FAOSTAT Statistics for Climate Change
Agriculture, Forestry and Other Land use

Final Workshop on Environment Statistics for the East African Community Region
Arusha, Tanzania 23 – 27 October 2017

ENVIRONMENT Team
FAO STATISTICS DIVISION
Outline

- Climate Change Statistics and Relevance to FAO work
- FAOSTAT Emissions Statistics
- FAOSTAT Climate Change Statistics beyond Emissions
Relevance to FAO work

- Climate change threatens our ability to achieve **global food security**, **eradicate poverty** and achieve **sustainable development**;

- Has both direct and indirect effects on **agricultural productivity** (changing rainfall patterns, drought, flooding and the geographical redistribution of pests and diseases);

- Greenhouse gas (**GHG**) emissions from human activity are a significant driver of climate change;

- Elevated CO\textsubscript{2} causes oceans acidification, influencing the health of our oceans and livelihoods.
FAOSTAT Climate Change-relevant Statistics

- Climate Change statistics support enhanced transparency under UNFCCC Paris Agreement, i.e. for National Determined Contributions (NDCs);

- FAO contributes to UNECE/UNSD on CC Relevant Statistics;

- Recent FAO work on Climate Change Indicators: Piloting current set of indicators;

- New: FAOSTAT Temperature Change (with NASA);

- Focus on communication of results to non-specialized users.
FAOSTAT Global default estimates

& geospatial data

IPCC 2006 Guidelines

Level 1

Level 2

Level 3

FAOSTAT Climate Change Relevant Statistics

- GHG Emissions from AFOLU Agriculture, Forestry and Other Land Use (Carbon Stock Change; Deforestation, Degradation; Peatland; Fire Statistics);

- Emissions Intensities;

- Emissions by Sector;

- Land Cover;

- Temperature Change.
FAO Statistical Work on GHG Emissions

- FAO database with estimates and updates GHG Emissions from AFOLU;
- 1961- now updating to 2015 (Agriculture); 1990-2015 (LULUCF): ~185 Countries
- Reference Tier 1 GHG Inventory using 2006 IPCC Guidelines:

[Image of FAO database and IPCC guidelines]

Emissions

**Emissions - Land Use**

- Land Use Total
- Forest Land
- Cropland
- Grassland
- Burning - Biomass

**Emissions - Agriculture**

- Agriculture Total
- Enteric Fermentation
- Manure Management
- Rice Cultivation
- Synthetic Fertilizers
- Manure applied to Soils
- Manure left on Pasture
- Crop Residues
- Cultivation of Organic Soils
- Burning - Savanna
- Burning - Crop Residues
- Energy Use

Facilitate National, Regional and Global analyses: regional comparisons and trend analysis for AFOLU, including IPCC assessment reports;

Fill data gaps and QA/QC procedures: Support member countries report under UNFCCC, addressing data gaps and needs in data QA/QC; e.g. a reference, Tier 1 data framework for analysis of AFOLU GHG trends for all countries–EU 28 QA/QC in 2014;

Explore policy-relevant emission indicators in support of analyses linked to resilience, food security, including SDGs processes (UNSD/UNECE);
Emissions by Sector

The Emissions by sector domain of the FAOSTAT Agri-Environmental Indicators section contains data on emissions of greenhouse gases (GHG) by gas... Show More

Food and Agriculture Organization of the United Nations (FAO)

Bulk Downloads
- All Data: 2.79 MB
- All Data Normalized: 6.5 MB
- All Area Groups: 308 KB
- Africa: 612 KB
- Americas: 515 KB
- Asia: 547 KB
- Europe: 456 KB
- Oceania: 160 KB

Last Update: September 6, 2016

Related Documents:
- Emissions by sector

Definitions and standards

Metadata


Other sectors Emissions Database for Global Atmospheric Research EDGAR
http://edgar.jrc.ec.europa.eu/
Emissions Intensities

kg CO2 per kg of whole fresh milk, 1961 - onward

Beyond emissions: Climate change statistics in FAOSTAT Agri-Environmental Indicators

Agri-Environmental Indicators

- Air and climate change
- Energy
- Fertilizers
- Land Use
- Land Cover
- Livestock Patterns
- Pesticides
- Soil
- Water
- Emissions by sector
- Emissions intensities
- Temperature change

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Description</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Land Use</strong></td>
<td>Share of land use category in Land, Agricultural area, Forest area,</td>
<td>1961-2014</td>
</tr>
<tr>
<td><strong>Emissions Intensities</strong></td>
<td>kg CO₂ / kg product</td>
<td>1961-2014</td>
</tr>
<tr>
<td><strong>Emissions by sector</strong></td>
<td>Tot emissions; Share by Gas; Share (gas) in sector</td>
<td>1990-2010</td>
</tr>
<tr>
<td><strong>Land Cover</strong></td>
<td>1000 ha</td>
<td>1992-2015</td>
</tr>
<tr>
<td><strong>Temperature</strong></td>
<td>°C anomalies; standard deviation</td>
<td>1961-2016</td>
</tr>
</tbody>
</table>

Recently released
Land Cover

One of the Terrestrial Essential Climate Variables


- **SDG 15.3.1**: Sub-indicator for proportion of land degraded;
- FDES – UNECE indicators and statistics;
- Environmental and Economic Accounting system (SEEA CF; SEEA AFF).
Area (1000 ha) of Woody crops
Average 1992 - 2015
Reference standard: SEEA CF Land Cover

14 LC classes;

Based on FAO, Land Cover Classification System (LCCS) and Rules

<table>
<thead>
<tr>
<th>Category</th>
<th>Basic rule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artificial surfaces (including urban and associated areas)</td>
<td>The category is composed of any type of artificial surfaces.</td>
</tr>
<tr>
<td>Herbaceous crops</td>
<td>The category is composed of a main layer of cultivated herbaceous plants.</td>
</tr>
<tr>
<td>Woody crops</td>
<td>The category is composed of a main layer of cultivated tree or shrub plants.</td>
</tr>
<tr>
<td>Multiple or layered crops</td>
<td>The category is composed of at least two layers of cultivated woody and herbaceous plants or different layers of cultivated plants combined with natural vegetation.</td>
</tr>
<tr>
<td>Grassland</td>
<td>The category is composed of a main layer of natural herbaceous vegetation with a cover from 10 to 100 per cent.</td>
</tr>
<tr>
<td>Tree-covered areas</td>
<td>The category is composed of a main layer of natural trees with a cover from 10 to 100 per cent.</td>
</tr>
<tr>
<td>Mangroves</td>
<td>The category is composed of natural trees with a cover from 10 to 100 per cent in aquatic or regularly flooded areas in salt and brackish water.</td>
</tr>
<tr>
<td>Shrub-covered areas</td>
<td>The category is composed of a main layer of natural shrubs with a cover from 10 to 100 per cent.</td>
</tr>
<tr>
<td>Shrub and/or herbaceous vegetation, aquac or regularly flooded</td>
<td>The category is composed of natural shrubs or herbs with a cover from 10 to 100 per cent in aquatic or regularly flooded areas with water persistence from 2 to 12 months per year.</td>
</tr>
<tr>
<td>Sparsely natural vegetated areas</td>
<td>The category is composed of any type of natural vegetation (all growth forms) with a cover from 2 to 10 per cent.</td>
</tr>
<tr>
<td>Terrestrial barren land</td>
<td>The category is composed of abiotic natural surfaces.</td>
</tr>
<tr>
<td>Permanent snow and glaciers</td>
<td>The category is composed of any type of glacier and perennial snow with persistence of 12 months per year.</td>
</tr>
<tr>
<td>Inland water bodies</td>
<td>The category is composed of any type of inland water body with a water persistence of 12 months per year.</td>
</tr>
<tr>
<td>Coastal water bodies and intertidal areas</td>
<td>The category is composed on the basis of geographical features in relation to the sea (lagoons and estuaries) and abiotic surfaces subject to water persistence (intertidal variations).</td>
</tr>
</tbody>
</table>

UN SEEA Central Framework, 2012
Geospatial data to populate the SEEA Land Cover

1) Global LC maps: land accounts: global and multi-temporal – matching LCC classifiers;

   MODIS v5 IGBP (2001 – 2012) *Herold et al., 2008*

2) Geoprocessing: GAUL (2014) - normalized to official Country areas;

c) Translating original land cover legends to common SEEA LC classes using UN Land Cover Classifiers (standard).
SEEA Land cover applications

- In support of Land Use statistical process with countries;

- Internal QA/QC - Trend analyses – Gap filling for Land Use;

- Relevant processes (including SDGs)/collaborations/SEEA database);

- Increasing role of geospatial information: SDGs process (covariate; stratification in integrated agricultural surveys).

http://2016africalandcover20m.esrin.esa.int/
CCI LAND COVER - S2 PROTOTYPE LAND COVER 20M MAP OF AFRICA 2016
Preliminary mapping of Land Cover to Land Use

Internal QA/QC

Work with countries

Assessment of uncertainties

Refinement
Temperature Changes

Higher temperatures impact negatively crop growth and yields throughout the world, putting livelihoods of million of farmers and communities at risk, in all regions.
FAOSTAT Climate Change Indicators: Temperature Change

- Collaboration with NASA Goddard Institute for Space Studies
  https://data.giss.nasa.gov/gistemp/;
- Country data set of temperature anomalies compared to a climatology reference (1951-1980);
- Data 1961 – 2016, will be updated yearly.

Temperature Change

Temperature Change & Standard Deviations for annual, seasonal and monthly means, 1961-2016

October 2017
Communicating Climate Change Indicators

Indicator FDES Basic
Set of Statistics:

Deviation of annual average temperature from long-term annual average

Mean annual temperature anomalies

Source: FAOSTAT, 2017
Mean Annual Change Temperature Index

FAO youtube channel:

https://www.youtube.com/watch?v=FFp08Jxto6w
Conclusions

- FAOSTAT agri-environment and climate change statistics in support of member countries;

- Focus on climate change statistics, in support to NSOs for relevant international reporting processes, under the Paris Agreement and in connection to the SDGs;

- Close collaboration with UNSD/UNECE for set of climate change statistics and meeting emerging data needs;

- Geospatial increasingly part of the process – need for integration.
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Web page:

Inputs;
Agri-environmental indicators;
Emissions – Agriculture
Emissions – Land use