



Food and Agriculture Organization
of the United Nations

>> FAO Statistics Division

Emissioni di gas climalteranti dai sistemi agroalimentari: il quadro globale

Francesco N Tubiello, FAO

Mitigazione CC Agricoltura e Foreste
Orto Botanico, Roma 6-7 Ottobre 2022



Data to monitor sustainable food and agriculture



Form of FAO
Food and Agriculture Organization of the United Nations
Reference Year: 2004/2005

**Questionnaire on Agricultural Resources
Land Use and Irrigation**
National Reporting Office and Contact name

Administrative and Contact Information
Registration name, Address, Telephone, Fax, Email, Website

Land Use and Irrigation
The Land Use and Irrigation Questionnaire has three major sections: Land use and irrigation, Land use - plantations and forests, and Irrigation. We have included detailed concepts and definitions of the land use categories in the Explanatory Notes sheet.

Please exclude rates on any deviation from the concepts and definitions regarding the specific data requested.

Your organization is not responsible for the data collection of one or more countries; we kindly ask you to include the contact point of the organization responsible in the section "Land use - contact details".

If you have any query regarding the questionnaire please contact:
Dr Francesco Tubiello
Tel: +39 051 357 2110
Email: Francesco.Tubiello@fao.org
http://www.fao.org/statistic/ev

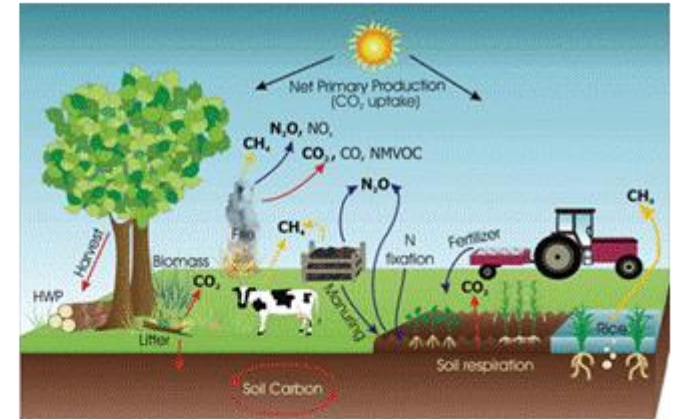
We kindly ask you to provide a reply by 02/04/2015

FAO leads an international reporting process on food and agriculture



SDG Indicators

IPCC 2006 Guidelines



Defining Food Systems within Food and Agriculture

Food Systems View



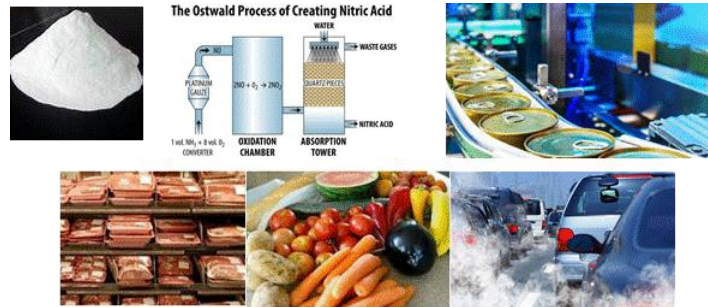
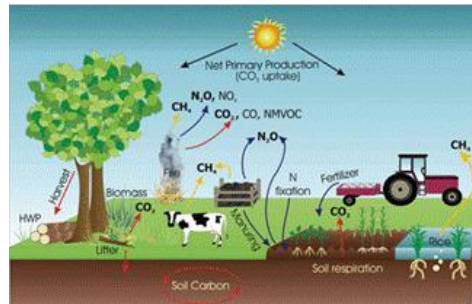
Farm gate



Land use change



Pre- and post-production

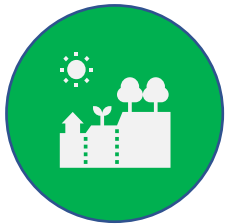


Defining Food Systems within Food and Agriculture

Food Systems View



Farm gate



Land use change



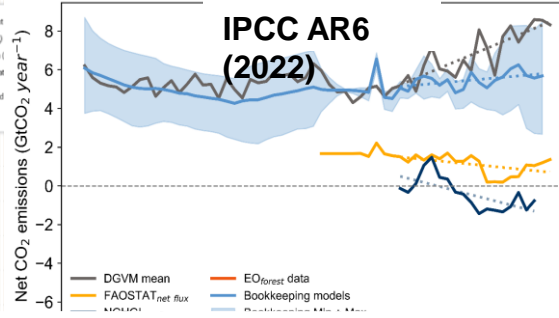
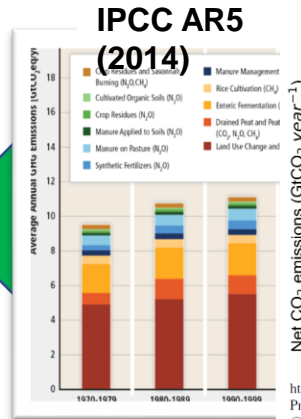
Food and Agriculture Organization of the United Nations

FAO Statistics Working Paper Series / 2100X

Pre

METHODS FOR ESTIMATING GREENHOUSE GAS EMISSIONS FROM FOOD SYSTEMS, PART III: ENERGY USE IN FERTILIZER MANUFACTURING, FOOD PROCESSING, PACKAGING, RETAIL HOUSEHOLD CONSUMPTION

IPCC	PROCESSES	FAO
	Wetlands, Settlements and Other Land	OTHER
	Forest Land	FOREST LAND
		USE



<https://doi.org/10.5194/essd-2021-389>
Preprint. Discussion started: 8 November 2021
© Author(s) 2021. CC BY 4.0 License.

Climate Policy View



Land Use, Land Use Change and Forestry (LULUCF)



Agriculture



Energy

Open Access Earth System Science Discussions Data

Industry

Waste

- 1 Pre- and post-production processes along supply chains increasingly dominate GHG emissions from agri-food systems globally and in most countries
- 2 Francesco N. Tubiello¹, Kevin Karl^{1,2}, Alessandro Flammini^{1,3}, Johannes Gütschow⁴, Griffiths Obli-Laryea⁴, Giulia Conchedda¹, Xueyao Pan¹, Sally Yue Qi², Hörn Halldórudóttir⁵, Heiðarsdóttir¹, Nathan Wanner¹, Roberta Quadrelli⁶, Leonardo Rocha Souza⁶, Philippe Benoit¹, Matthew Hayek⁷, David Sandalow², Erik Mencos-Contrera^{8,9}, Cynthia Rosenzweig^{9,8}, Jose¹ Rosero Moncayo¹, Piero Conforti¹ and Maximo Torero¹

Food systems are responsible for a third of global anthropogenic GHG emissions

M. Crippa¹, E. Solazzo², D. Guizzardi¹, F. Monforti-Ferrario¹, F. N. Tubiello² and A. Leip³

We have developed a new global food emissions database (EDGAR-FOOD) estimating greenhouse gas (GHG; CO₂, CH₄, N₂O, fluorinated gases) emissions for the years 1990–2015, building on the Emissions Database of Global Atmospheric Research (EDGAR), complemented with land use/land-use change emissions from the FAOSTAT emissions database. EDGAR-FOOD provides a complete and consistent database in time and space of GHG emissions from the global food system, from production to consumption, including processing, transport and packaging. It responds to the lack of detailed data for many countries by providing sectoral contributions to food-system emissions that are essential for the design of effective mitigation actions. In 2015, food-system emissions amounted to 18 Gt CO₂ equivalent per year globally, representing 34% of total GHG emissions. The largest contribution came from agriculture and land use/land-use change activities (71%), with the remaining were from supply chain activities: retail, transport, consumption, fuel production, waste management, industrial processes and packaging. Temporal trends and regional contributions of GHG emissions from the food system are also discussed.

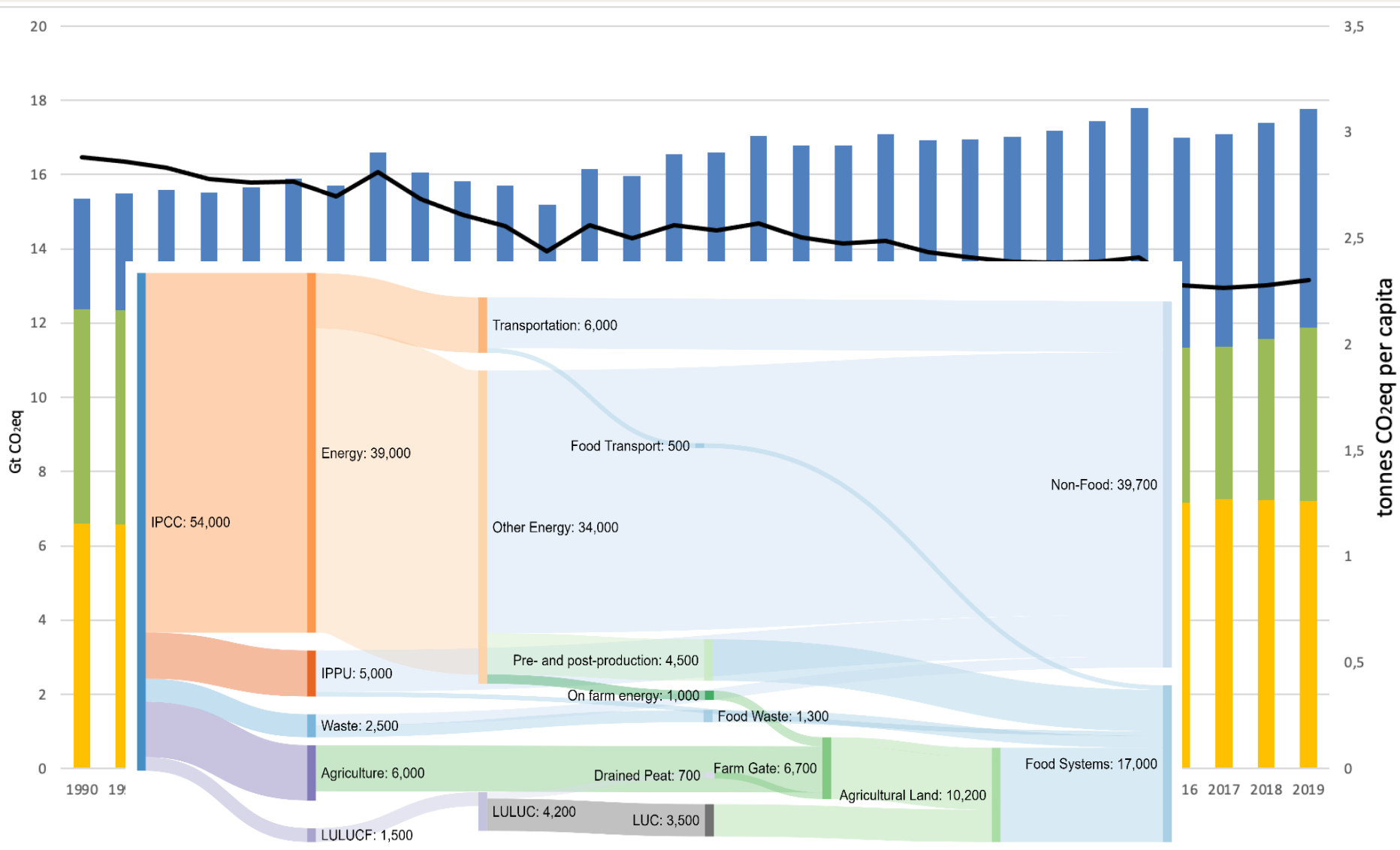
>> FAO Statistics Division

FAOSTAT Emissions Shares Domain stats

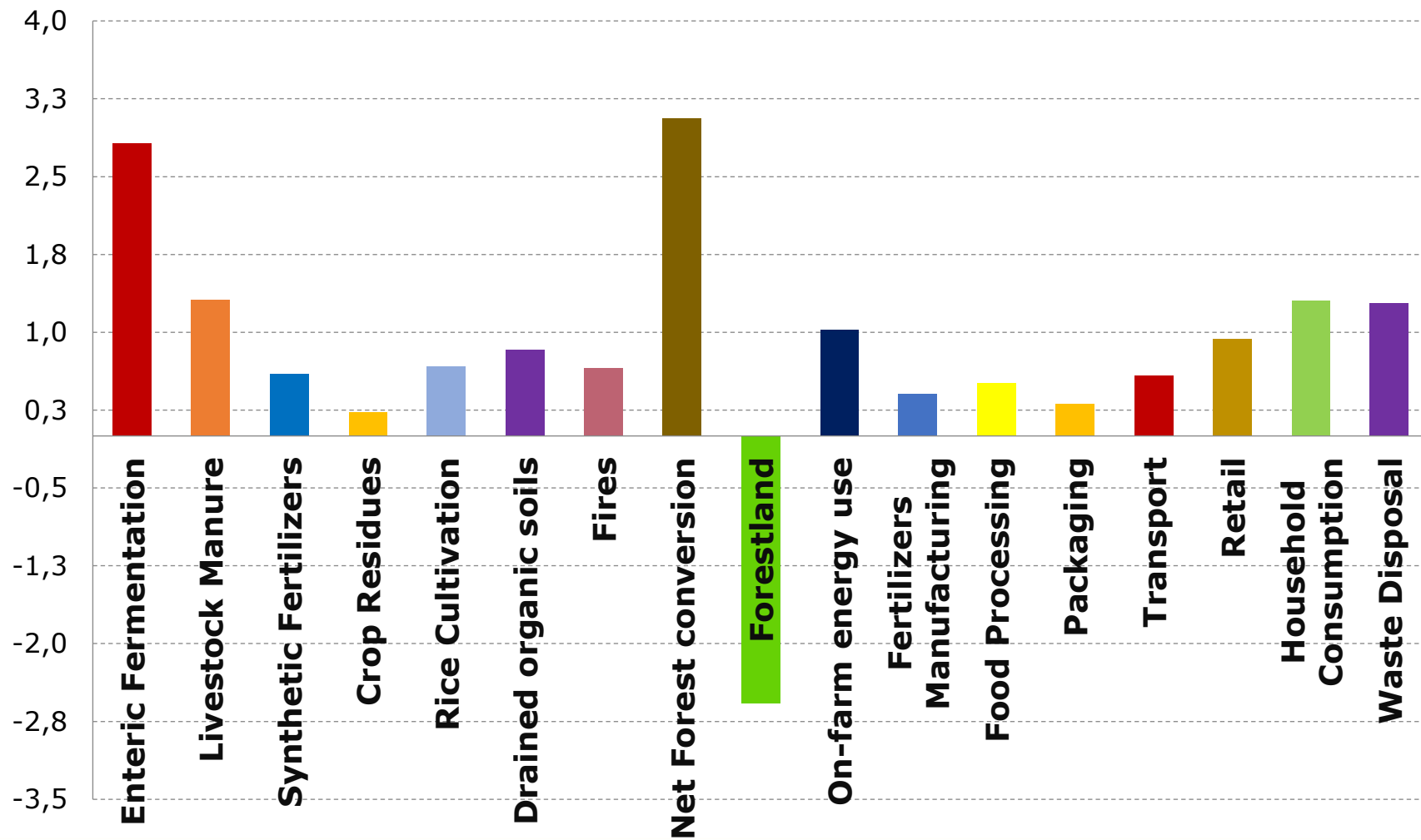
	Emissions and Shares
Greenhouse gas	CO ₂ ; N ₂ O; CH ₄ ; F-gases
Spatial Coverage	194 Countries and 36 Territories
Temporal Coverage	1990-2019
Thematic Coverage	All IPCC sectors, all food system processes

GLOBAL AND REGIONAL HIGHLIGHTS

Emissions from food systems



Gt CO₂e emissions/removals



Food Systems shares by gas, 2019

Food Systems View

CO₂

CH₄

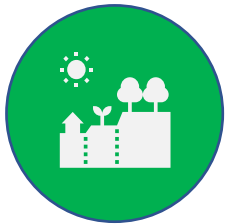
N₂O

CO₂eq



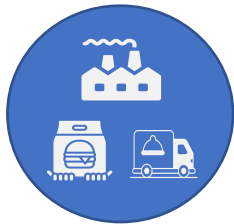
Farm gate

13%



Land use change

9%



Pre- and post-production

11%

GRAND TOTAL

33%

Annex I and Non-annex I emissions and shares

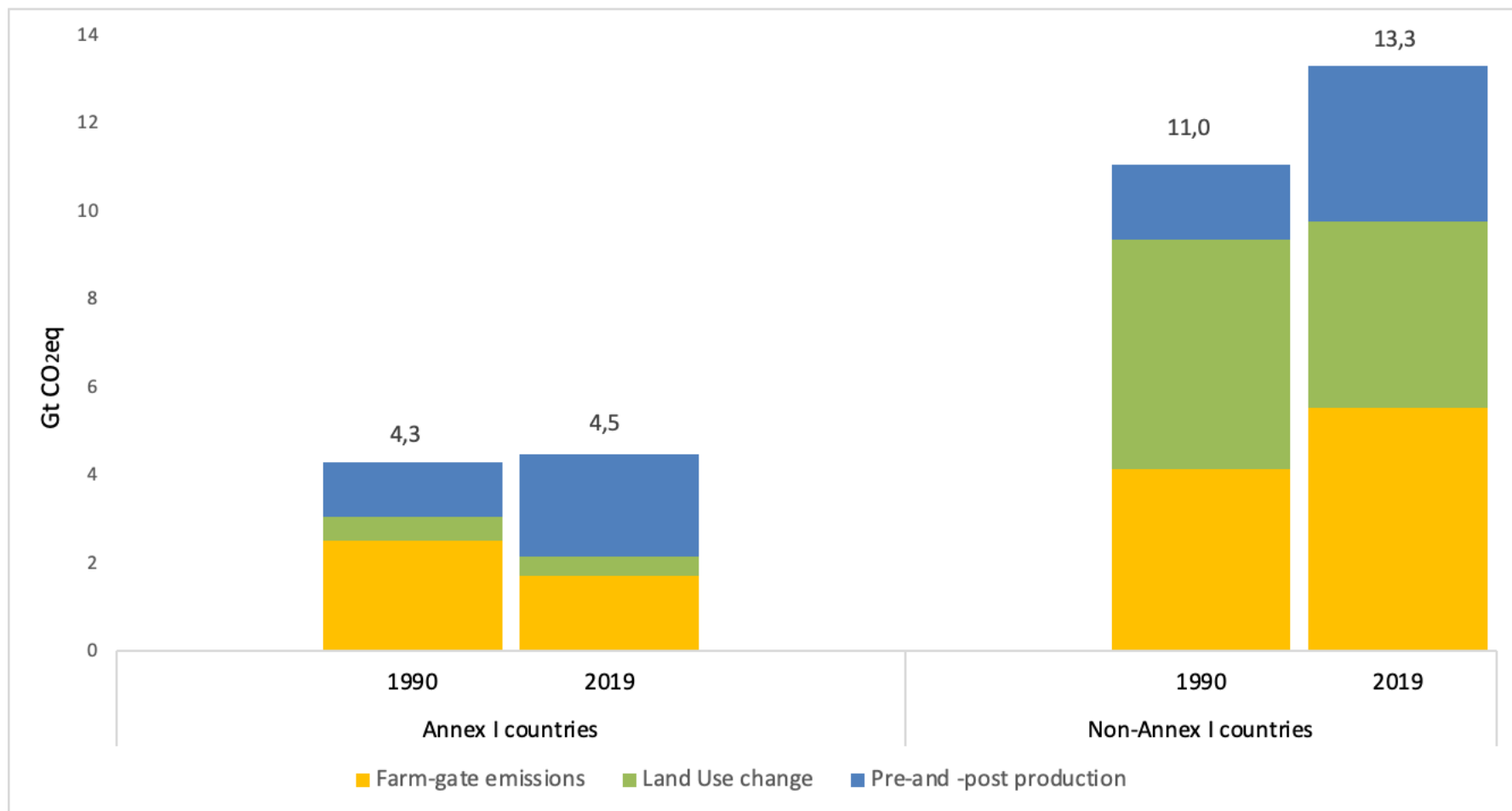
Food shares:

24%

27%

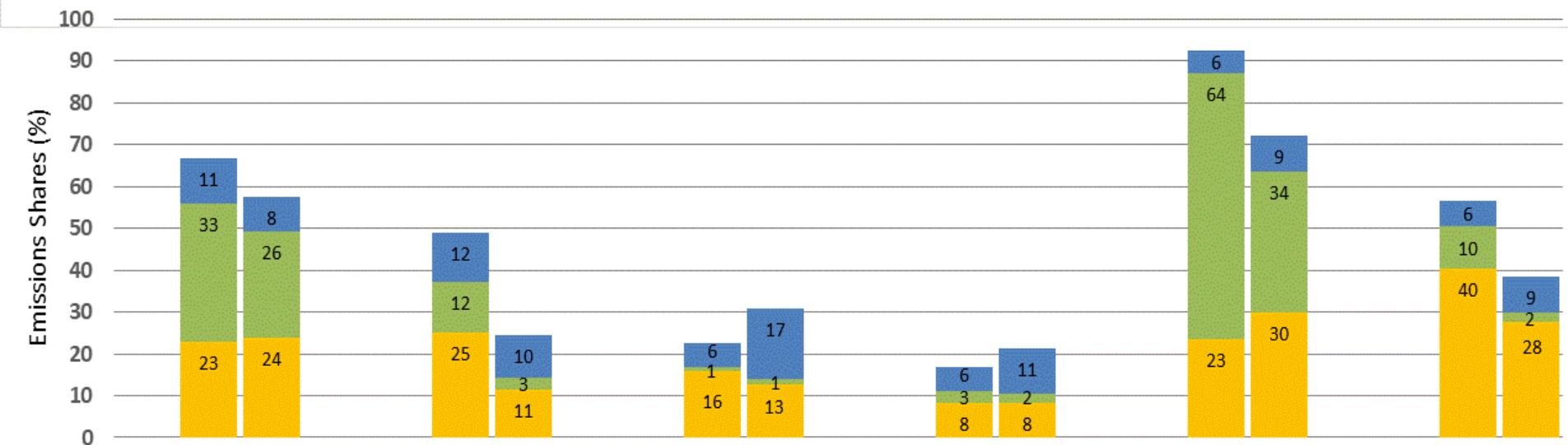
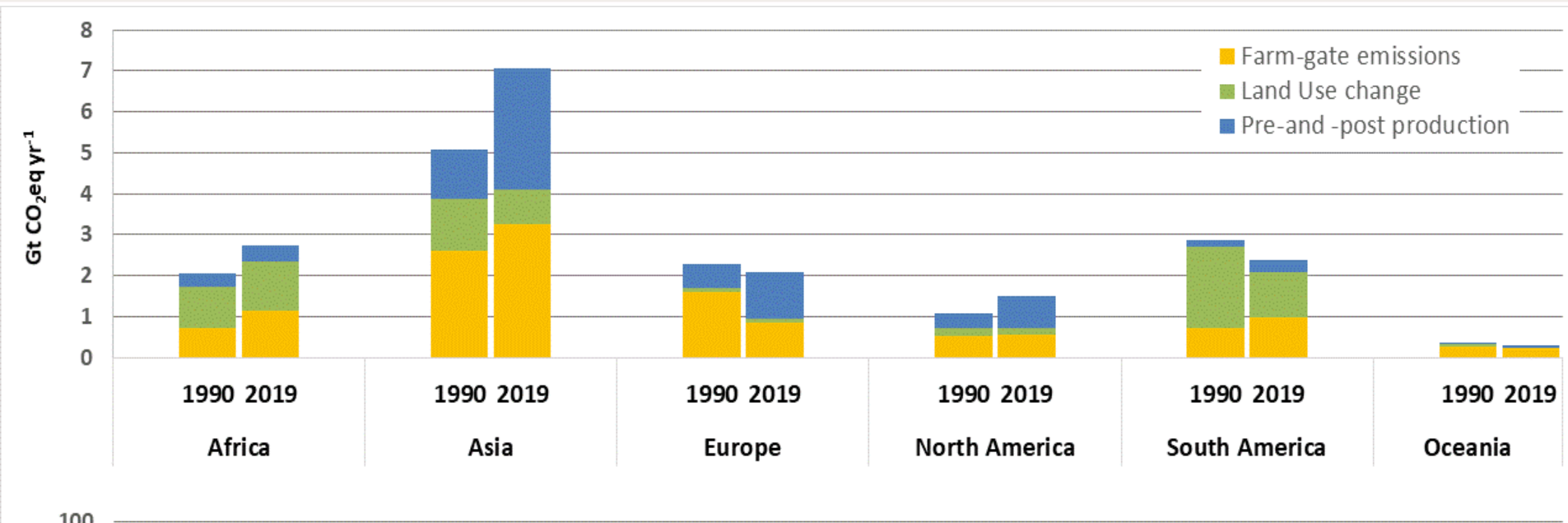
60%

40%



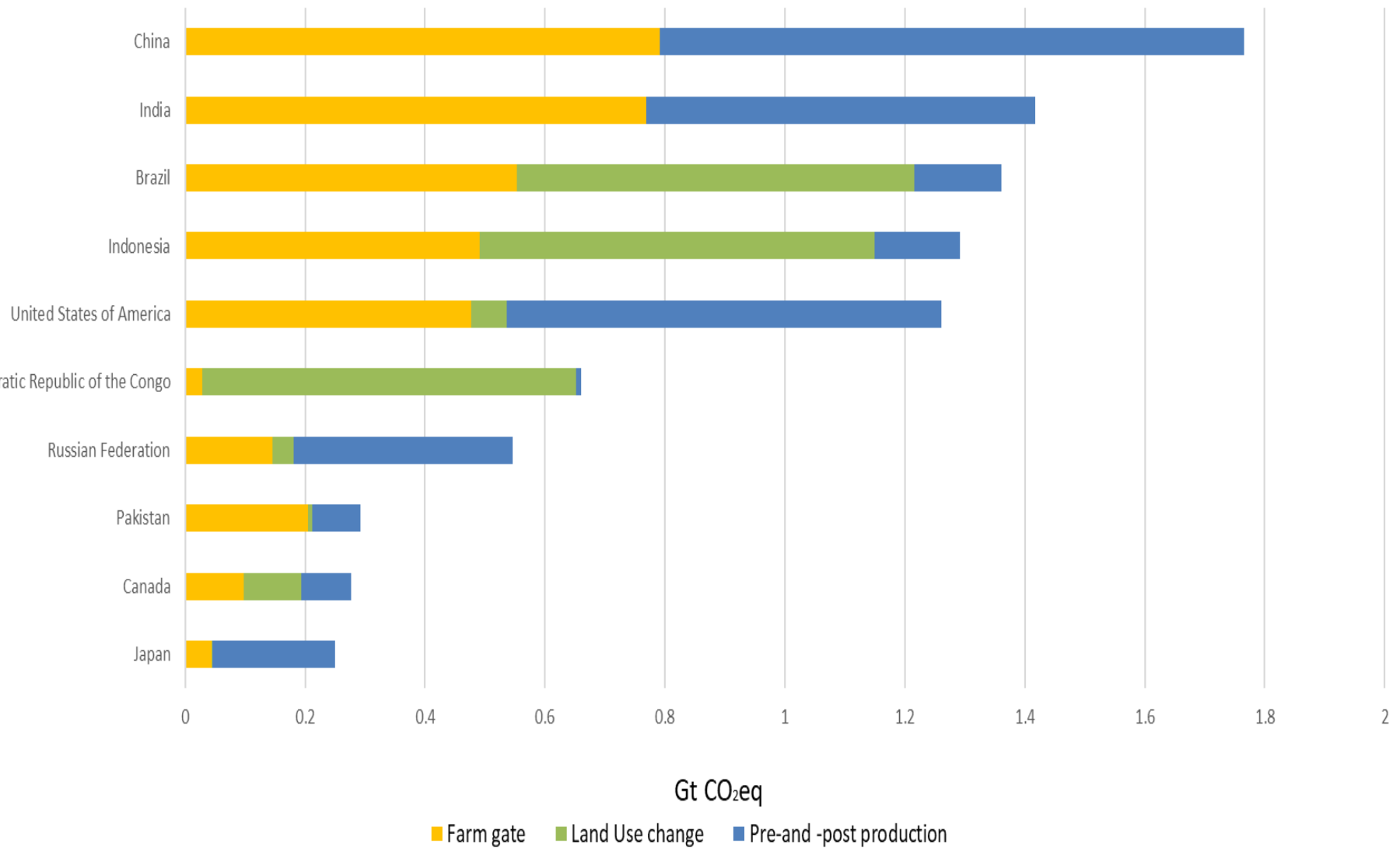
Annex I to the UNFCCC: developed countries; non-Annex I: developing

Regional trends in emissions shares, 1990-2019



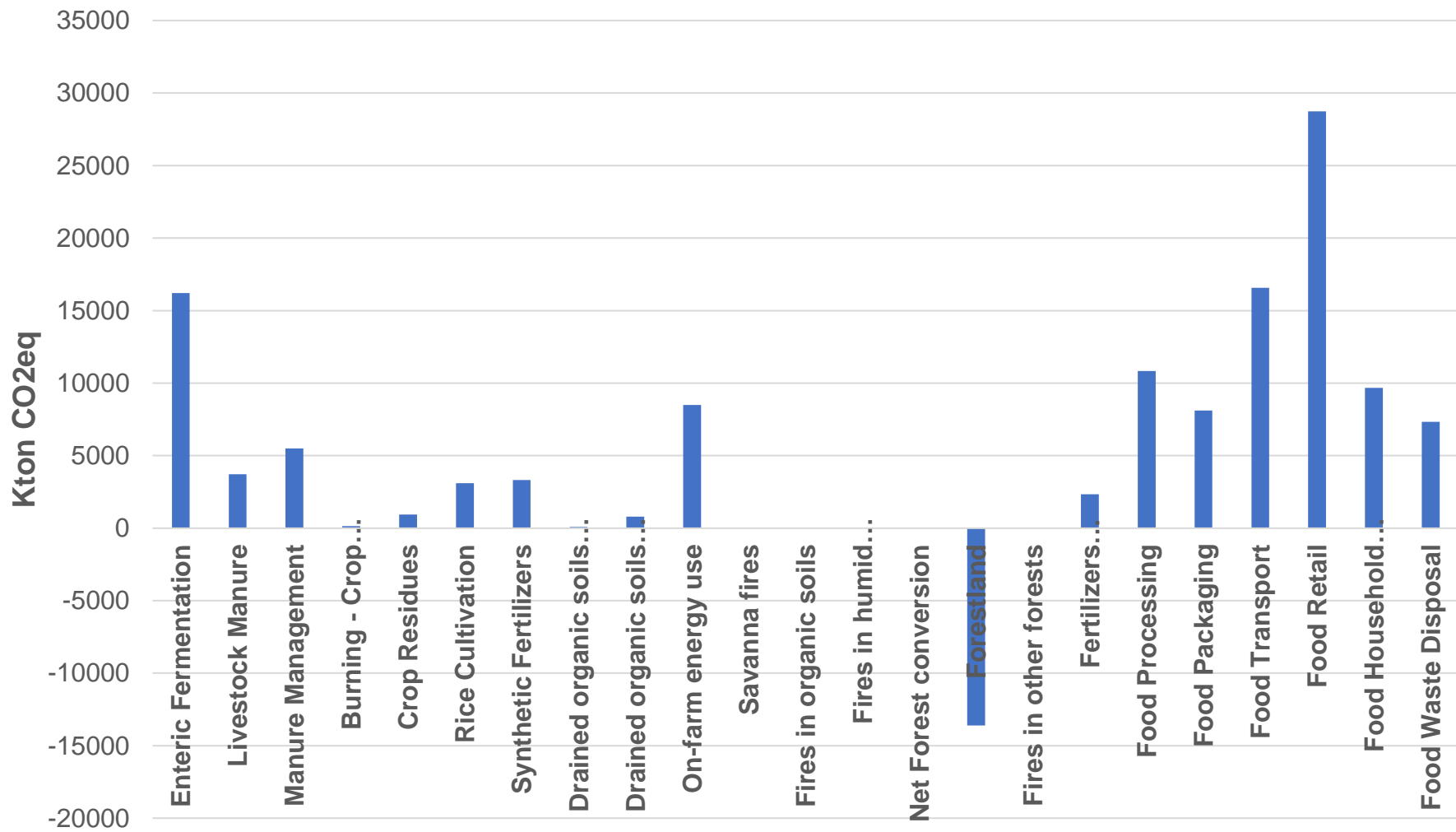
COUNTRY HIGHLIGHTS

Top ten countries food systems emissions, 2019



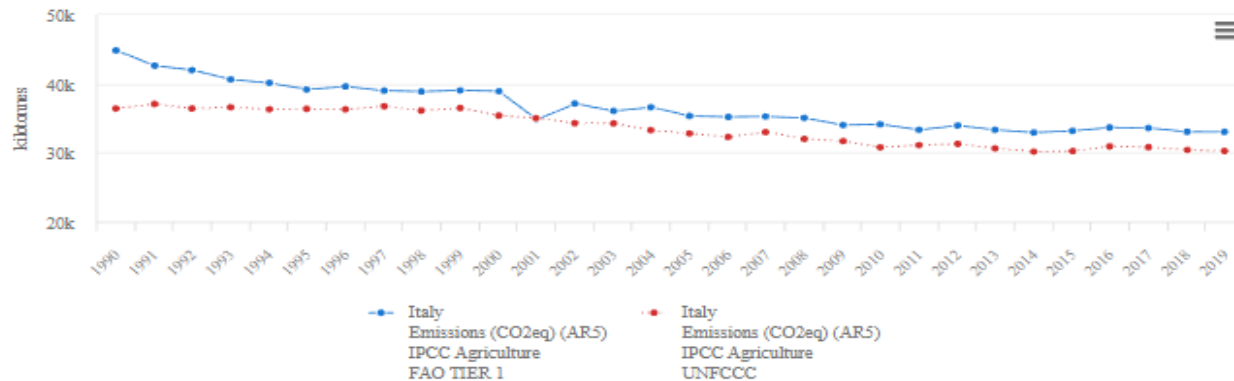
UNA FINESTRA SULL'ITALIA

Agri-food systems emissions, Italy 2019

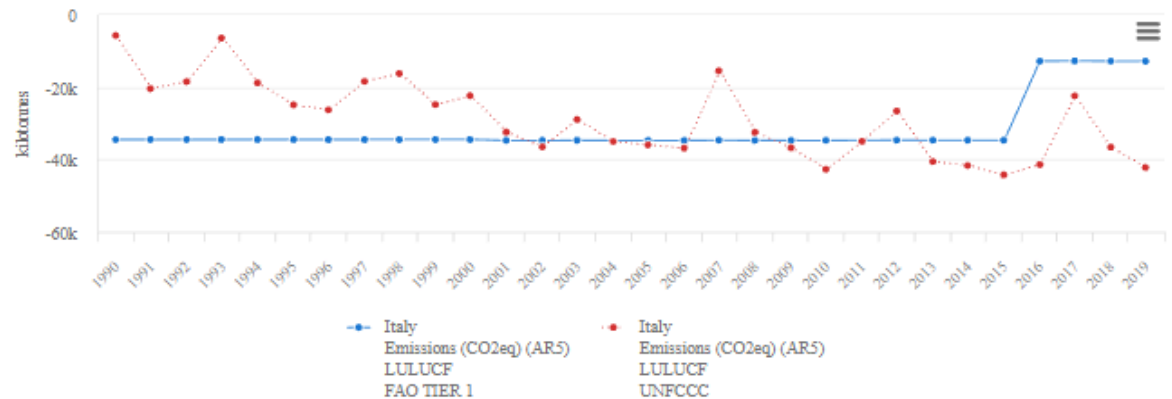


Validazione, Italy 2019

Emissions (CO₂eq (AR5)) IPCC Agriculture + (Total)
1990 - 2019



Emissions (CO₂eq (AR5)) LULUCF + (Total)
1990 - 2019



(Pre and post:
EUROSTAT fro
activity data)



Conclusioni

- Le emission di gas serra dai sistemi ago-alimentary sono il 30% del totale
- Le emission lungo la filiera dopo il farm-gate stanno aumentando; ma rimane l' importanza della CO₂ da land use e il metano dagli allevamenti
- La mitigazione va pianificata almeno su tre aree diverse per struttura (farm, land use, post-production) e per tipologia di gas serra

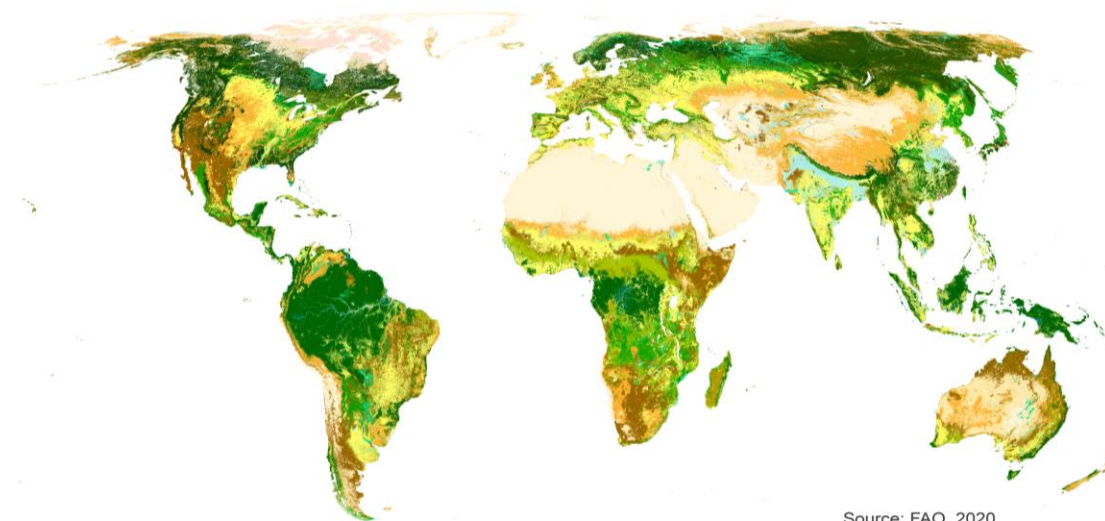


Food and Agriculture
Organization of the
United Nations



Thank you!

francesco.tubiello@fao.org



Source: FAO, 2020





FAOSTAT Data Briefs:

GHG AFOLU:

<https://www.fao.org/3/cb5293en/cb5293en.pdf>

Forest Carbon Fluxes:

<https://www.fao.org/3/cb1578en/cb1578en.pdf>

Food Systems GHG:

<https://www.fao.org/3/cb7514en/cb7514en.pdf>

Land use:

<https://www.fao.org/3/cb6033en/cb6033en.pdf>

Land Use and Cover:

<https://www.fao.org/3/cb2860en/cb2860en.pdf>

Rationale

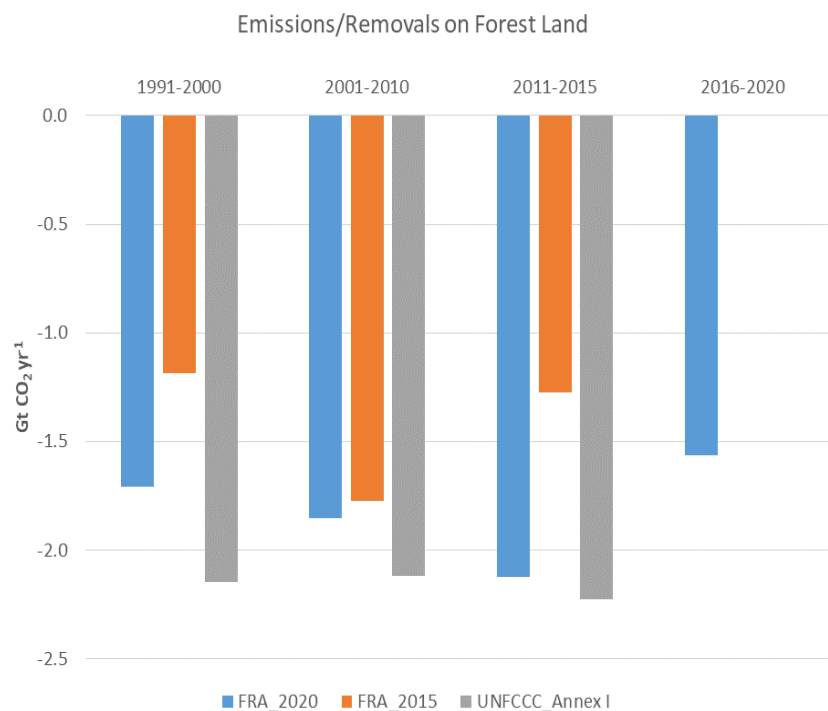
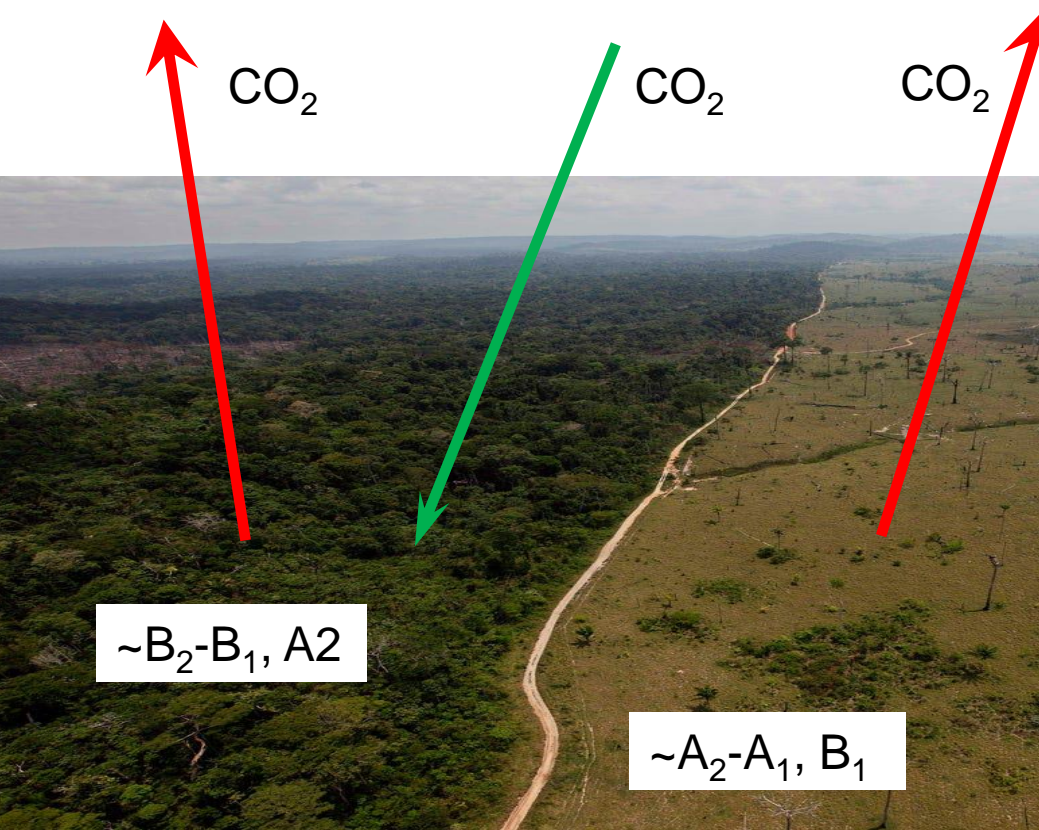
- Provide global knowledge products that enable analysis of food and agriculture trends at regional and world level (e.g., IPCC AR6)
- Disseminate data and tools in support of country QAQC and validation processes for their National Greenhouse gas inventories (NGHGI)
- Enhance capacity of countries to collect, analyse and report data on food and agriculture and food systems, consistently with FAO, UNFCCC and SDG processes



Forest Emissions data: Forest loss and forest land (FRA 2020 updates)

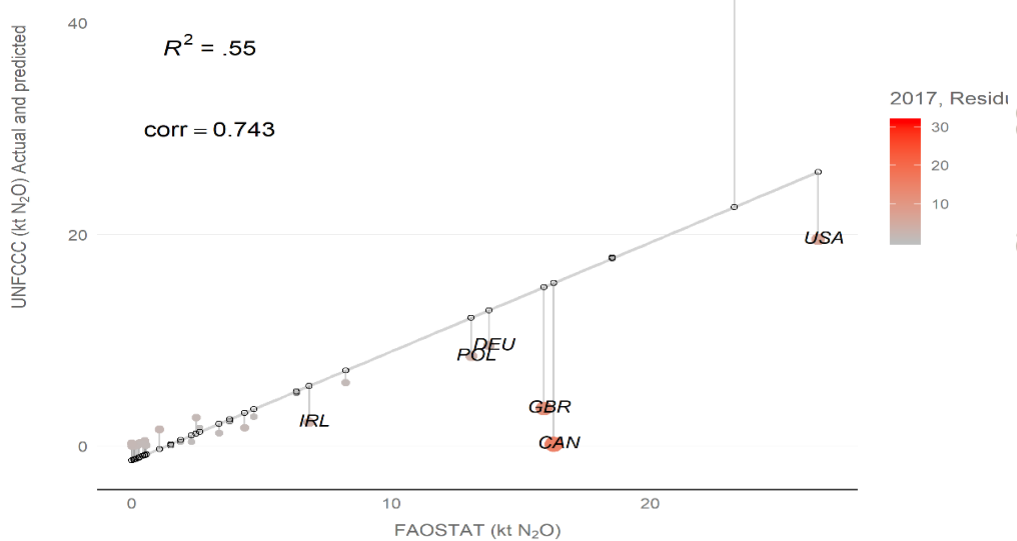
- $A_i (A_{nr}, A_{pl})$ = Forest land area (Nat. Regen., Planted)
- B_i = Carbon stock in living biomass
- $i = 1990, \dots, 2020$

FAOSTAT Emissions estimates:



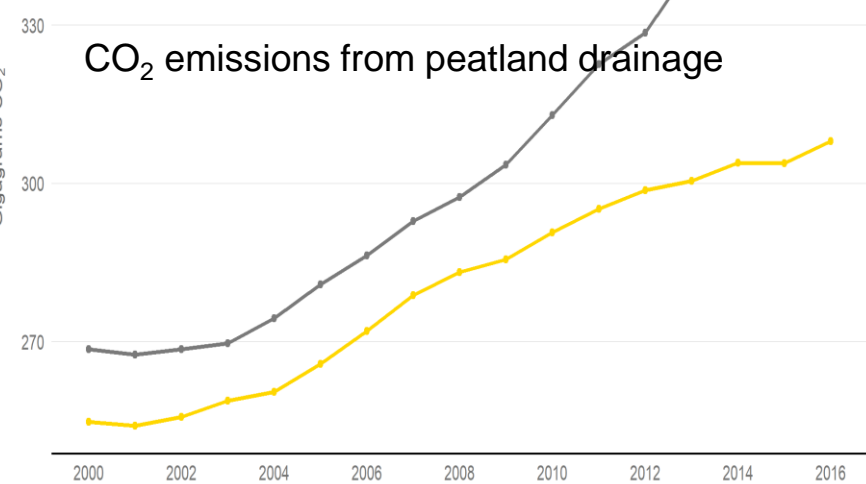
FAOSTAT from Geospatial Products: Organic Soils drainage and fires

N₂O emissions from peatland drainage, FAO/UNFCCC data



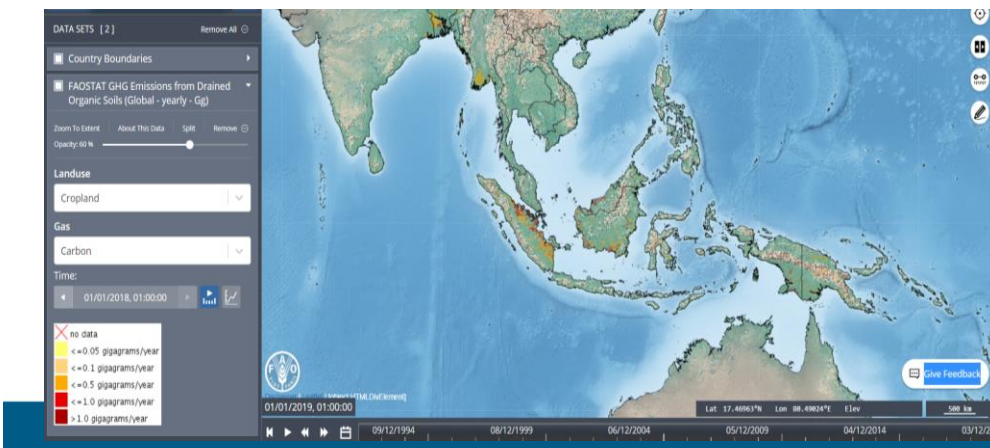
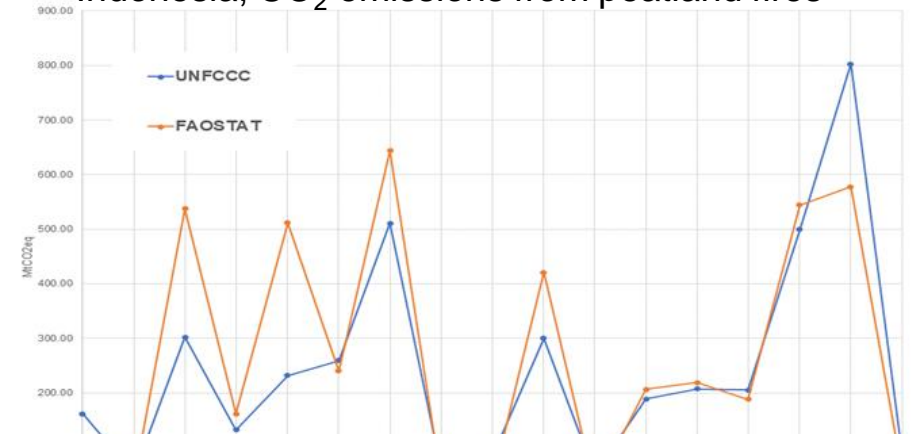
Source: FAOSTAT, 2020

Indonesia 2018 Biennial Update Report vs FAOSTAT



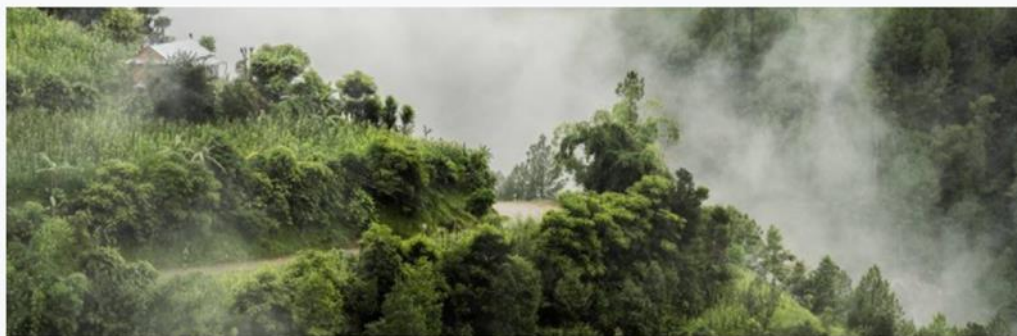
Source: FAOSTAT, 2020

Indonesia, CO₂ emissions from peatland fires





FAO Statistics Division—Environment Statistics



- Crop, livestock and food
- Economics
- Environment**
- Data
- Methodology
- Food security and nutrition
- Social
- Methodological innovation
- Census of agriculture
- Agricultural surveys

Environment statistics

FAO's work on environment statistics contributes to FAO's efforts to collect, analyze, interpret and disseminate data and information on food and agriculture with the goal of making agriculture, forestry and fisheries more productive and sustainable.

Environment statistics at FAO focuses, in particular, on promoting sustainable agriculture and the sustainable use of terrestrial ecosystems.

To do so, FAO collects, analyzes, interprets and disseminates country, regional and global agri-environmental statistics to support evidence-based decision-making and countries in their efforts to strengthen national environment statistics related to food and agriculture. Advancing relevant analytical knowledge, the data also support countries in their international reporting needs. These include country reporting processes for climate change and for the indicators of the Sustainable Development Goals (SDG), and in particular, for indicator 2.4.1, on the "Proportion of agricultural area under productive and sustainable agriculture".

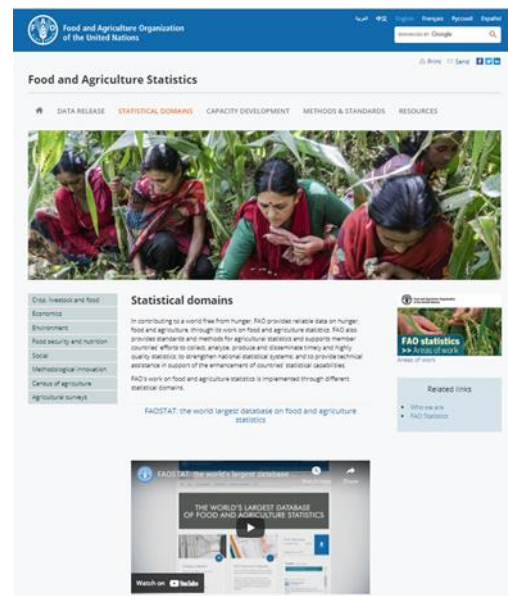


Environment statistics brochure

Latest

- The consolidated European synthesis of CH4 and N2O emissions for EU27 and UK: 1990-2018... quantification of global nitrous oxide sources and sinks
- Data release on environment statistics

Information Portal of the FAO Statistics Division



<http://www.fao.org/food-agriculture-statistics/statistical-domains/en/>



FAO Data Collection: International Reporting on Food and Agriculture

Countries officially report food and agriculture data to FAO

- Regulated by FAO Constitution – Statistics a core pillar of FAO;
- Via National focal points (National Statistic Offices; Ministry of Agriculture; Other);
- Data are analyzed and disseminated on corporate FAO platforms (e.g., FAOSTAT, FRA)

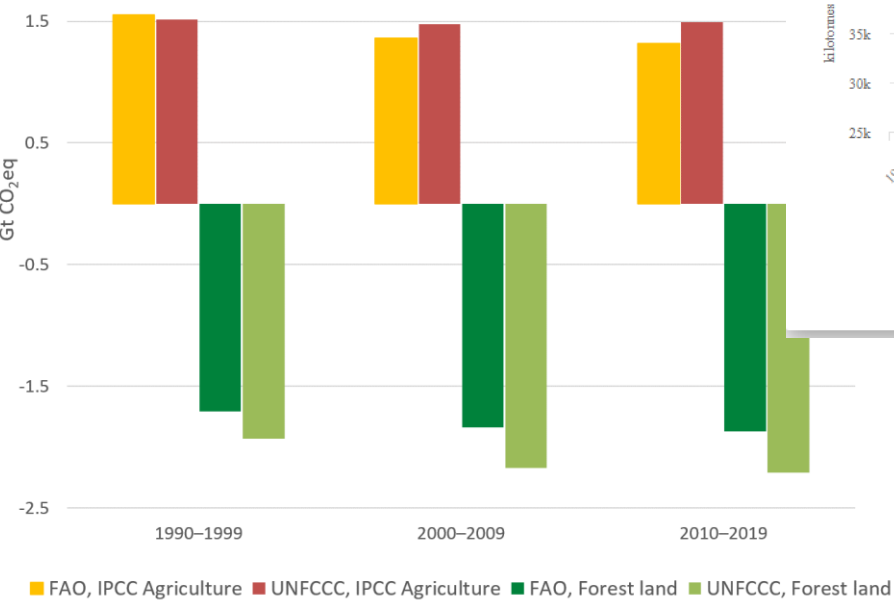
The collage illustrates the FAO data collection and dissemination process. It features several key elements:

- Questionnaire on Agricultural Resources:** A form for reporting agricultural resources, including sections for 'Land use and Irrigation' and 'National Reporting Office and Contact name'.
- Cover page:** A page from a report, likely a statistical yearbook, with a 'Cover page' label.
- Bulk Download:** A button for downloading data, labeled 'Bulk Download' and 'All FAOSTAT Data 880 MB'.
- Database Updates:** A section titled 'Database Updates' with sub-sections for 'Credits to Agriculture (revised)' and 'FAO Statistical Yearbooks'.
- FAO Statistical Yearbooks:** A section titled 'FAO Statistical Yearbooks' with a sub-section for 'The FAO Statistical Yearbook provides a selection of indicators on food and agriculture by country'.
- Tweets by @FAOstats:** A section titled 'Tweets by @FAOstats' showing tweets from James Egan and others, including a tweet about 'A digital platform in reporting across nine developing areas, and closing new services and printing jobs in 2017'.

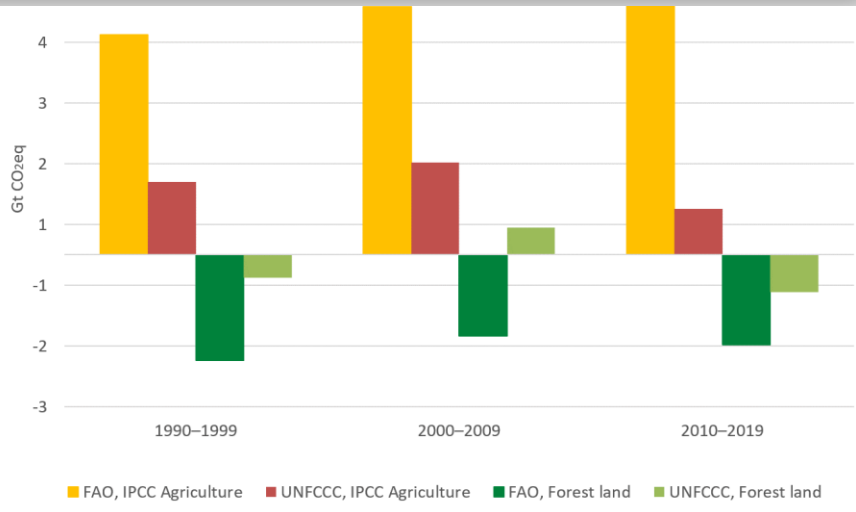
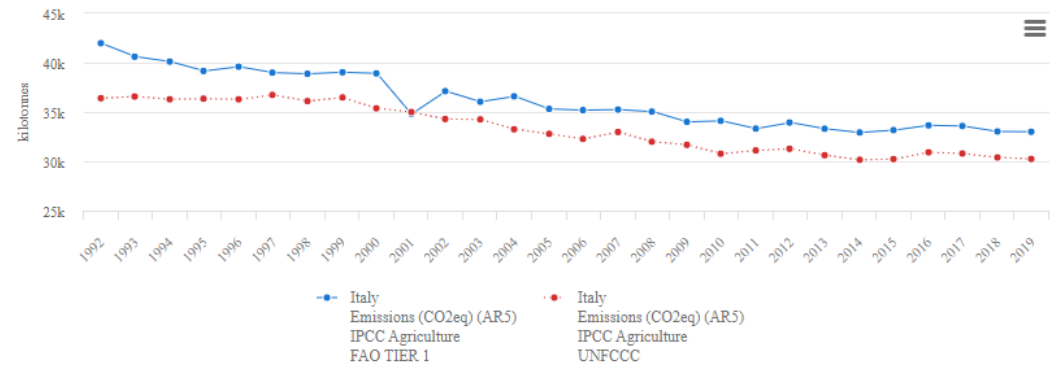
COMPARING TO COUNTRY DATA

Comparing Global Numbers FAO/UNFCCC

Annex I



Emissions (CO₂eq (AR5)) IPCC Agriculture + (Total)
1992 - 2019



Source: FAOSTAT, 2021.

Source: FAOSTAT, 2021.