Statistics Division

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Session 4: Agri-Environmental statistics and indicators within FAOSTAT

Workshop on Environment Statistics
(Yaounde, Cameroon, 5-9 December 2011)

Characteristics of Agri-Environmental data

- ✓**Problems of scale**: environmental phenomena are **site specific**; statistics at the country level may be not very significant in some cases (e.g. “big countries” like Brazil, with a variety of landscapes).
- ✓**Different data sources**: questionnaires, surveys, remote sensing, modeling, field measurements.
- ✓**Different data types**: tables, georeferenced maps.

Statistics Division

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Agri-Environmental data

Data source	Pros	Cons	Issues	Examples
Questionnaires	✓Official data	✓Limited coverage ✓Different compilers,	✓methodologies, reliability	FAOSTAT
Surveys	✓ Standard methodologies	✓Different compilers ✓Big projects: updates quite rare		GLASOD
Remote sensing	✓Continuous monitoring ✓ Standard methodologies ✓Global coverage at the pixel scale.	✓Indirect measurements (inverse problem)	✓Methodologies, spatial resolution issues, quality assessment	✓Vegetation monitoring ✓LC maps.
Modelling	✓Standard methodologies ✓Global coverage at the pixel scale (if spatial modelling)	✓ Dependance on model limitations	✓Model reliability ✓Input data quality (“garbage in, garbage out”)	✓GAEZ land suitability, GLADIS
Measurements	✓Direct measurements ✓ Input for geostatistical processing.	✓Quality assessment ✓ Not uniform coverage, point measurements. ✓Varying reliability		✓Meteo data from stations (CLIMPAG)

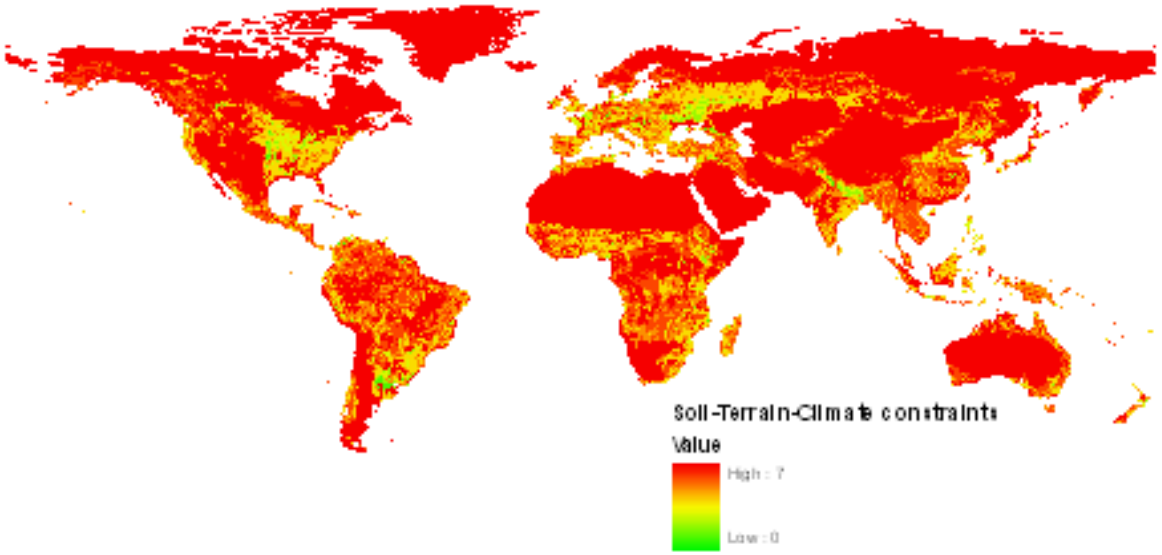
Statistics Division

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Agri-Environmental data

Data types

Country/area	Forest area (1 000 ha) 1990	2000	2005	2010	Annual change rate 1990-2000 1 000 ha/yr	1990-2000 %/a	2000-2005 1 000 ha/yr	2000-2005 %/a	2005-2010 1 000 ha/yr	2005-2010 %/a
Angola	60976	59728	59104	58480	-125	-0.21	-125	-0.21	-125	-0.21
Botswana	13718	12535	11943	11351	-118	-0.90	-118	-0.96	-118	-1.01
Comoros	12	8	5	3	n.s.	-3.97	-1	-8.97	n.s.	-9.71
Djibouti	6	6	6	6	0	0	0	0	0	0
Eritrea	1621	1576	1554	1532	-5	-0.28	-4	-0.28	-4	-0.28
Ethiopia	15114	13705	13000	12296	-141	-0.97	-141	-1.05	-141	-1.11
Kenya	3708	3582	3522	3467	-13	-0.35	-12	-0.34	-11	-0.31
Lesotho	40	42	43	44	n.s.	0.49	n.s.	0.47	n.s.	0.46
Madagascar	13092	13122	12838	12553	-57	-0.42	-57	-0.44	-57	-0.45
Malawi	3896	3567	3402	3237	-33	-0.88	-33	-0.94	-33	-0.99
Mauritius	39	39	35	35	n.s.	-0.03	-1	-2.05	n.s.	0.06
Mayotte	18	16	15	14	n.s.	-1.15	n.s.	-1.26	n.s.	-1.35
Mozambique	43378	41188	40079	39022	-219	-0.52	-222	-0.54	-211	-0.53
Namibia	8762	8032	7661	7290	-73	-0.87	-74	-0.94	-74	-0.99
Réunion	87	87	85	88	0	0	n.s.	-0.46	1	0.70
Seychelles	41	41	41	41	0	0	0	0	0	0
Somalia	8282	7515	7131	6747	-77	-0.97	-77	-1.04	-77	-1.10
South Africa	9241	9241	9241	9241	0	0	0	0	0	0
Swaziland	472	518	541	563	5	0.93	5	0.87	4	0.80
Uganda	4751	3869	3429	2988	-88	-2.03	-88	-2.39	-88	-2.72
United Republic of Tanzania	41495	37462	35445	33428	-403	-1.02	-403	-1.10	-403	-1.16
Zambia	52800	51134	50301	49468	-167	-0.32	-167	-0.33	-167	-0.33
Zimbabwe	22164	18894	17259	15624	-327	-1.58	-327	-1.79	-327	-1.97
Eastern and Southern Africa	**304312**	**285906**	**276679**	**267517**	**-1841**	**-0.62**	**-1845**	**-0.65**	**-1832**	**-0.67**
Algeria	1667	1579	1536	1492	-9	-0.54	-9	-0.55	-9	-0.58
Egypt	44	59	67	70	2	2.98	2	2.58	1	0.88
Libyan Arab Jamahiriya	217	217	217	217	0	0	0	0	0	0
Mauritania	415	317	267	242	-10	-2.66	-10	-3.37	-5	-1.95
Morocco	5049	5017	5081	5131	-3	-0.06	13	0.25	10	0.20
Sudan	76381	70491	70220	69949	-589	-0.80	-54	-0.08	-54	-0.08
Tunisia	643	837	924	1006	19	2.67	17	2.0	16	1.72
Western Sahara	707	707	707	707	0	0	0	0	0	0
Northern Africa	**85123**	**79224**	**79019**	**78814**	**-590**	**-0.72**	**-41**	**-0.05**	**-41**	**-0.05**
Benin	5761	5061	4811	4561	-70	-1.29	-50	-1.01	-50	-1.06
Burkina Faso	6847	6248	5949	5649	-60	-0.91	-60	-0.98	-60	-1.03
Burundi	289	198	181	172	-9	-3.71	-3	-1.78	-2	-1.01
Cameroon	24316	22116	21016	19916	-220	-0.94	-220	-1.02	-220	-1.07
Cape Verde	58	82	84	85	2	3.58	n.s.	0.36	n.s.	0.36



Tables

✓generally data at country level

✓ Usually from questionnaires

Geo-referenced datasets

✓varying spatial resolutions

✓ Vector or raster formats

✓ Possible extraction of statistics according to different subdivisions

Statistics Division

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Agri-Environmental data

Some databases available @ FAO

Thematic area	Database	Examples of data
Climate	**CLIMPAG/ FAOCLIM-Net**	Precipitation, ET, Temperature, Vap.Pressure, Wind speed
Water	**AQUASTAT**	Average precip., Tot.Renew.Water Res., Agr.withdrawals.
Land &Water	**Land and Water Digital Media Series**	Global map of Irrigated Areas, Soil and Terrain Database for Southern Africa, Digital Soil Map of the World and derived soil properites
Agriculture	**Agro-MAPS**	Production, harvested area, Yield for different crops (1981-2001). Large data gaps.
Environment, land productivity, population.	**FGGD (Food Insecurity, Poverty and Environment Global GIS Database)**	Length of growing period (LGP) zones of the world, Coefficient of variation (CV) of length of growing period (LGP), 1901-1996
Environment, population.	**GEONETWORK Catalogue**	Global Change In Net Primary Productivity (1981-2003); Global map of irrigated areas
Livestock	**GLW (Gridded Livestock of the World)**	Livestock density, Livestock production systems
Agricultural statistics	**FAOSTAT**	Statistics on: production, trade, prices, land, forestry, population, fertilizers, pesticides.
Forests	**FRA (Forest resource assessment)**	Forested areas, characteristics, policy, trends, management.

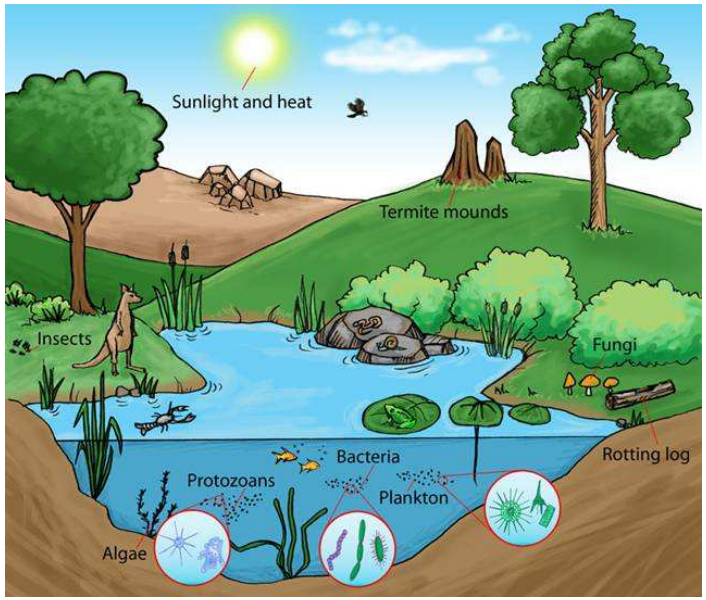
Statistics Division

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Agri-Environmental Indicators

Natural ecosystems:

Natural fluxes, high biodiversity, highly differentiated productivity.

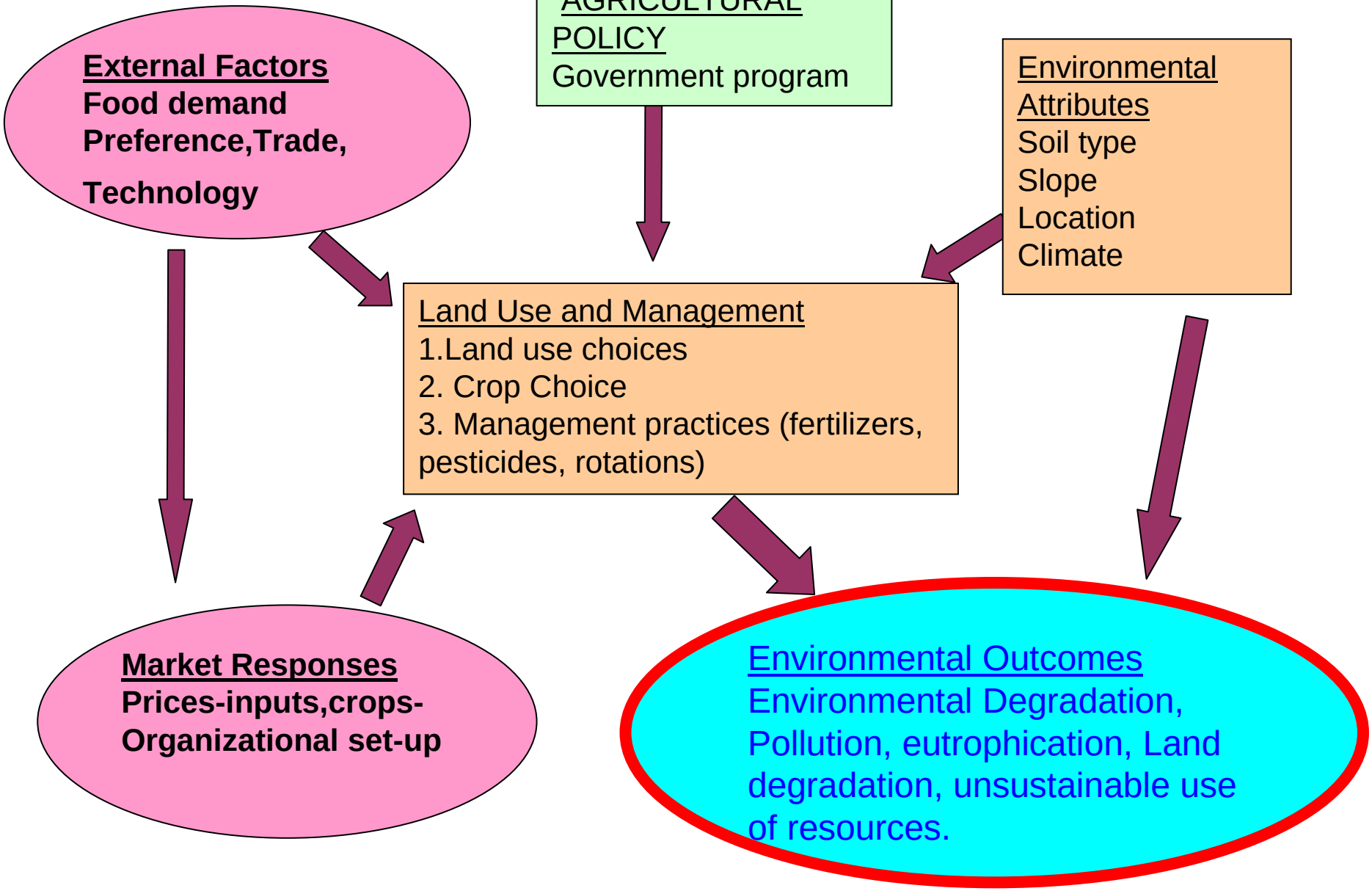


Agroecosystems:

low biodiversity and high productivity (only for the selected species) maintained through massive artificial inputs (fertilizers, work, pesticides).

Statistics Division

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS



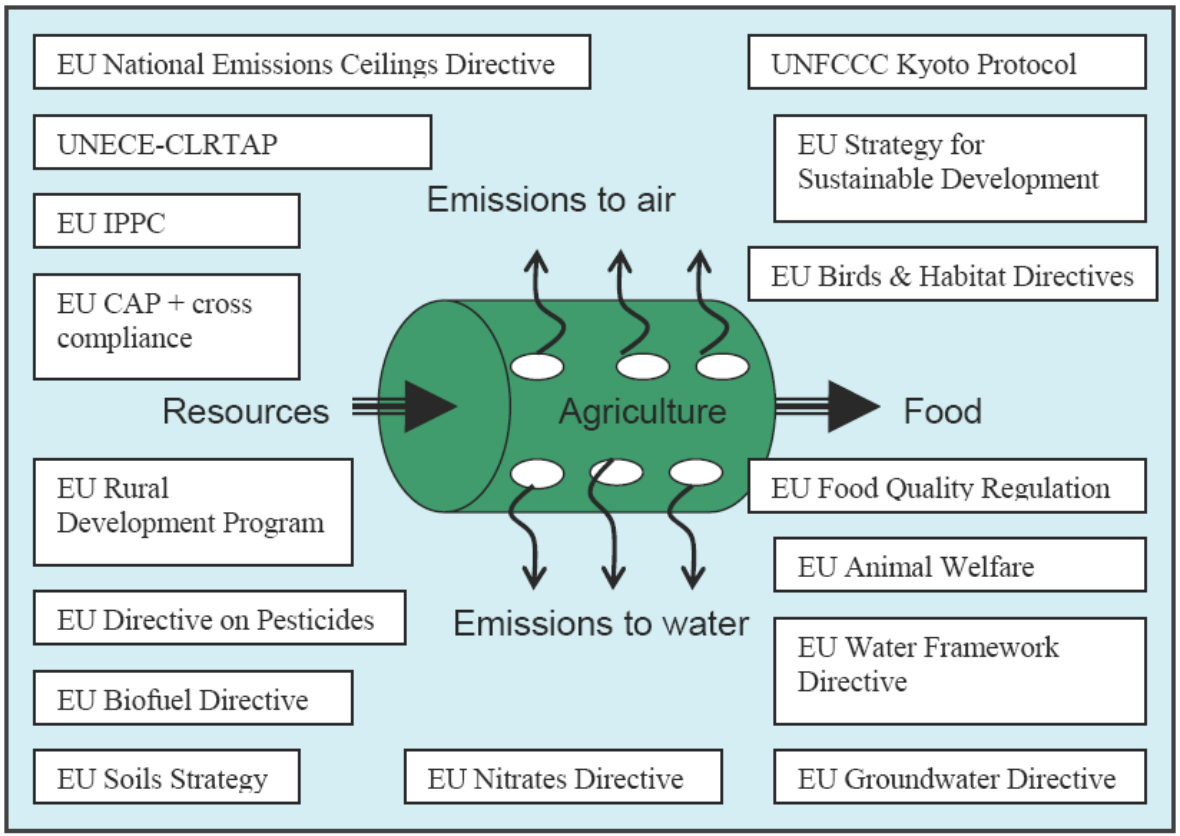
Agri-environmental Indicators

An **agri-environmental indicator** is a summary measure, combining raw data, used to describe the state of the environment, a risk to the environment, a change in the environment, or a driving force behind such a change, that can be attributed wholly or in part to an agricultural activity or activities.

from OECD 2000

Agri-environmental Indicators: **Policy relevance**

Example: European directives requiring Agri-Environmental Indicators.



Eurostat 2011

Policy relevance: need to monitor the impacts of agriculture on the environment and the environmental performance of the agricultural sector.

Agri-environmental Indicators

International activities on Agri-environmental indicators in the last 10 years

Institution	Area	N. of indicators		References
		First set	Latest set	
OECD	34 OECD countries	37	13	Environmental Indicators for Agriculture (3 volumes)
Eurostat/EEA/JRC	EU-27	40	28	EEA. 1999. Environmental indicators: typology and overview. European Commission. 2006. Communication from the Commission.

FAOSTAT Agri-Env Indicators

– Dataset developed following as much as possible the EUROSTAT and OECD frameworks.

– At the moment 52 data series are available, grouped into 17 indicators.

– Data are from FAO databases and from external sources (e.g. IEA, IFOAM, UNFCCC).

Statistics Division

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

FAOSTAT Agri-Env Indicators

Domain	Subdomain	Environmental Component	Indicator	Correspondences	
				EUROSTAT	OECD
Responses	Policy		AgriEnv. Commitments	1	
	Attitudes	Land	Area under Organic Farming	4	12
Driving forces	Input use	Fertilizers	Mineral fertilizer consumption	5	
		Pesticides	Pesticide consumption	6	8
		Water	Irrigation (share of irrigable areas)	7	
		Energy	Energy use	8	9
	Land Use	Land	Land Use Change	9	
			% Agr.area/ total area		10

Statistics Division

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

FAOSTAT Agri-Env Indicators

Domain	Subdomain	Environmental Component	Indicator	Correspondences	
				EUROSTAT	OECD
			Cropping patterns	10.1	11
			Livestock patterns	10.2	
	Farm management	Land	Conservation agriculture	11.2	
		Air & Climate Change	Ammonia emissions from Agriculture	18	2
Pressures	Pollution	Nutrients	Gross Nitrogen Balance	15	6
			Gross Phosphate balance	16	7
			Greenhouse Gases from Agriculture	19	4
	Resource Depletion	Water	Water abstraction (Quantity and share of water used for irrigation)	20	1
		Soil	Soil erosion	21	
		Energy	Biofuels production	24	
State		Soil	Soil quality	26	

Statistics Division

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

FAOSTAT Agri-Env Indicators

Available data series

N.	Indicator	Series
1	Agri-Environmental Commitments	Protected area
1	Agri-Environmental Commitments	Protected area as % on total area
2	Organic Agriculture	Organic Agriculture area
2	Organic Agriculture	Organic Agriculture (share on total agricultural area)
3	Min.Fertilizers Consumption	K Fertilizers consumption/agric.area
3	Min.Fertilizers Consumption	N Fertilizers consumption/agric.area
3	Min.Fertilizers Consumption	P Fertilizers consumption/agric.area
3	Min.Fertilizers Consumption	Nitrogen Fertilizers (N total nutrients)
3	Min.Fertilizers Consumption	Nitrogen Fertilizers (P205 total nutrients)
3	Min.Fertilizers Consumption	Nitrogen Fertilizers (K20 total nutrients)
3	Min.Fertilizers Consumption	N+P Fertilizers (total nutrients)
3	Min.Fertilizers Consumption	N+P+K Fertilizers (total nutrients)
3	Min.Fertilizers Consumption	N+P+K (total nutrients) Cons. per hectare
3	Min.Fertilizers Consumption	N+P (total nutrients) Cons. per hectare
4	Pesticide Consumption	Pesticide use by Ha of agricultural land
4	Pesticide Consumption	Pesticide Consumption (total)
5	Area equipped for irrigation	Total area equipped for irrigation
5	Area equipped for irrigation	Share of Irrigated Agricultural Area
6	Energy use	Energy used in agriculture/forestry
6	Energy use	Share of agr. En. Cons. on the total energy consumption
7	Agricultural land use change	Agricultural land use change compared to the previous year

Statistics Division

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

FAOSTAT Agri-Env Indicators
Available data series

N.	Indicator	Series
8	Cropping patterns	Arable land
8	Cropping patterns	Permanent crops
8	Cropping patterns	Permanent meadows and pastures
8	Cropping patterns	Share Perm.Crops on AgrLand
8	Cropping patterns	Share Perm.Pasture on AgrLand
8	Cropping patterns	Share arable land on AgrLand
9	Livestock patterns	Cattle, Pigs, Sheep total density
9	Livestock patterns	Cattle density
9	Livestock patterns	Pigs density
9	Livestock patterns	Sheep and Goats density
9	Livestock patterns	Poultry density
9	Livestock patterns	Cattle and Buffaloes (Total)
9	Livestock patterns	Sheep and Goats (Total)
9	Livestock patterns	Poultry Birds (Total)
9	Livestock patterns	Pigs (Total)
9	Livestock patterns	Pigs share on total livestock
9	Livestock patterns	Cattle share on total livestock
9	Livestock patterns	Poultry share on total livestock
9	Livestock patterns	Sheep share on total livestock
9	Livestock patterns	Pigs share on total livestock (excl.Poultry)
9	Livestock patterns	Cattle share on total livestock (excl.Poultry)
9	Livestock patterns	Sheep share on total livestock (excl.Poultry)
9	Livestock patterns	Total Livestock number

Statistics Division

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

FAOSTAT Agri-Env Indicators
Available data series

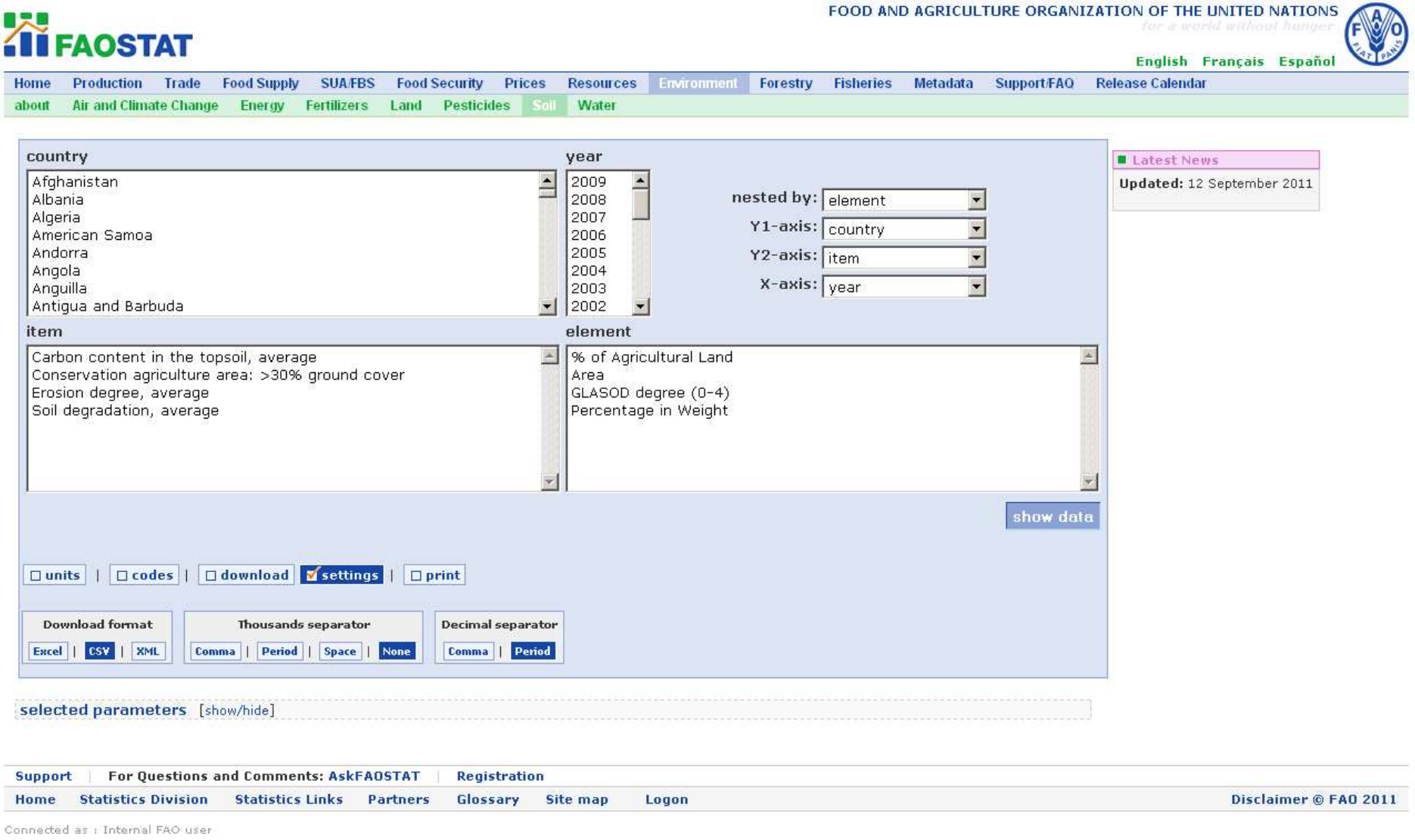
N.	Indicator	Series
10	Conservation agriculture	Conservation agriculture area: >30% ground cover
10	Conservation agriculture	Conservation agriculture area as % of cultivated area
11	Ammonia emissions	Ammonia emissions from Agriculture
11	Ammonia emissions	Share of agricultural ammonia emissions on total ammonia emissions
12	GHG emissions from Agriculture	Share GHG from agriculture/total GHG emissions
12	GHG emissions from Agriculture	Total GHG emissons from agriculture
13	Water use in Agriculture	Agricultural water withdrawal
13	Water use in Agriculture	Agricultural water withdrawal as % of total water withdrawal
14	Soil Erosion	Average Soil Erosion
14	Soil Erosion	Average Soil Degradation
15	Biofuels	Total biofuels production
15	Biofuels	Share of biofuels on total renewable energy production
16	Soil Quality	Average carbon content in the Topsoil
17	Share agricultural land	Agricultural Area/Land Area

Statistics Division

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

FAOSTAT Agri-Env Indicators

Test website

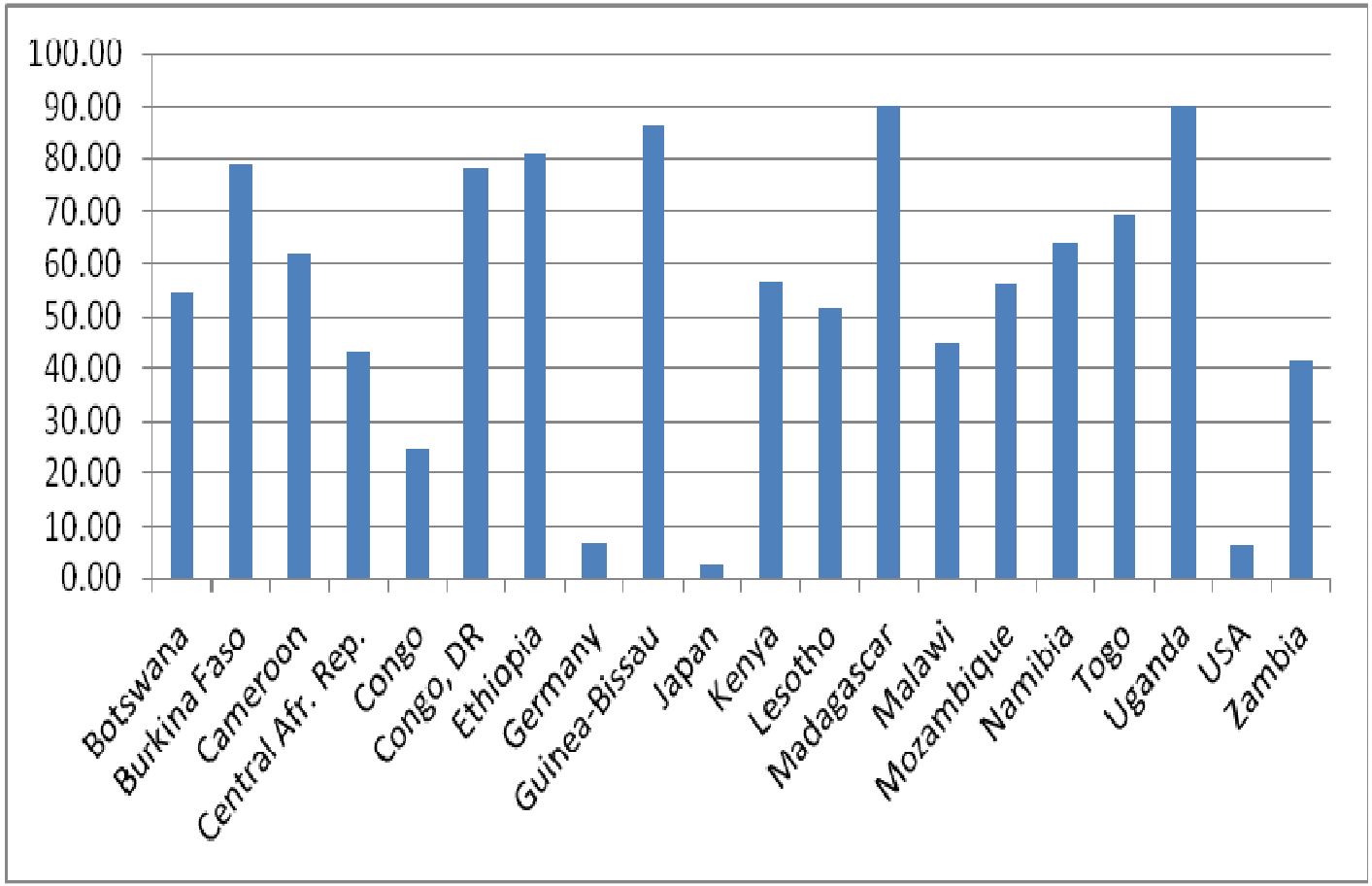


Statistics Division

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

FAOSTAT Agri-Env Indicators

Share of Agricultural Greenhouse Gases (GHG) emissions on the total GHG emissions

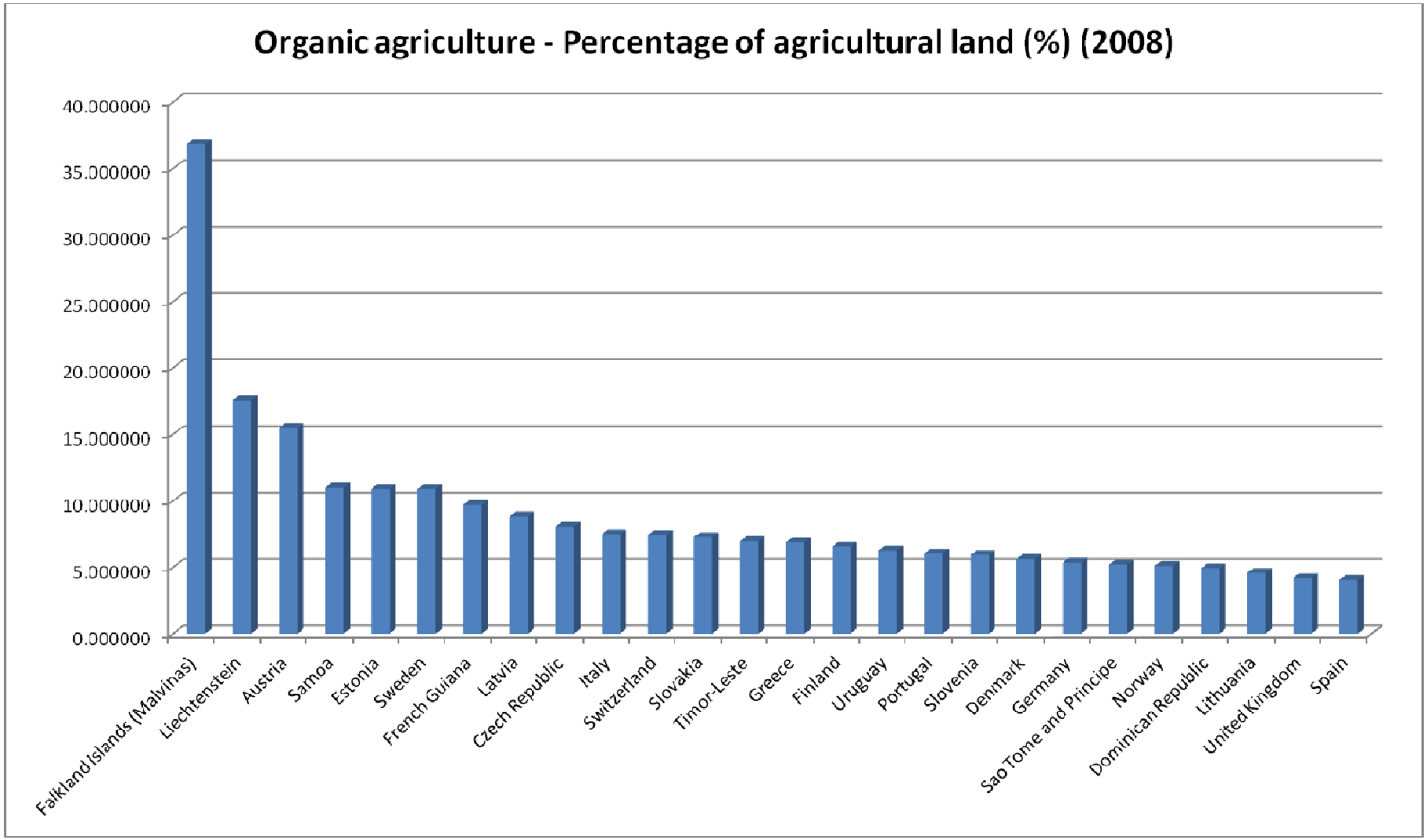


- Agriculture accounts for roughly 14% of global Greenhouse Gases (GHGs)
- About 74% of total agricultural emissions originate in developing countries.

Statistics Division

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

FAOSTAT Agri-Env Indicators



Statistics Division

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Fertilizers

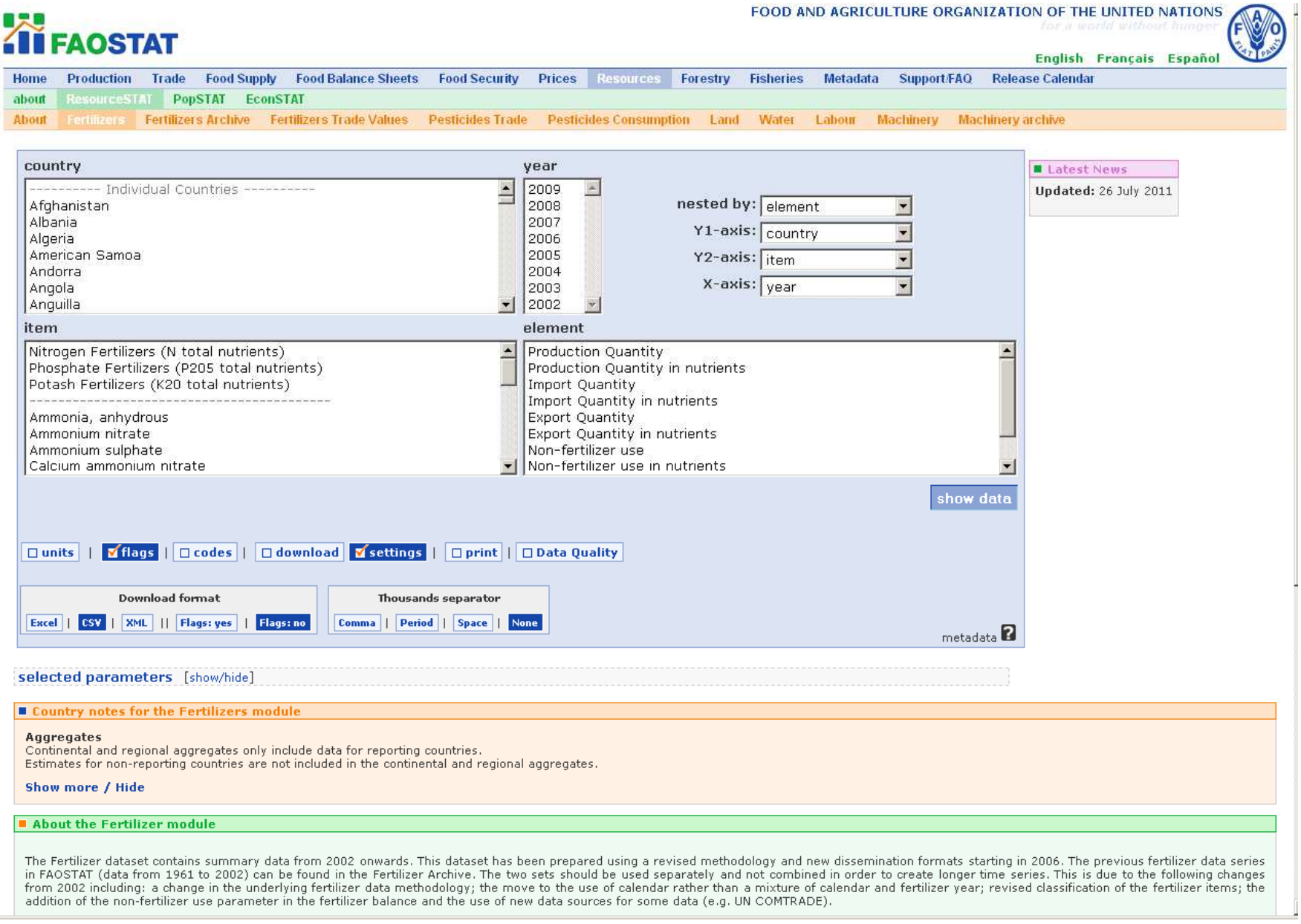
The new fertilizer datasets have been prepared using a **revised methodology** and **new dissemination formats**. Detailed methodology notes on the new fertilizer dataset can be found in FAOSTAT. The previous fertilizer data collection series in FAOSTAT is continued with this data release.

http://faostat.fao.org/site/575/default.aspx#ancor

Statistics Division

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

FAOSTAT: Fertilizers page



Fertilizers use - benefits

- Fertilizer use contributes significantly to the world agriculture output and food supply.

- Plants require nutrients(nitrogen,phosphates and potash) in order to grow, and develop fully to a productive capacity. and complete their life.

- Improved agricultural productivity and food security

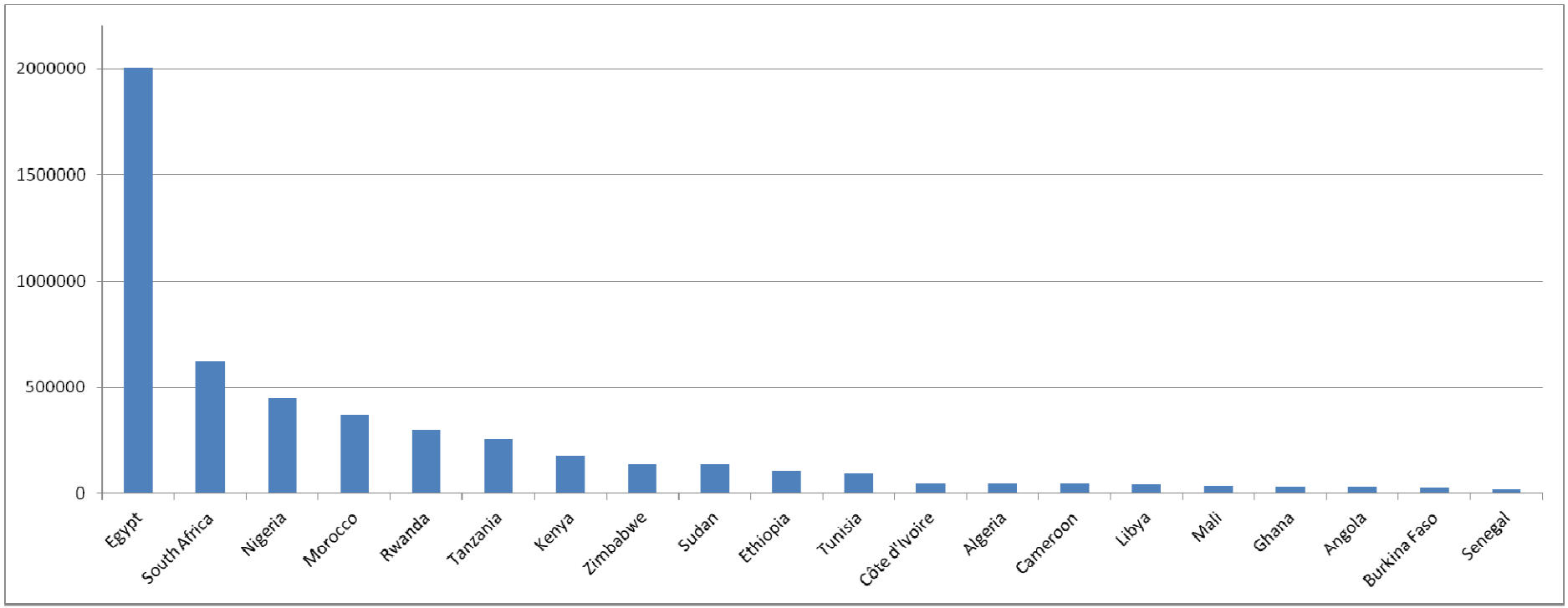
Fertilizers use - Issues

- Run off the land due to heavy rainfall/erosion.
- Leaching into groundwater.
- Escape in the form of gas into atmosphere.

Statistics Division

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

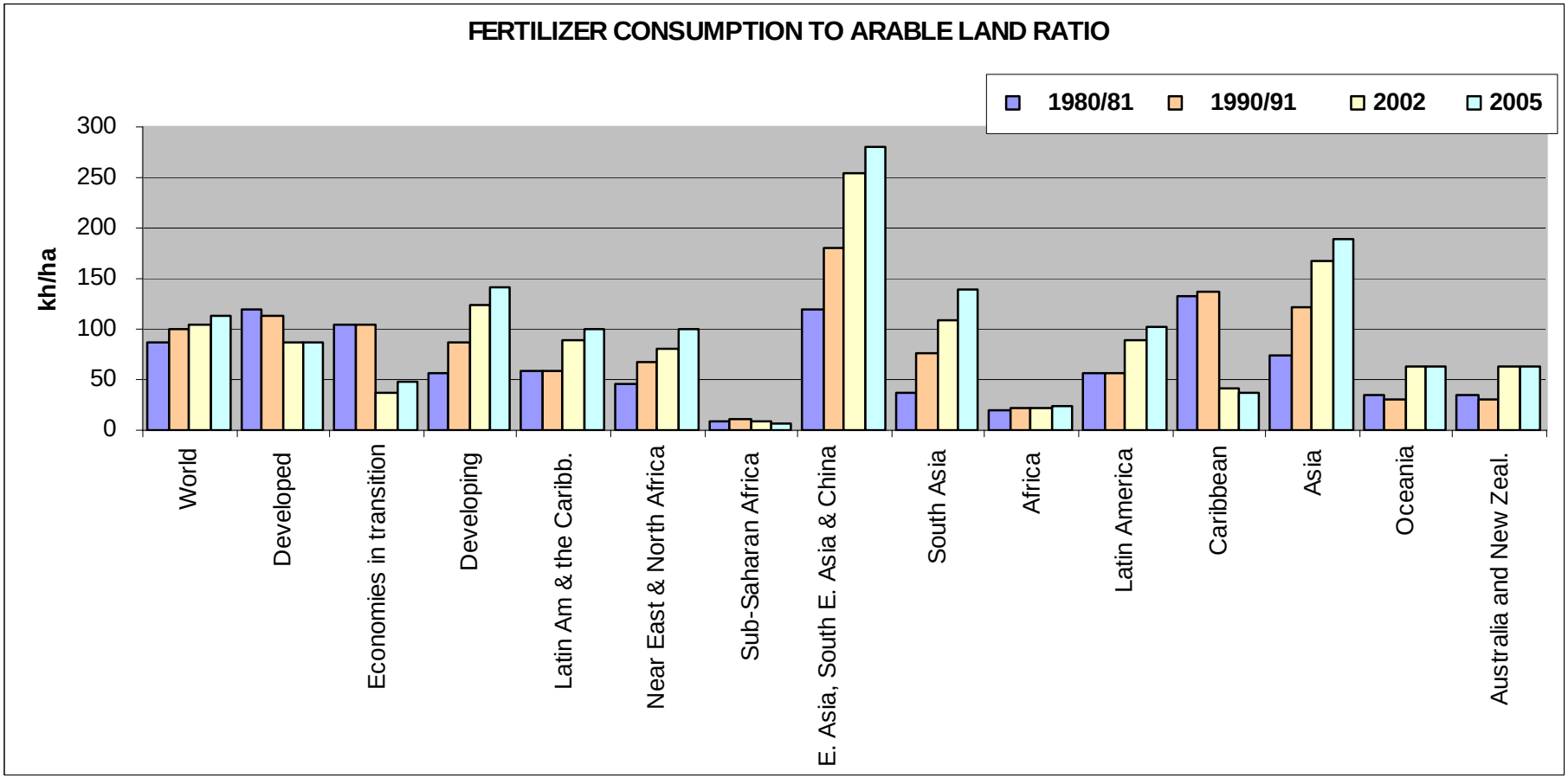
Fertilizers consumption in Africa (N+K+P, tonnes of nutrients, 2008)



Statistics Division

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Fertilizers consumption: patterns per region

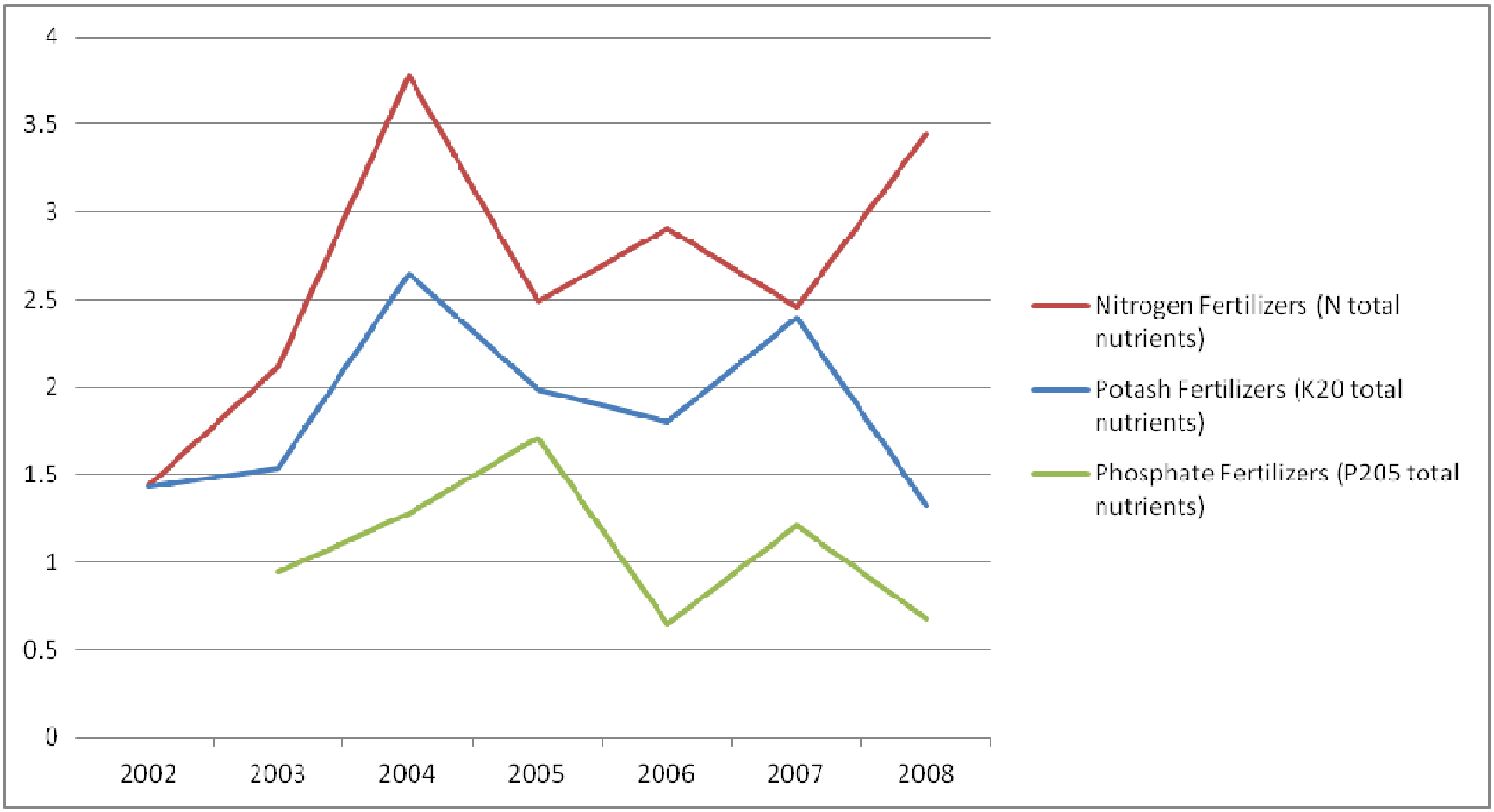


Statistics Division

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Fertilizers consumption (Tonnes per Ha of Agricultural Land)

Cameroon 2002-2008



Statistics Division

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Pesticides

The present FAOSTAT database refers to the **quantity of pesticides used in or sold** to the agricultural sector for crops and seeds; data are expressed in **metric tons of active ingredients**.

Consumption (tonnes of active ingredients) refers to quantities of pesticides applied to crops and seeds in the agriculture sector. Figures are expressed in metric tons of active ingredients.

http://faostat.fao.org/site/424/default.aspx#ancor

Statistics Division

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

FAOSTAT: Pesticides page

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

FAOSTAT

English Français Español

Home | Production | Trade | Food Supply | Food Balance Sheets | Food Security | Prices | Resources | Forestry | Fisheries | Metadata | Support/FAQ | Release Calendar

about | ResourceSTAT | PopSTAT | EconSTAT

About | Fertilizers | Fertilizers Archive | Fertilizers Trade Values | Pesticides Trade | Pesticides Consumption | Land | Water | Labour | Machinery | Machinery archive

country

---------- Individual Countries ----------
Albania
Algeria
Angola
Argentina
Armenia
Australia
Austria

year

2009
2008
2007
2006
2005
2004
2003
2002

nested by: element
Y1-axis: country
Y2-axis: item
X-axis: year

item

Insecticides + (Total)
Insecticides > (List)
Chlorinated Hydrocarbons
Organo-Phosphates
Carbamates Insecticides
Pyrethroids
Botanic.Produc&Biologic.
Other Insecticides

element

Consumption

show data

☐ units | ☑ flags | ☐ codes | ☑ show empty rows | ☐ download | ☑ settings | ☐ print | ☐ Data Quality

Download format: Excel | CSV | XML || Flags: yes | Flags: no

Thousands separator: Comma | Period | Space | None

Decimal separator: Comma | Period

Latest News

Updated: 03 March 2011

selected parameters [show/hide]

Country Notes for the Pesticides Consumption module

ALGERIA
Data refer to sales for use in the agricultural sector expressed in Formulated Products.
BURKINA FASO
Starting in 1998, data are expressed in Formulated Products.

Show more / Hide

About the Pesticides Consumption module

Database on Pesticides Consumption

The Statistics Division of the Food and Agriculture Organization of the United Nations started the collection of data on consumption of major individual pesticides products about three decades ago. However, the response to the related Pesticides Consumption Annual Questionnaire sent to all member countries was not very encouraging.

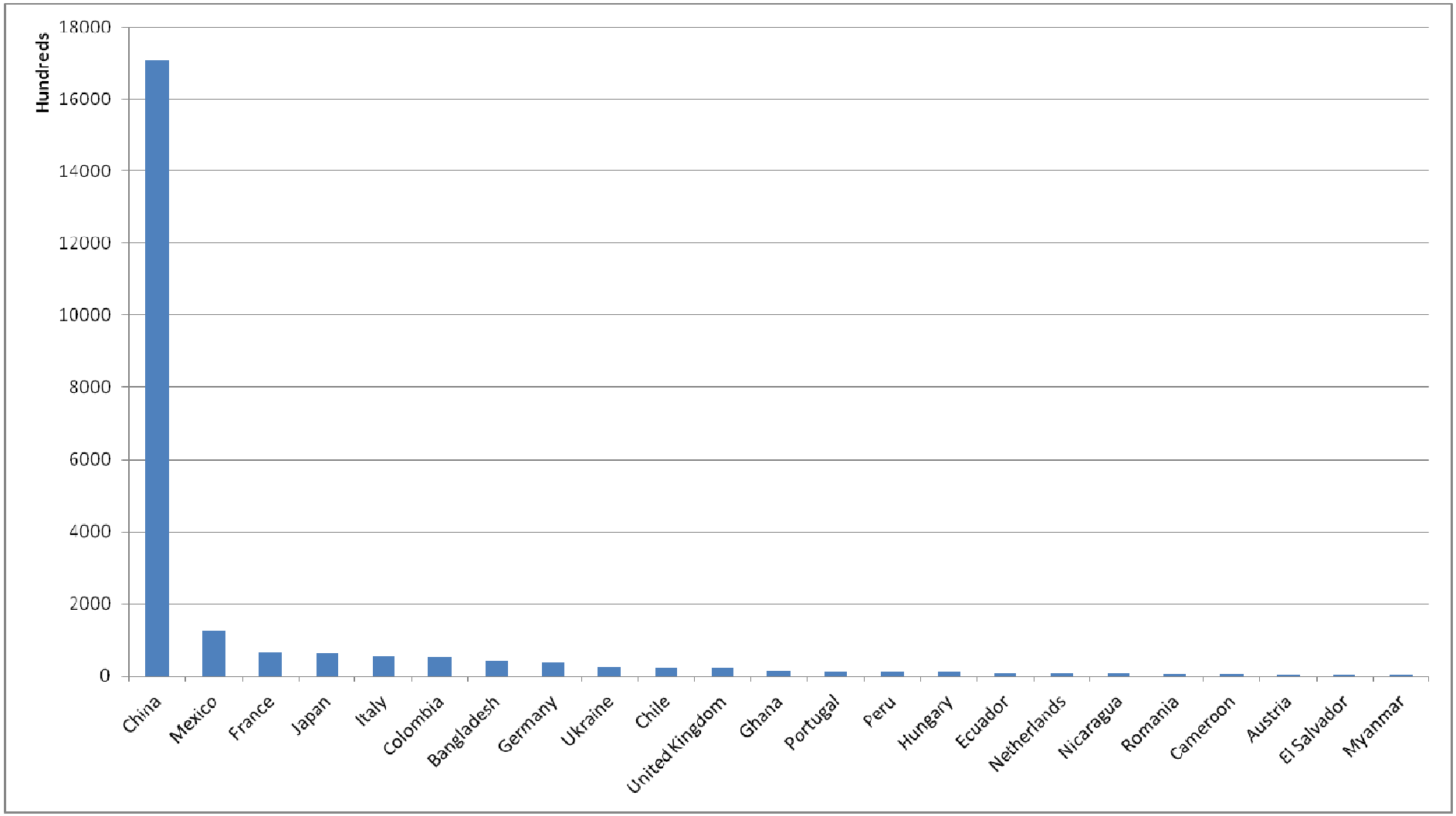
Pesticides: issues

- Overuse and abuse of pesticides at many places
  E.g.: cotton, vegetables, rice
- Highly toxic products: Some countries are lagging behind in phasing out high incidence of accidental poisoning
  + an estimated 300.000 self-poisoning cases in Asia p.a.
- Food safety and other public health risks (residues)
- Environmental risks
- Market access Pesticide residue requirements are increasingly important in trade
- Pesticide quality (Illegal trade in pesticides; counterfeit products; some countries lack sufficient quality control)
- Obligations under international instruments

Statistics Division

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

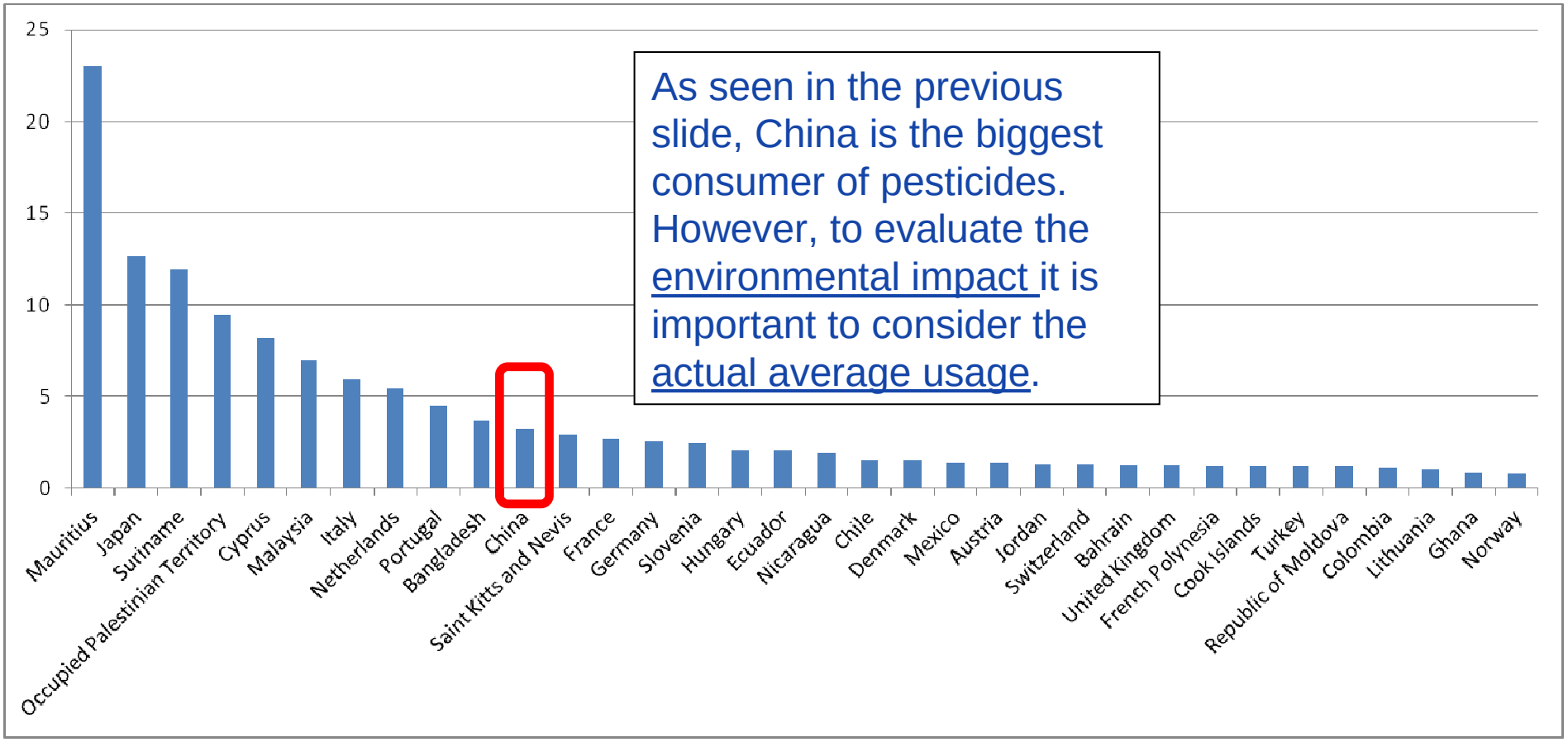
Pesticides consumption (hundreds of tonnes, 2008)



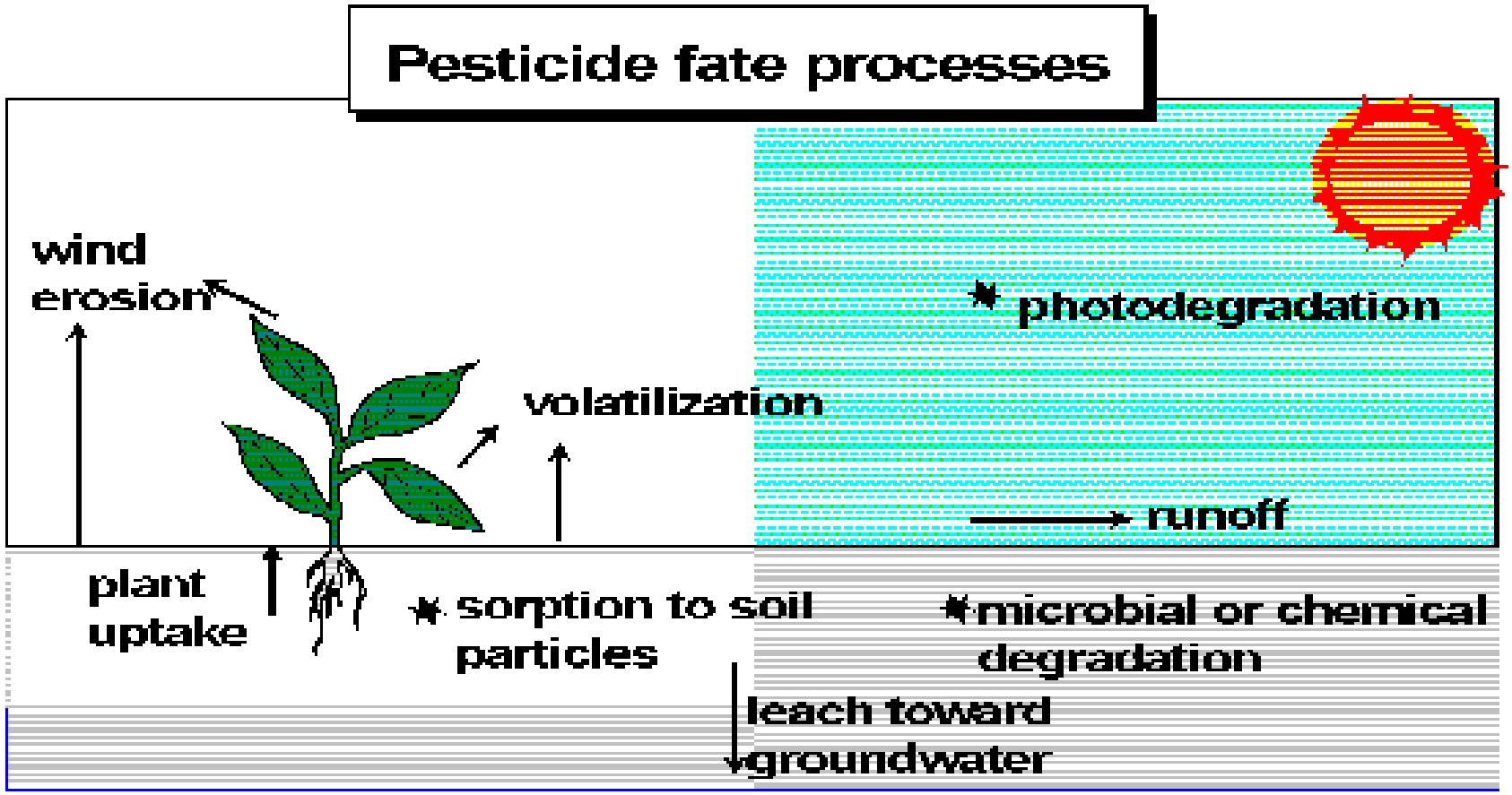
Statistics Division

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Pesticides average usage (tonnes /Ha agricultural area, 2008)



Movement of Pesticides in the Environment



Statistics Division

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Land Use

Land use: the sequence of operations carried out with the purpose to obtain goods and services from the land, characterized by the actual goods and services obtained as well as by the particular management interventions undertaken by the land users

Land use is generally determined by **socio-economic market forces and the biophysical constraints and potentials imposed by the land resource**

FAOSTAT Land-use statistics contain a wide range of information on variables that are significant for: understanding the structure of a country's agricultural sector; making economic plans and policies for food security; deriving environmental indicators, including those related to investment in agriculture and data on gross crop area and net crop area which are useful for policy formulation and monitoring.

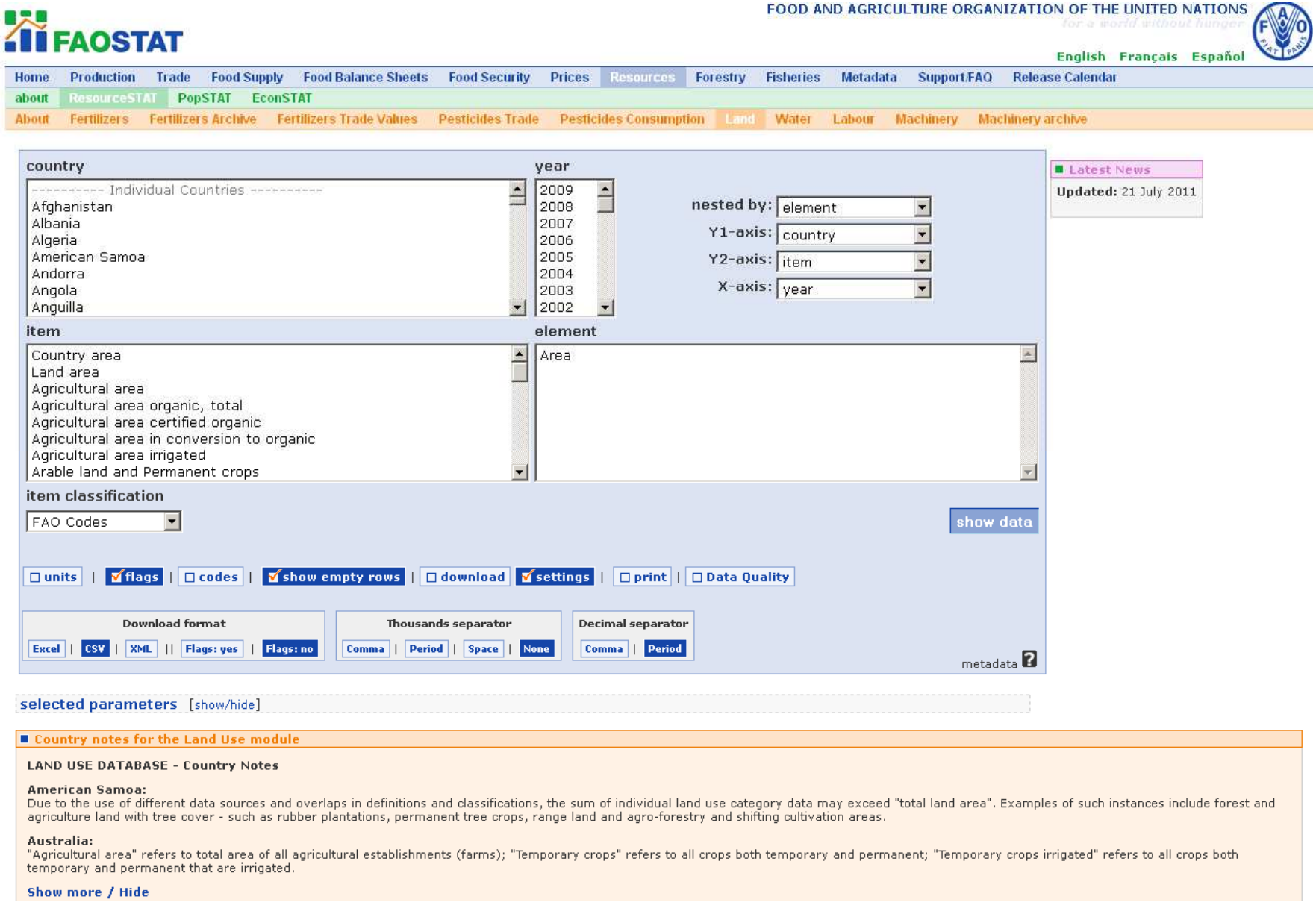
Land use is the single most important driver of land degradation as it focuses on interventions on the land which directly affect its status and impacts on goods and services.

http://faostat.fao.org/site/377/default.aspx#ancor

Statistics Division

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

FAOSTAT: Land Use page



FAO land use data

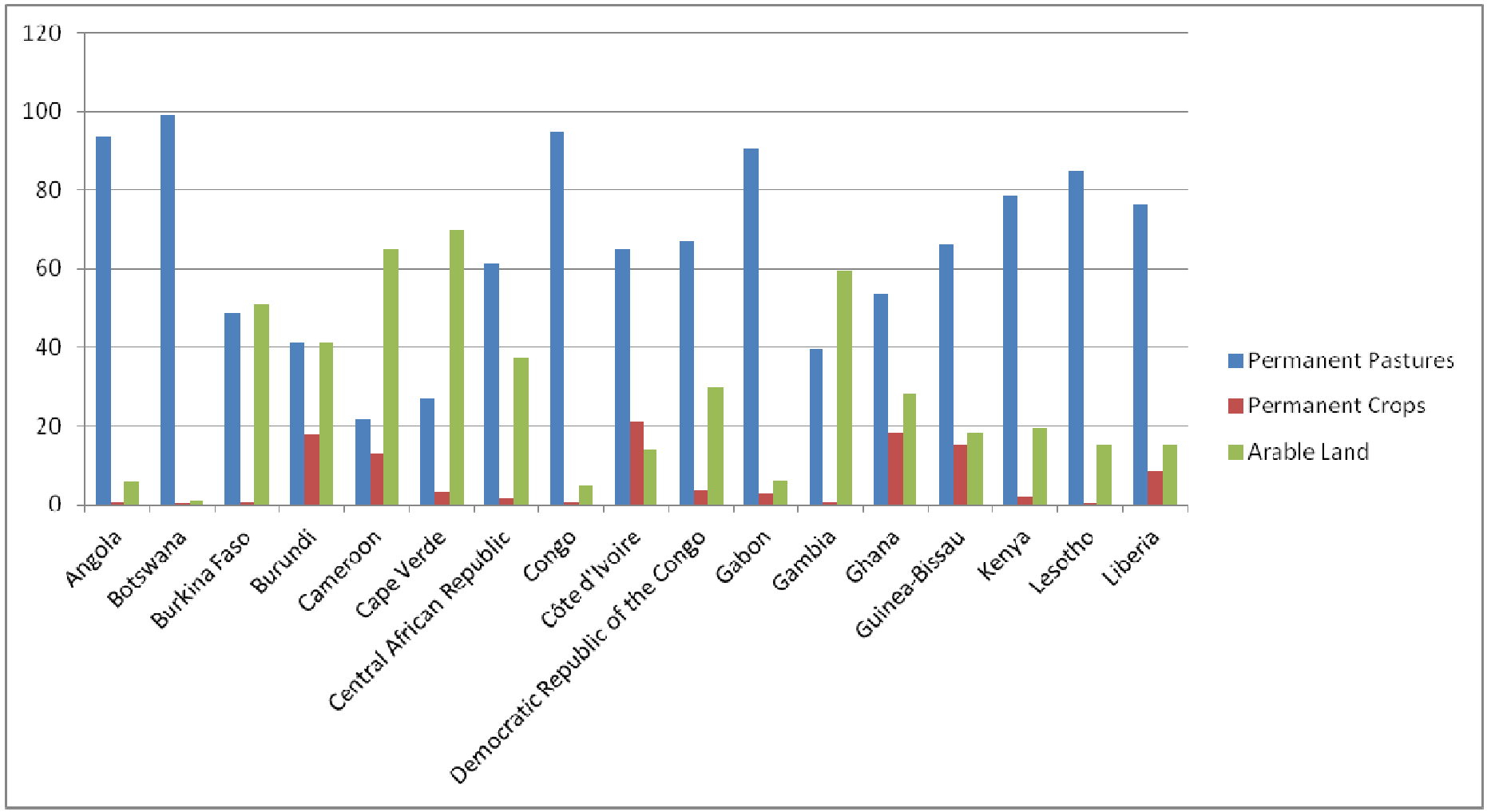
Significant for conducting studies from various perspectives on

- agricultural production,
- food security;
- deriving cropping intensity and feasibility for sustainable agricultural development
- deriving land use indicators for measuring countries agricultural practices in view of sustainability and environmental conditions.

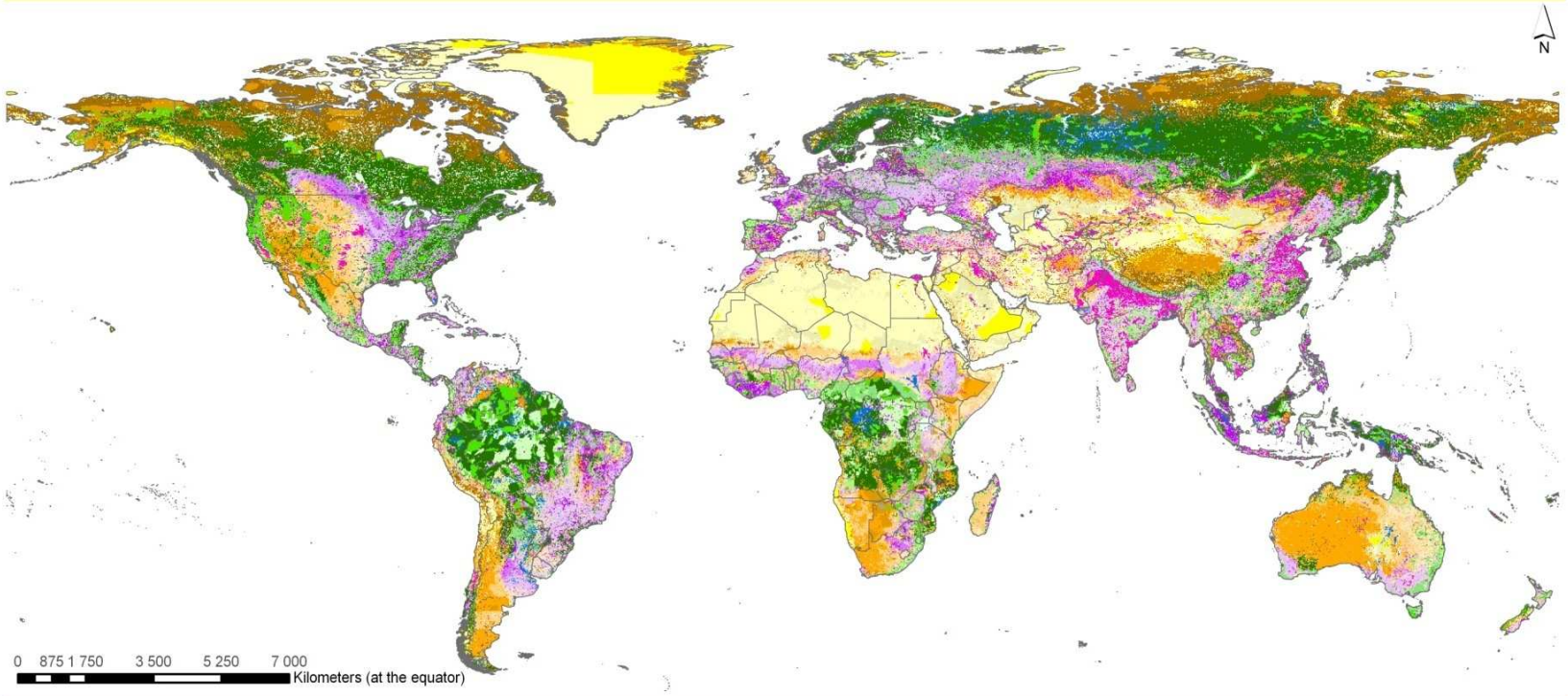
Statistics Division

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Land Use in Africa: cropping patterns (subdivision of agricultural land)



Land use systems of the world



Geographic Projection

Land use systems

- 1 Forestry no use / not managed (Natural)
- 2 Forestry Protected areas
- 4 Forestry Pastoralism moderate or higher
- 5 Forestry Pastoralism moderate or higher with scattered plantations
- 6 Forestry Scattered Plantations
- 7 Herbaceous no use / not managed (Natural)
- 8 Herbaceous Protected areas
- 9 Herbaceous Extensive pastoralism
- 10 Herbaceous Mod. Intensive pastoralism
- 11 Herbaceous Intensive pastoralism
- 13 Rainfed Agriculture (Subsistence / commercial)
- 14 Agro-pastoralism Mod. Intensive
- 15 Agro-pastoralism Intensive
- 16 Agro-pastoralism mod. intensive or higher with Large scale irrigation
- 17 Agriculture Large scale irrigation (> 25% pixel size)
- 18 Agriculture Protected areas
- 19 Urban areas
- 20 Wetlands no use / not managed (Natural)
- 21 Wetlands Protected areas
- 22 Wetlands Mangroves
- 23 Wetlands Agro-pastoralism
- 24 Bare areas no use / not managed (Natural)
- 25 Bare areas Protected areas
- 26 Bare areas Extensive pastoralism
- 27 Bare areas Mod. Intensive pastoralism or higher
- 28 Water Coastal or no use / not managed (Natural)
- 29 Water Protected areas
- 30 Water Inland Fisheries
- Country boundaries

Reference: LADA, 2008. "Mapping Land Use Systems at global and regional scales for Land Degradation Assessment Analysis". Nachtergaele F. & Petri M. (under publication).

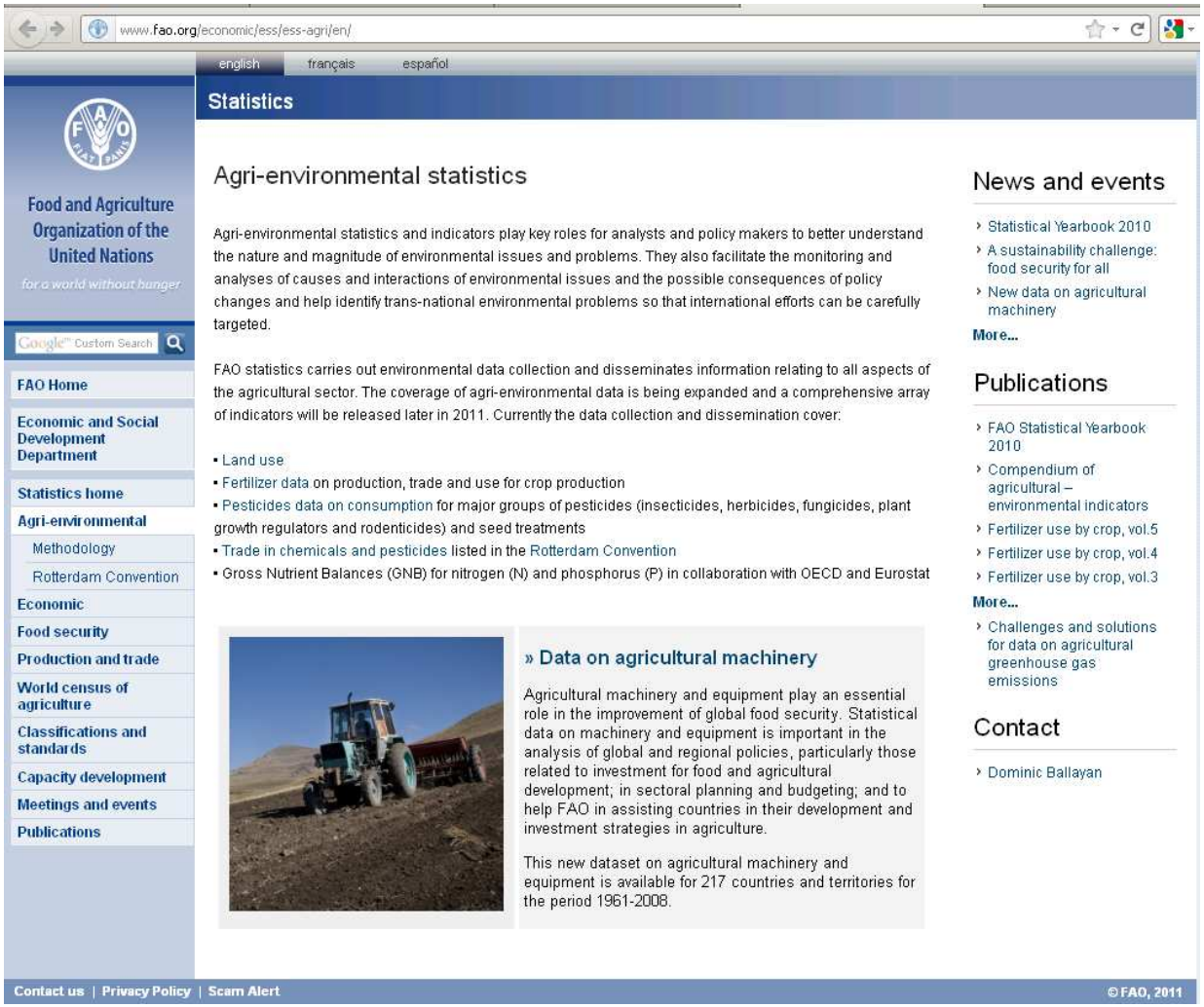
The Land Use Database of the world was developed as part of the project Land Degradation Assessment in Drylands (LADA), a four-year project funded by the Global Environment Facility (GEF). The project is implemented by the United Nations Environment Programme (UNEP) and executed by the Food and Agriculture Organization of the United Nations (FAO).

The geographic representation employed on this map do not imply of any opinion whatsoever concerning the legal status of any county, territory, or concerning the delineation of its boundaries.

Statistics Division

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Agri-Environmental statistics at FAO: the ESS website http://www.fao.org/economic/ess/ess-agri/en/



Statistics Division

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Thank you for your attention.

For more information on agri-environmental data and statistics available at FAO:

robert.mayo@fao.org

simone.rossi@fao.org