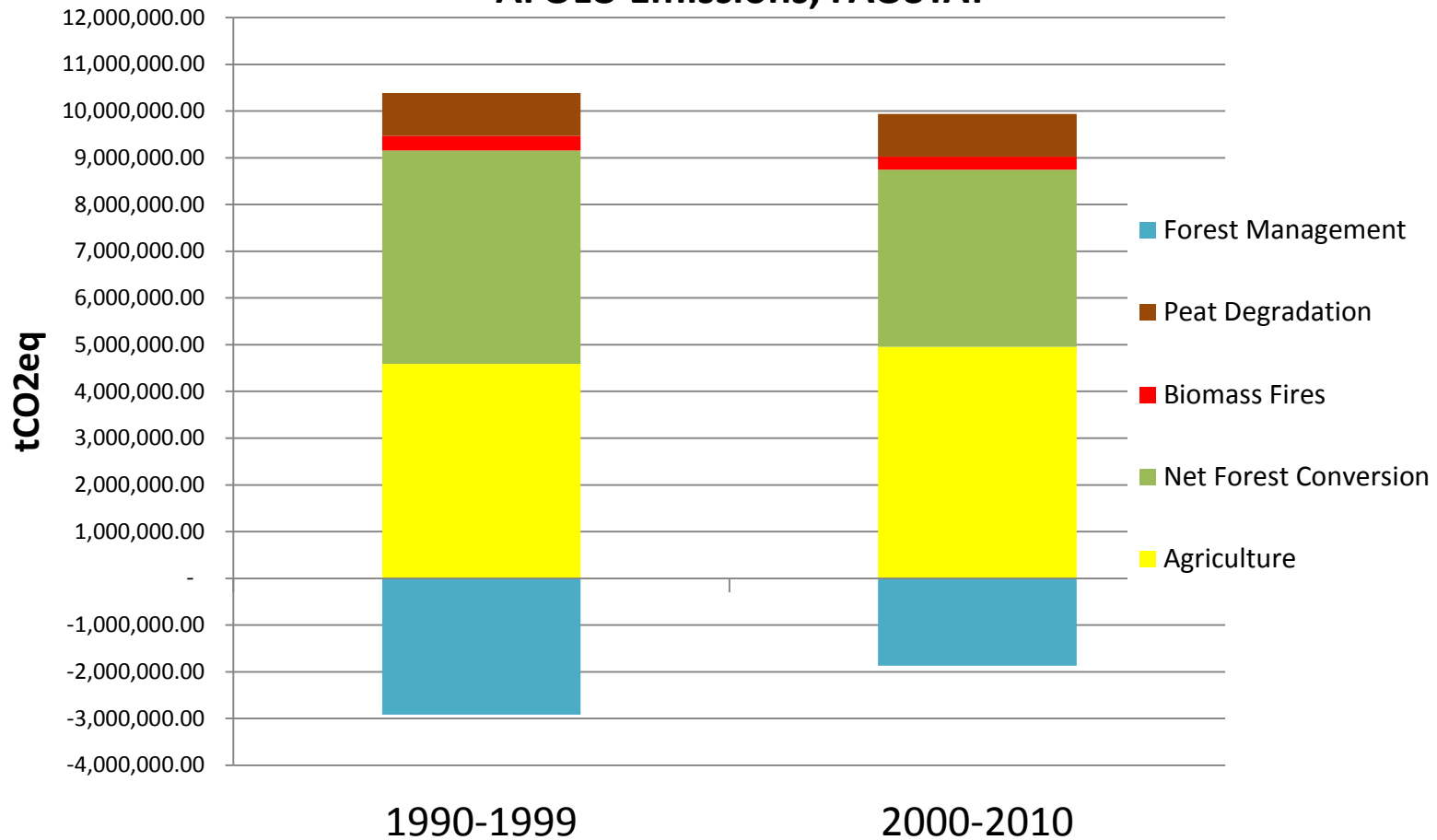
Continent	Emissions (CO2 equivalent) 1990-2010
Africa	2,294

http://faostat3.fao.org/faostat-gateway/go/to/browse/G1*/E



1. IPCC AR5 AFOLU GHG Data

AFOLU Emissions, FAOSTAT



GHG Emissions Statistics: Categories

DOMAIN	CATEGORY	GAS reported	Data source	
Agriculture	Enteric Fermentation	CH ₄	FAOSTAT	
	Manure Management	CH ₄ , N ₂ O	FAOSTAT	
	Rice Cultivation	CH ₄	FAOSTAT	
	Agricultural soils	Synthetic Fertilizers	N ₂ O	FAOSTAT
		Manure applied to soils	N ₂ O	FAOSTAT
		Manure left on pasture	N ₂ O	FAOSTAT
		Crop residues	N ₂ O	FAOSTAT
		Cultivated organic soils	N ₂ O	HWSD, GLC2000
		Burning - Savanna	CH ₄ , N ₂ O	GFED4, JRC, FRA-GEZ
	Burning – Crop residues	CH ₄ , N ₂ O	FAOSTAT	

DOMAIN	CATEGORY	GAS reported	Data source
LULUCF	Forest land	CO ₂	FRA
	Cropland	CO ₂	FAOSTAT, HWSD, GLC2000
	Grassland	CO ₂	FAOSTAT, HWSD, GLC2000
	Burning Biomass	CH ₄ , N ₂ O, CO ₂	FRA, HWSD
	Wetlands	CO ₂	
	Settlements	CO ₂	
	Other land	CO ₂	



Estimation of GHG emissions from burning of vegetation

$$E = \underbrace{A \cdot M_B \cdot C_f}_{\text{Activity data}} \cdot EF$$

Activity data = Dry matter burned

E = GHG emissions from fire (N_2O , CH_4).

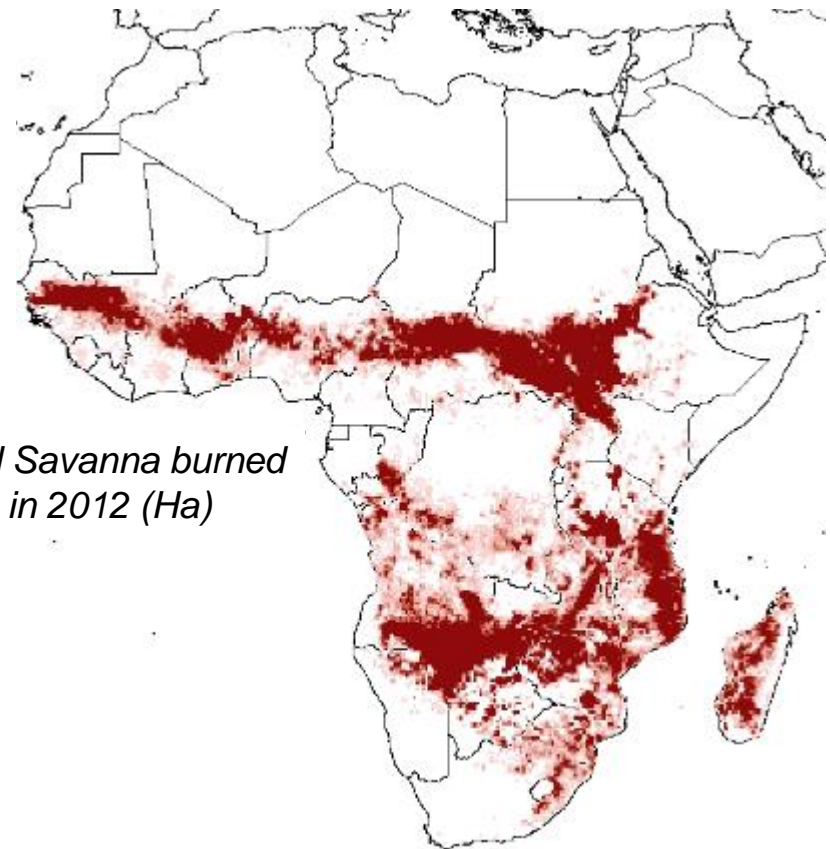
A = Area burned obtained from the Global Fire Emission Database (GFED4) - Burned Areas dataset (based on MODIS and SPOT-VEGETATION, 13 LC classes)

M_B
 C_f
 EF

IPCC default values (Tier 1 default values for Biomass consumption: tables 2.4/2.5 of the IPCC 2006 Guidelines, V.4, Ch.2).

Estimation of GHG emissions from burning of vegetation: 1 - Mapping area burned

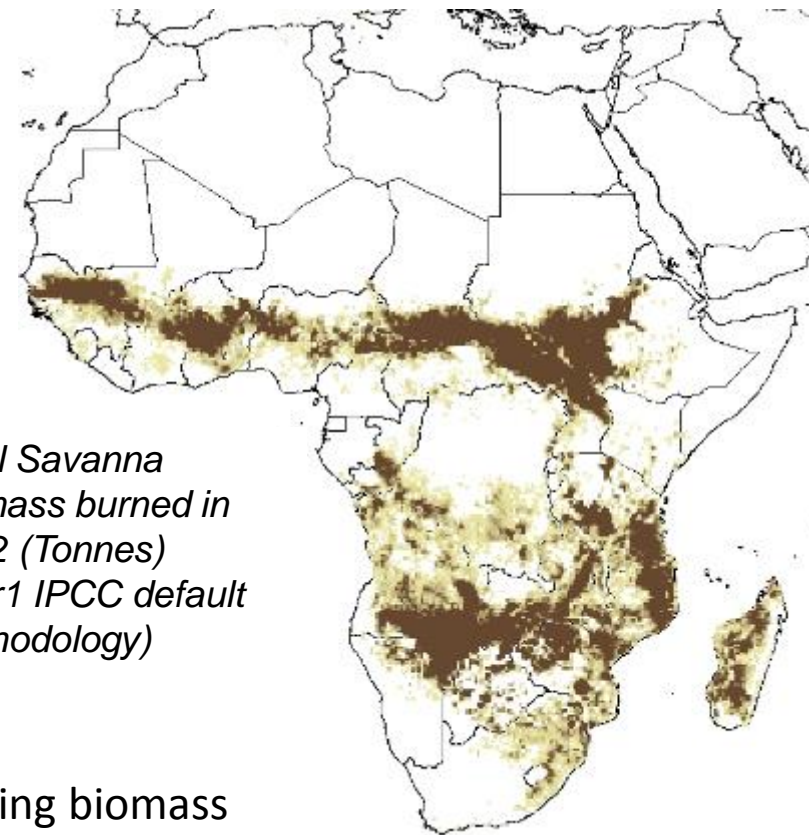
UMD Classification
Water
Evergreen Needleleaf forest
Evergreen Broadleaf forest
Deciduous Needleleaf forest
Deciduous Broadleaf forest
Mixed forest
Closed shrublands
Open shrublands
Woody savannas
Savannas
Grasslands
Croplands
Urban and built-up
Barren or sparsely vegetated
Unclassified



Estimation of GHG emissions from burning of vegetation: 2 - *Estimating biomass burned*

Example: Savanna	
IPCC classification	Biomass burned/ha (IPCC default values)
Savanna - Tropical	7
Savanna - Non Tropical	4.1

Climate zones are identified using the JRC Climate Map based on the IPCC Climatic Zones layer.



Total Savanna biomass burned in 2012 (Tonnes) (Tier1 IPCC default methodology)

Biomass burned is estimated at pixel level by multiplying biomass burned per Ha by the area burned

Estimation of GHG emissions from burning of vegetation: 3 - Emission factors

TABLE 2.5
EMISSION FACTORS (g kg^{-1} DRY MATTER BURNT) FOR VARIOUS TYPES OF BURNING. VALUES ARE MEANS \pm SD AND ARE BASED ON THE COMPREHENSIVE REVIEW BY ANDREA E AND MERLET (2001)
(To be used as quantity ' G_{ef} ' in Equation 2.27)

Category	CO ₂	CO	CH ₄	N ₂ O	NO _x
Savanna and grassland	1613 \pm 95	65 \pm 20	2.3 \pm 0.9	0.21 \pm 0.10	3.9 \pm 2.4
Agricultural residues	1515 \pm 177	92 \pm 84	2.7	0.07	2.5 \pm 1.0
Tropical forest	1580 \pm 90	104 \pm 20	6.8 \pm 2.0	0.20	1.6 \pm 0.7
Extra tropical forest	1569 \pm 131	107 \pm 37	4.7 \pm 1.9	0.26 \pm 0.07	3.0 \pm 1.4
Biofuel burning	1550 \pm 95	78 \pm 31	6.1 \pm 2.2	0.06	1.1 \pm 0.6

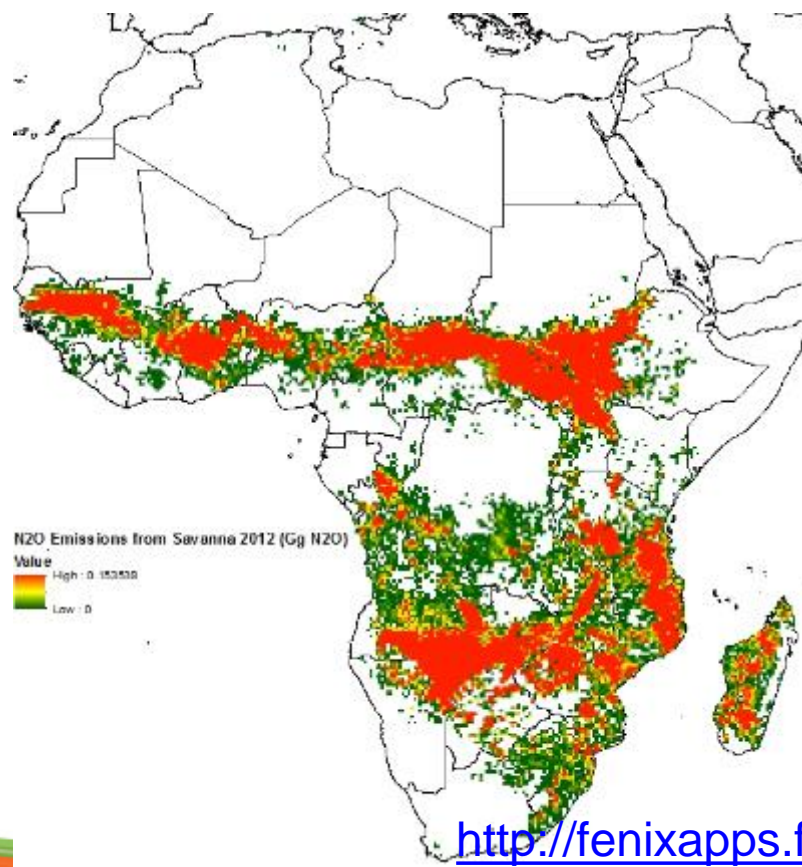
Note: The "extra tropical forest" category includes all other forest types.
Note: For combustion of non-woody biomass in Grassland and Cropland, CO₂ emissions do not need to be estimated and reported, because it is assumed that annual CO₂ removals (through growth) and emissions (whether by decay or fire) by biomass are in balance (see earlier discussion on synchrony in Section 2.4).

Default emission factors are provided by the IPCC Guidelines and assigned to each pixel according to the vegetation type and to the climatic zone (JRC-IPCC Climatic Zones).



Estimation of GHG emissions from burning of vegetation: 4 - Emissions

Emissions = Activity Data * Emission Factor

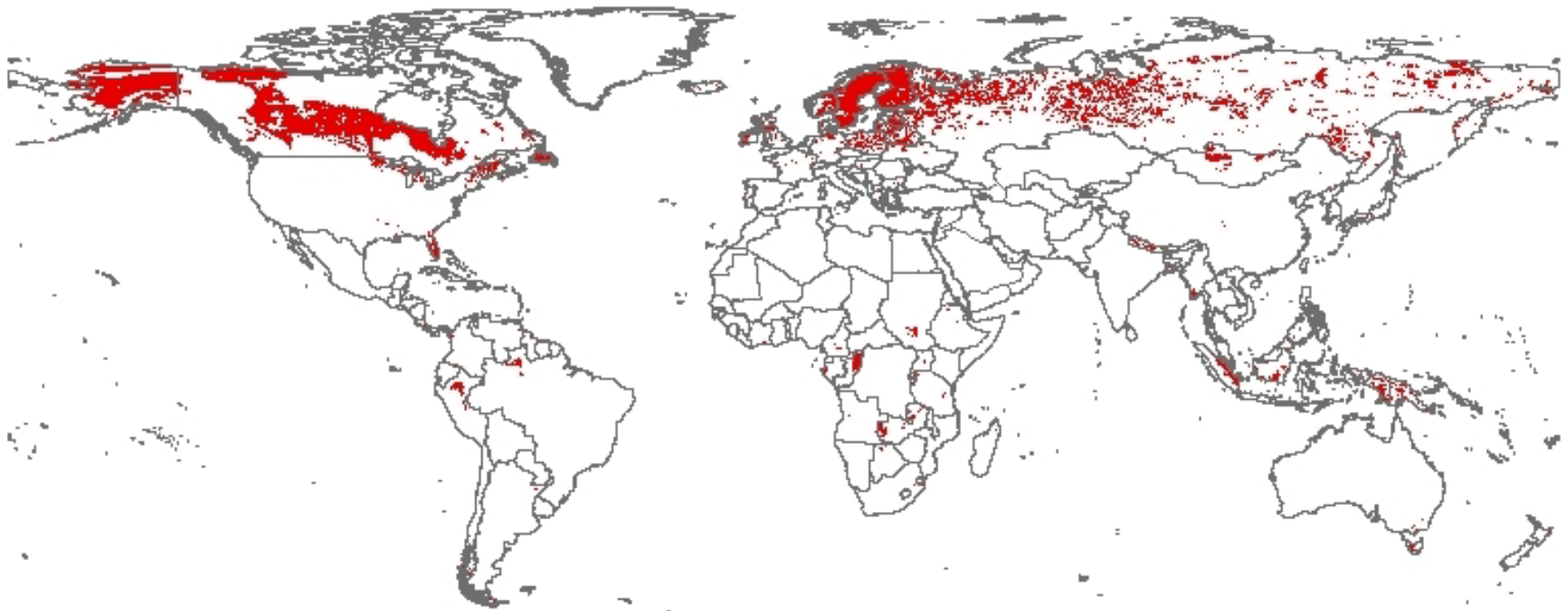


http://fenixapps.fao.org/repository/fenix/view.html?lang=EN&tab=ghg_emissions_co2_savanna



Utilization of geo-referenced data

2: Peatlands



Utilization of geo-referenced data

2: Peatlands

- Organic Soils (Histosols):
 - Harmonized World Soil Database (FAO, IIASA, ISRIC, CAS, JRC - 2012)
- Cultivated (cropped) areas:
 - GLC 2000 (currently exploring MODIS 2001-2010)
- Climatic zones:
 - JRC map, 2010, according to IPCC prescriptions



World distribution of cultivated histosols





Activities on capacity development

- **Technical capacities, in support of Member Countries to:**
 - assess and report GHG emissions from agriculture, including land use activities (Biennial Update Report, BUR)
 - identify mitigation options, including Nationally appropriate mitigation actions (NAMAs).
- **Functional capacities, to strengthen institutions coordination and cooperation:**
 - capacities to access, generate, manage and exchange information and knowledge towards robust GHG inventory, BUR, NAMA (national data systems).
 - capacities to engage with relevant national and international agencies and institutions for efficient support to countries.
- **Three levels:** Regional; Sub-regional; National





International partnering

Agencies:

- UNDP/LECB
- UNDP/UN-REDD
- UNFCCC
- IPCC (AR5, TFI)
- UNEP
- ESCAP

Global initiatives:

- UN-REDD
- NAMA partnership
- LEDS Global Partnership
- CD REDD
- National agencies



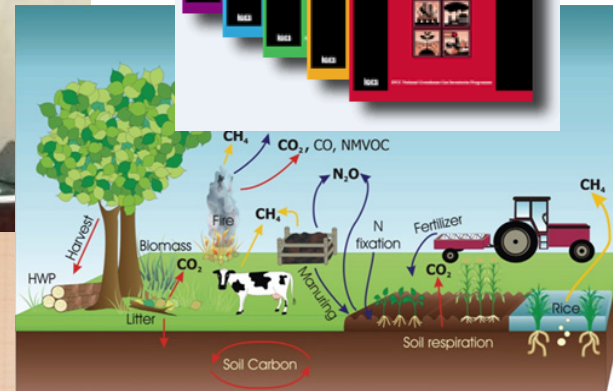


Conclusions

- Availability of a global greenhouse gas emission database by country, as tool to support member countries identify and report GHG emissions and mitigation actions in AFOLU
- Implementation of Robust Regional Capacity Development Program on Rural Statistics
- Need to build stronger collaboration with relevant agencies to automatize provision of geo-reference data for updates



Thank you!



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