Agri- Environmental indicators and the recently adopted Framework for the Development of Environment Statistics-FDES

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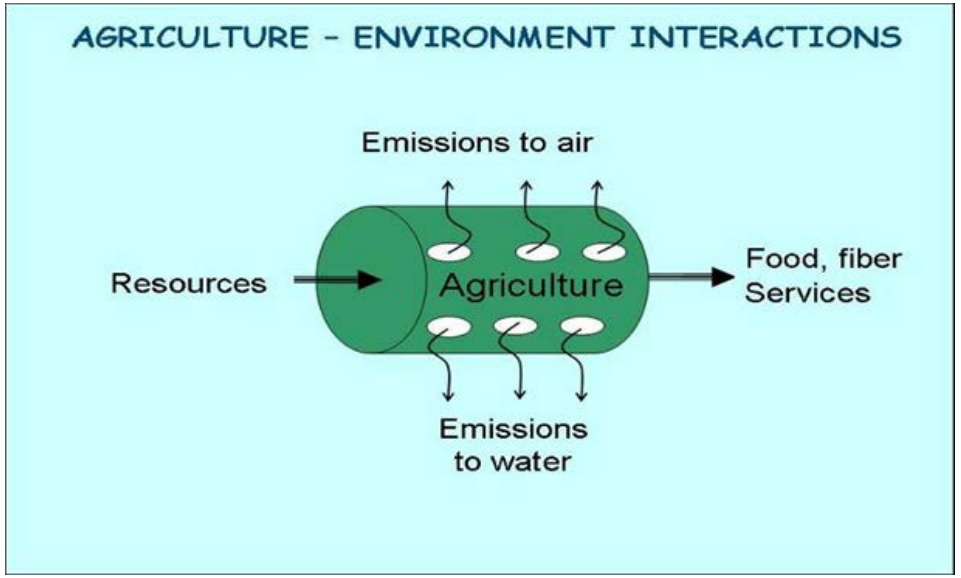
Environmental Statistics Team
FAO Statistics Division

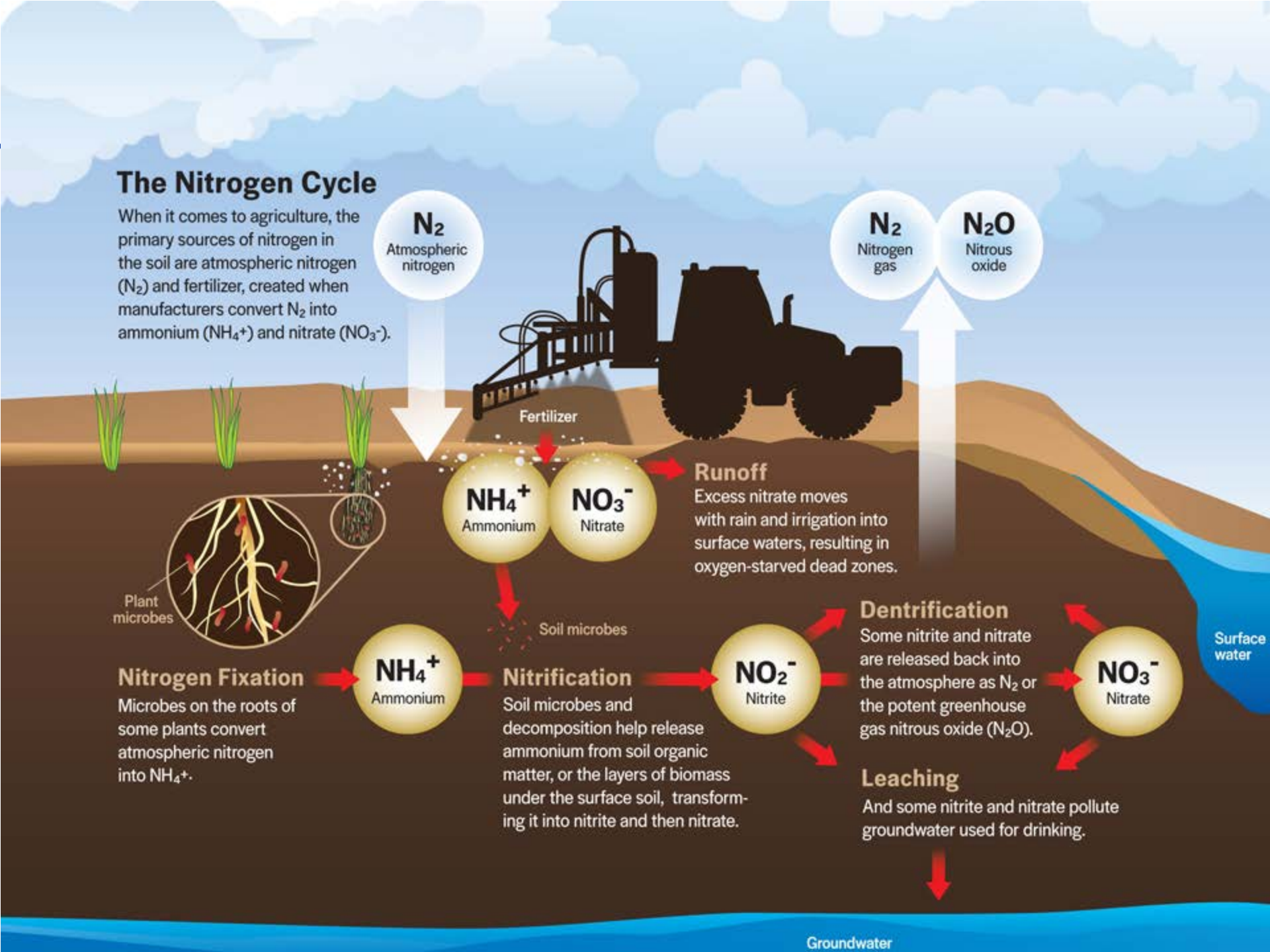
Environment-related constraints to productivity growth

- Environmental sustainability of high production
- Rising input costs
- Land degradation
- Water shortages
- Environmental pressures
- Climate change

Some Environmental Challenges facing Agriculture

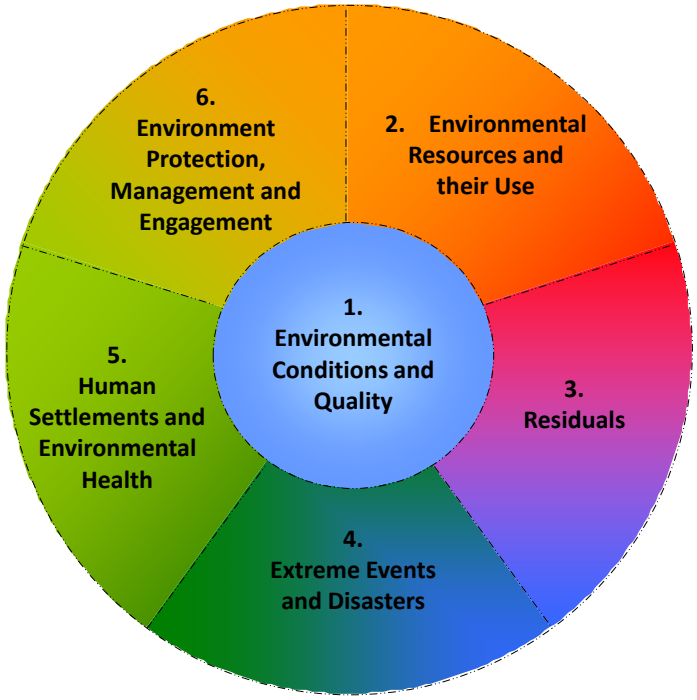
- Increasing use of chemicals, infrastructure and machinery
- Greenhouse gas emissions,
- Flows and imbalance of nutrients
- Effect of releases of contaminants from livestock production




The Nitrogen Cycle
When it comes to agriculture, the primary sources of nitrogen in the soil are atmospheric nitrogen (N_2) and fertilizer, created when manufacturers convert N_2 into ammonium (NH_4^+) and nitrate (NO_3^-).
N_2 Atmospheric nitrogen
N_2 Nitrogen gas
N_2O Nitrous oxide
Fertilizer
NH_4^+ Ammonium
NO_3^- Nitrate
Runoff
Excess nitrate moves with rain and irrigation into surface waters, resulting in oxygen-starved dead zones.
Plant microbes
Soil microbes
Nitrogen Fixation
Microbes on the roots of some plants convert atmospheric nitrogen into NH_4^+.
NH_4^+ Ammonium
Nitrification
Soil microbes and decomposition help release ammonium from soil organic matter, or the layers of biomass under the surface soil, transforming it into nitrite and then nitrate.
NO_2^- Nitrite
Dentrification
Some nitrite and nitrate are released back into the atmosphere as N_2 or the potent greenhouse gas nitrous oxide (N_2O).
NO_3^- Nitrate
Leaching
And some nitrite and nitrate pollute groundwater used for drinking.
Surface water
Groundwater

The Framework for the Development of Environmental Statistics (FDES)

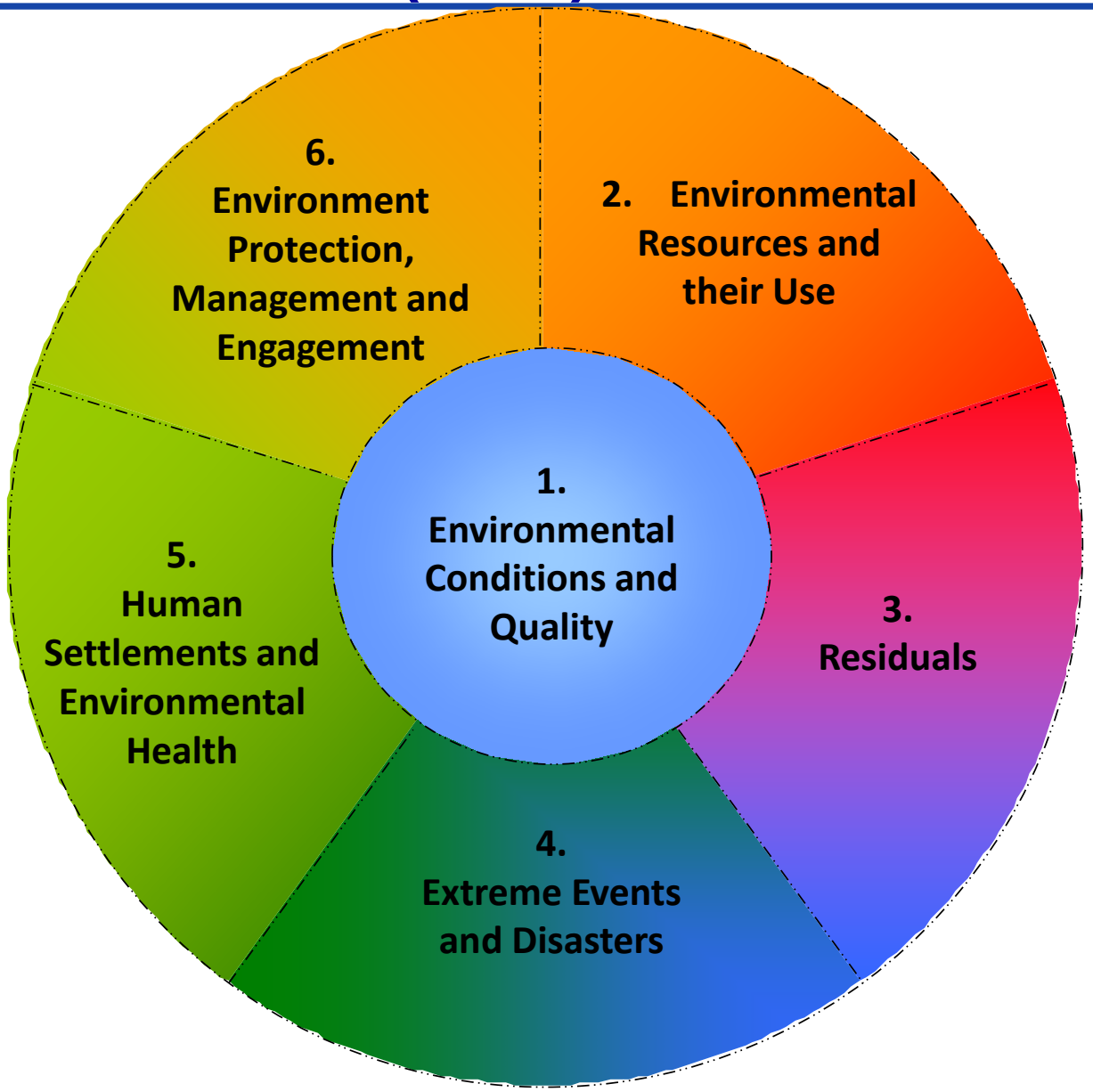
FDES 2013



Component 1: Environmental Conditions and Quality	SubSub-component 1.1: Physical Conditions Sub-component 1.2: Land Cover, Ecosystems and Biodiversity Sub-component 1.3: Environmental Quality
Component 2: Environmental Resources and their Use	Sub-component 2.1: Non-energy Mineral Resources Sub-component 2.2: Energy Resources Sub-component 2.3: Land Sub-component 2.4: Soil Resources Sub-component 2.5: Biological Resources Sub-component 2.6: Water Resources
Component 3: Residuals	Sub-component 3.1: Emissions to Air Sub-component 3.2: Generation and Management of Wastewater Sub-component 3.3: Generation and Management of Waste
Component 4: Extreme Events and Disasters	Sub-component 4.1: Natural Extreme Events and Disasters Sub-component 4.2: Technological Disasters
Component 5: Human Settlements and Environmental Health	Sub-component 5.1: Human Settlements Sub-component 5.2: Environmental Health
Component 6: Environment Protection, Management and Engagement	Sub-component 6.1: Environment Protection and Resource Management Expenditure Sub-component 6.2: Environmental Governance and Regulation Sub-component 6.3 : Extreme Event Preparedness and Disaster Management Sub-component 6.4: Environmental Information and Awareness

The Framework for the Development of Environmental Statistics (FDES)

FDES 2013



FDES

COMPONENT	SUB-COMPONENT
1: Environmental Conditions and Quality	1.1: Physical Conditions 1.2: Land Cover, Ecosystems and Biodiversity 1.3: Environmental Quality
2: Environmental Resources and their Use	2.1: Non-energy Mineral Resources S2.2: Energy Resources 2.3: Land 2.4: Soil Resources 2.5: Biological Resources 2.6: Water Resources
3: Residuals	3.1: Emissions to Air 3.2: Generation and Management of Wastewater 3.3: Generation and Management of Waste
4: Extreme Events and Disasters	4.1: Natural Extreme Events and Disasters 4.2: Technological Disasters
5: Human Settlements and Environmental Health	5.1: Human Settlements 5.2: Environmental Health
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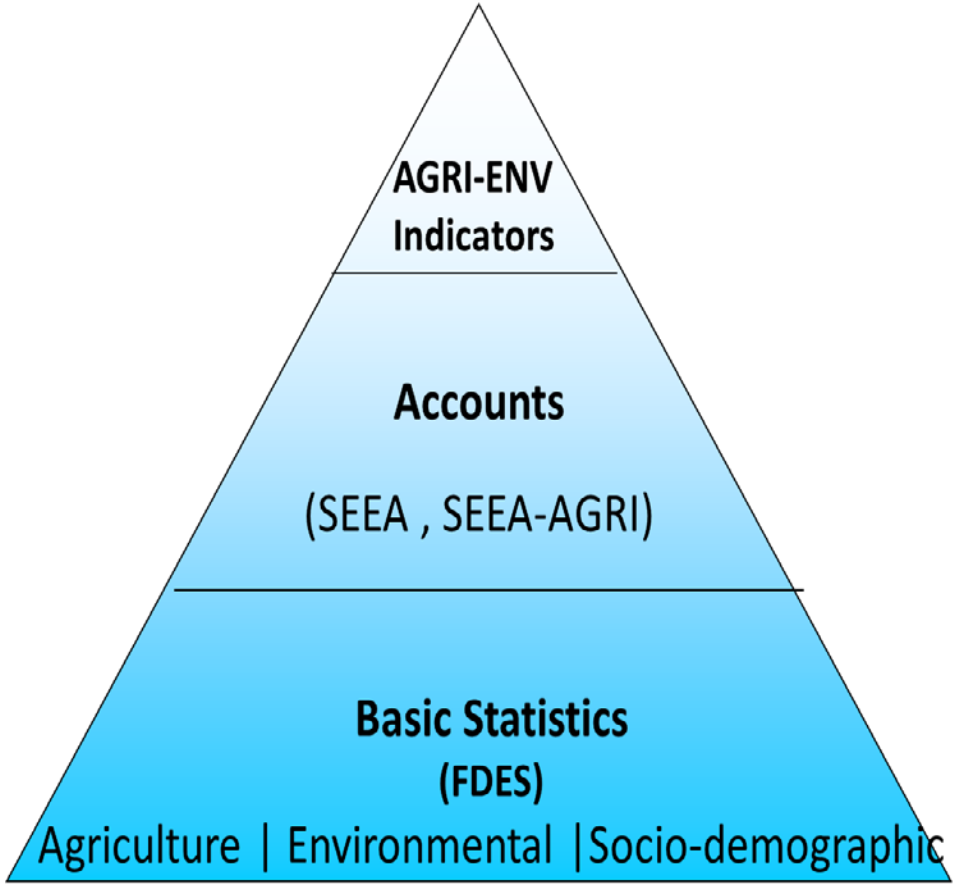
The Framework for the Development of Environment Statistics (FDES)

Sub- component 2.5: Biological Resources	
	2.5.3.a: Main annual and perennial crops **2.5.3.a.1: Area harvested** **2.5.3.a.2: Area planted** **2.5.3.a.3: Amount produced** **2.5.3.a.4:** Amount of organic production **2.5.3.a.5**: Amount of genetically modified crops produced **2.5.3.b:** Amount used of: **2.5.3.b.1: Natural fertilizers (e.g., manure, compost, lime)** **2.5.3.b.2: Chemical fertilizers** **2.5.3.b.3: Pesticides** **2.5.3.c:** Monoculture / resource-intensive crops **2.5.3.c.1:** Area being used for production **…**

The Agri-Environmental Information Pyramid

- The components of the FDES can easily be related to the description of the interrelationships between agriculture and the environment
- The relevant statistics are included in the Core and Basic Sets and can be used to derive agri-environmental indicators
- The FDES compatible with other statistical and analytical frame works:SEEA, DPSIR,etc.



FAO Agri-environment Datasets, Statistics and Indicators

FAO Statistics Division has much of the data needed for Agri-environmental indicators

- Land use data(FAOSTAT)
- Agricultural production and Trade(FAOSTAT)
- Agricultural inputs- Fertilizer data-(FAOSTAT)
- Agricultural inputs- Pesticides consumption data (FAOSTAT)

Different databases at FAO that serve different purposes

- FAO Global Forest Resources Assessments (FRA) => monitors the world's forests at 5 to 10 year intervals since 1946.
- AQUASTAT => FAO's global information system on water and agriculture
- The FAOSTAT database => focus is to integrate datasets for possible environment issues and analysis

Agri-Environmental Indicators in FAOSTAT

Domain	Sub-domain	Indicator
Air & Climate Change	Ammonia emissions	Ammonia (NH3) emissions from agriculture as a % of total NH3 emissions
Energy	Energy use in Agriculture and Forestry	Agriculture and forestry energy use as a % of total energy use
	Bioenergy production	Bioenergy production as a % of total renewable energy production
Fertilizers Consumption	Nitrogen Consumption	Nitrogen and Phosphate nutrient use on arable and permanent crop area (N tonnes /1000 ha)
	Phosphate Consumption	Phosphate nutrient use on arable and permanent crop area (P205 tonnes /1000 ha)
	Nitrogen and Phosphate	Nitrogen and Phosphate nutrient use on arable and permanent crop area (N+P205 tonnes /1000 ha)
Land	Agricultural area	Agricultural area as a % of land area
	Agricultural area use change	Changes in agricultural area (% per year)
	Area equipped for irrigation	Area equipped for irrigation as a % of agricultural area
	Conservation agriculture	Conservation agriculture area (>30% group cover) as a % of agricultural area
	Cropping patterns	Permanent crops area as a % of agricultural area
		Permanent meadows and pastures area as a % of agricultural area
		Arable land area as a % of agricultural area
	Organic agricultural area	Organic area as a % of agricultural area
	Protected land area	Protected terrestrial area as a % of land area

Agri-Environmental Indicators in FAOSTAT

Domain	Sub-domain	Indicator
Livestock	Livestock Density	Livestock total per hectare of agricultural area (livestock total number/ha)
	Cattle and Buffalo	Cattle and Buffalo as a % of total livestock
	Pigs	Pigs as a % of total livestock
	Sheep and goats	Sheep and goats as a % of total livestock
	Poultry birds	Poultry birds as a % of total livestock
Pesticides	Pesticides Use	Pesticide use on arable and permanent crop area (tonnes /1000 ha)
Soil	Soil Erosion - GLASOD	Average soil erosion expressed in GLASOD erosion degree
	Land degradation - GLASOD	Average land degradation expressed in GLASOD erosion degree
	Carbon in topsoil	Average carbon content in the topsoil as a % in weight
	Soil Erosion - GLASOD	Average soil erosion expressed in GLASOD erosion degree
Water	Water use in agriculture	Water withdrawal for agricultural use as a % of total water withdrawal

Current activities and Future Directions for Improving Agri-Environment Data and Indicators

- The revision of the land use questionnaire to include new items related to the SEEA and new areas of concern

- The revision of the pesticides questionnaire to include trade and chemicals listed in the Rotterdam Convention

- New FAOSTAT domain on greenhouse gas (GHG) emissions from agriculture

- Coordination with EUROSTAT and OECD in Developing policy relevant Agri-Environmental indicators

- Developing SEEA-AGRI and indictors for FAO Strategic Objective 2:

  "*Increase and improve provision of goods and services from agriculture, forestry and fisheries in a sustainable manner*"

Questions for Discussion

- What are the critical agri-environmental issues in the region?
- How complete and suitable are the indicators included in the new suite of Agri-environmental indicators in FAOSTAT?
- What is the capacity of countries to produce the basis statistical data required for the indicators and what specific support is needed to do so?

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