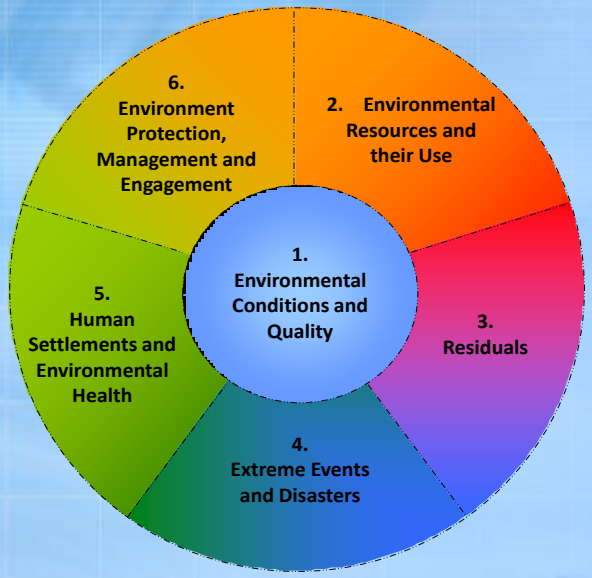
Chapter 2: Conceptual Foundation and Structure of the FDES

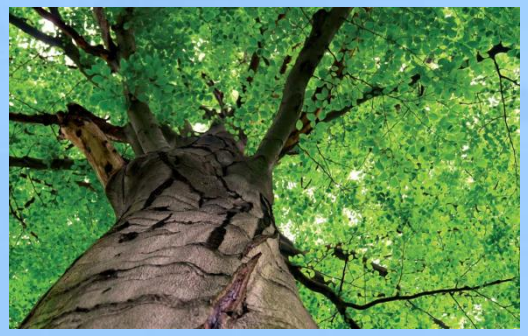


Workshop on Environment Statistics in support of the implementation of the Framework for the Development of Environment Statistics (FDES 2013)
(Arusha, Tanzania, 6-10 July 2015)

Environment Statistics Section, United Nations Statistics Division

Contents

1. Need for a framework for developing environment statistics
2. Revision of the FDES
3. Description of the FDES
4. Conceptual foundation of the FDES
5. FDES structure and overview of its 6 components
6. Applications of the FDES to cross-cutting issues
7. Links between the FDES and social and economics statistics



1. Need for a framework for developing environment statistics

- Environment statistics is multi- and interdisciplinary.

  - A framework marks out the areas and the corresponding statistics that fall into its scope.

- Sources of data can be statistical surveys, administrative records, measurements from monitoring stations and networks, remote sensing and field surveys, or scientific research.

  - A framework provides common tools (definitions, classifications) that bring the different data together in an integrative manner.

- The multitude of sources means a multitude of stakeholders.

  - A framework marks out the roles of the different stakeholders and brings them together to a common platform.

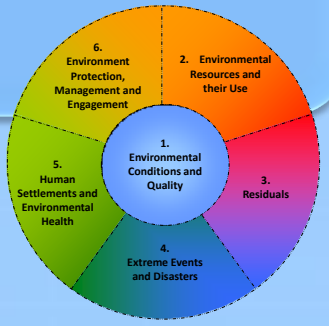
- Need an internationally recognized and recommended framework to guide the development, coordination and organization of environment statistics.



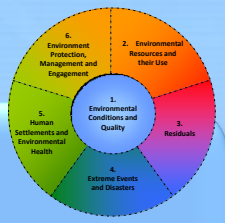
2. Revision of the FDES and development of a Core Set of Environment Statistics

Statistical Commission mandate: The 41st (2010) session of the UN Statistical Commission endorsed the revision of the 1984 FDES and the development of a Core Set of Environment Statistics.

Statistical Commission endorsement: The 44th (2013) session endorsed the revised Framework (FDES 2013) as the framework for strengthening environment statistics programmes in countries, and recognized it as a useful tool to adequately respond to the increasing demand for environmental information in the follow-up to Rio+20 and the Post-2015 Development Agenda.



2. Revision of the FDES and development of a Core Set of Environment Statistics



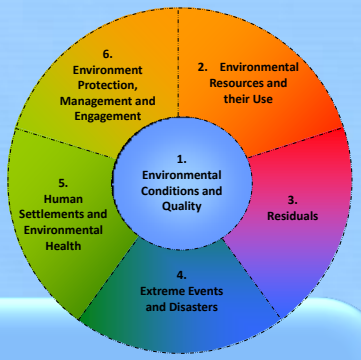
- 1984 – 2010: improved scientific knowledge and emerging environmental concerns called for a revision of the FDES 1984.
- Contents and structure of FDES required considerable work by EG and UNSD
- To develop the draft Core Set of Environment Statistics, more than 2,500 environmental indicators and statistics were analyzed, in terms of relevance, statistical feasibility and methodological soundness.
- The draft Core Set was tested in 25 countries through a pilot exercise (August to September 2012): substantive improvement, prioritized statistics within Basic Set.
- Both the revised FDES and the Basic Set were subjected to a Global Consultation process, 76 countries, areas and organizations provided feedback (September to November 2012).

Expert Group on the Revision of the FDES

Comprised of experts representing all regions, including developing (13) and developed (10) countries, as well as 7 international agencies and UNCEEA. It represented the interest of NSOs, environmental ministries and agencies, and academia.

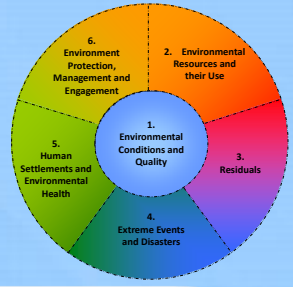
EG and UNSD met four times and worked together remotely continually during the process.

3. Description of the FDES



- The resulting FDES 2013 is a flexible, multi-purpose conceptual and statistical framework that marks out the scope of environment statistics.
- It provides an organizing structure to guide the collection and compilation of environment statistics at the national level, bringing together data from the various relevant subject areas and sources.
- It is broad, comprehensive and integrative. It covers the issues and aspects of the environment that are relevant for policy analysis and decision making and it can be applied to inform about cross-cutting issues such as climate change.

3. Description of the FDES



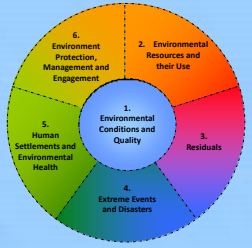
Scope of the FDES

Covers biophysical aspects of the environment and those aspects of the human sub-system that directly influence and interact with the state and quality of the environment.

Audience of the FDES

- Primarily to guide the producers of statistics in countries at early stages of, or in the process of strengthening or further developing their environment statistics programmes.

3. Description of the FDES

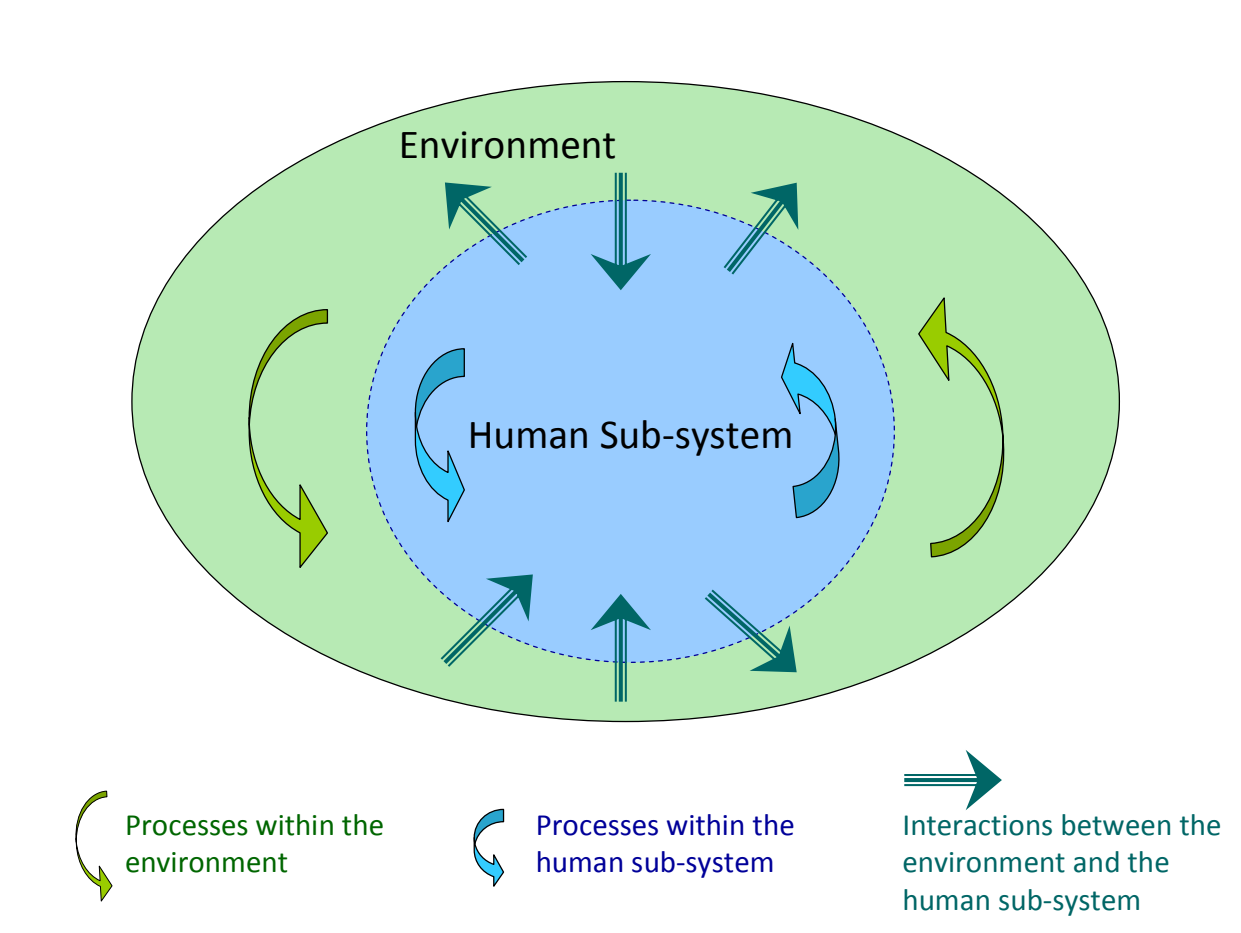


Users of the FDES

- Environment statisticians in NSOs, environmental administrations/authorities.
- Other producers/users of environmental data and environment statistics in line ministries, sectoral authorities and other institutions.
- The FDES marks out the roles of the different data producers, thus facilitating inter-agency coordination within countries. It can be used by inter-institutional collaborating committees/round-tables participating in the production and dissemination of environment statistics.
- It can also be used by international and regional institutions to organize and strengthen their production and dissemination of environment statistics.

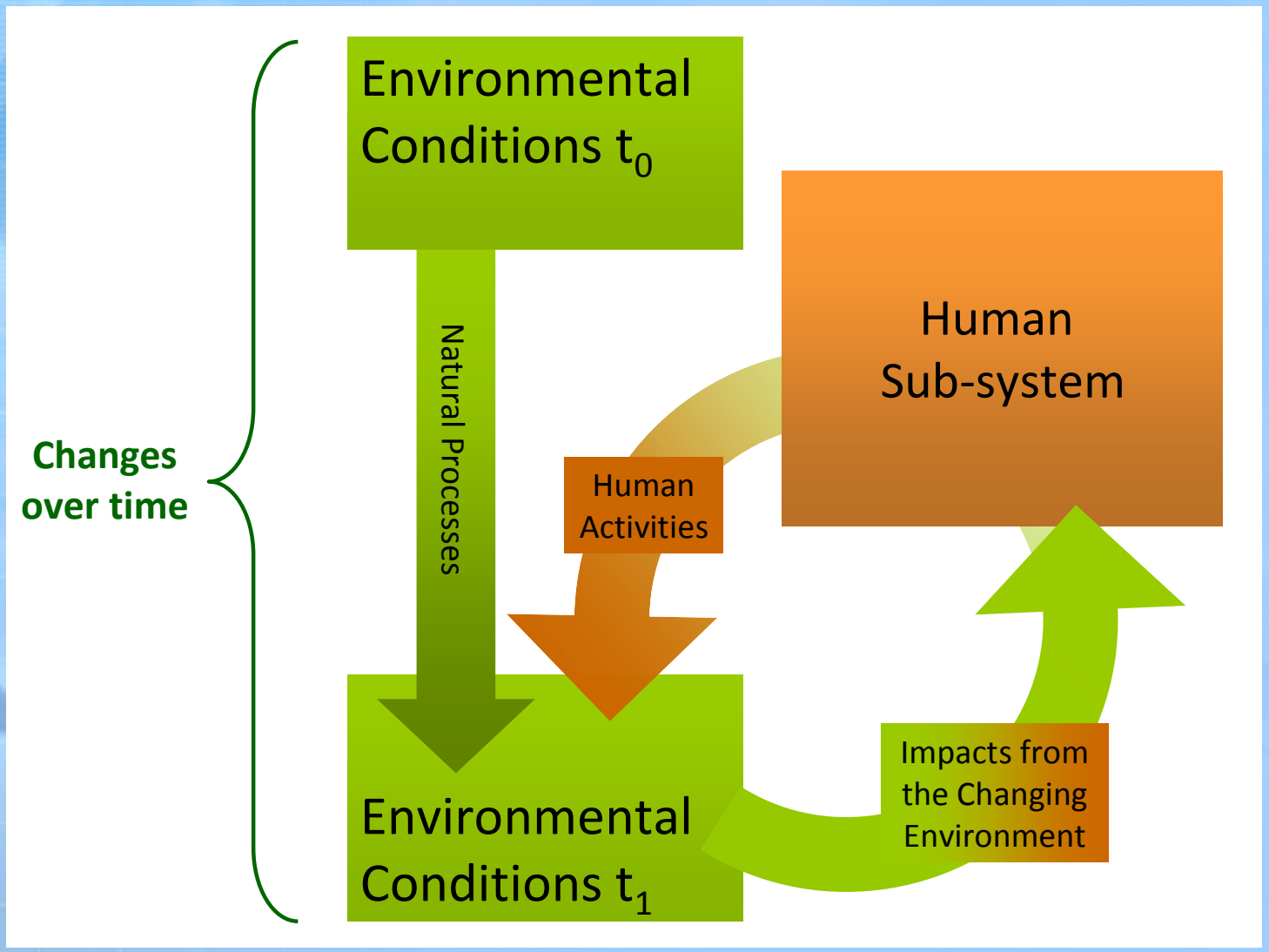
4. Conceptual foundation of the FDES

The environment, the human sub-system, and interactions between them

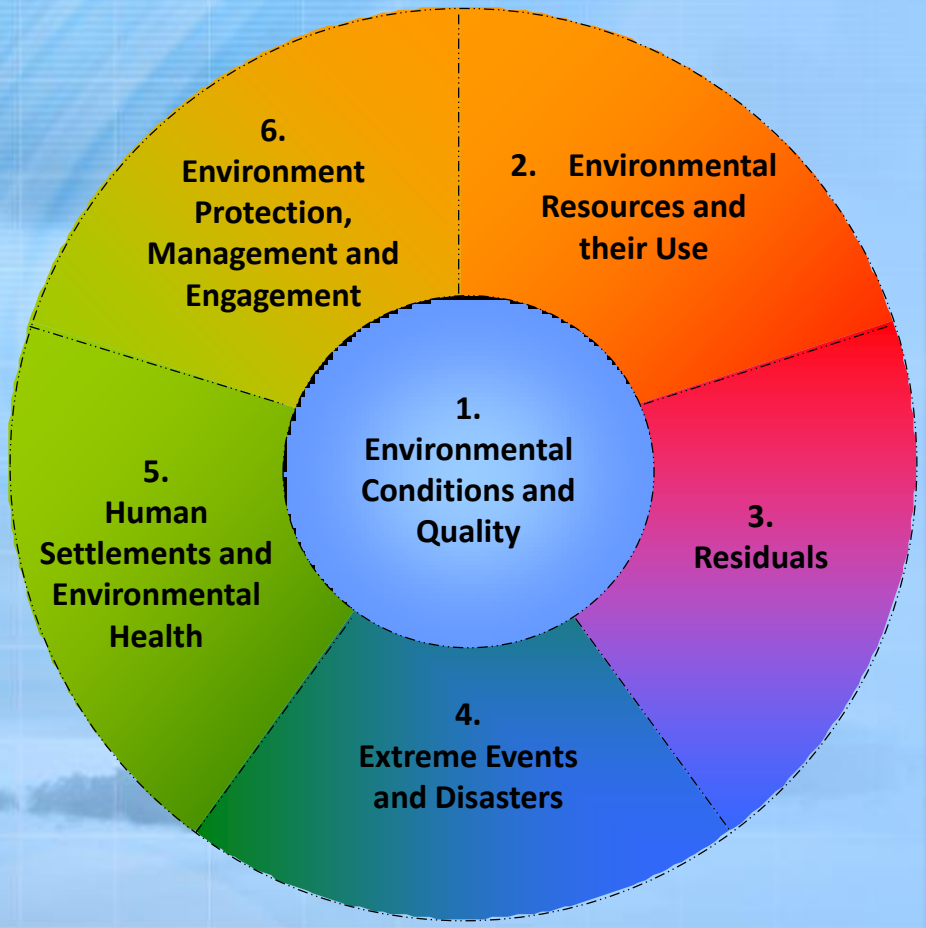


4. Conceptual foundation of the FDES

Environmental conditions and their changes



5. FDES structure and overview of its 6 components



- Six components
- At the centre of the FDES: Environmental conditions and quality
- All of the components relate to each other
- Multi-layered (component, sub-component, topic, individual statistics)
- Flexible
- Adaptable

Multi-layered structure of the FDES

Levels of the FDES

1 digit	2 digits	3 digits	4 or 5 digits
Component	**Sub-component**	**Statistical Topic**	**Statistics**

Component 1: Environmental Conditions and Quality	Sub-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: 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 Sub-component 3.4: Release of Chemical Substances
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

Basic Set of Environment Statistics

Component 1: Environmental Conditions and Quality

Sub-component 1.3: Environmental Quality

Topic	Statistics and Related Information (**Bold Text - Core Set/Tier 1**; Regular Text - Tier 2; *Italicized Text - Tier 3*)	
Topic 1.3.1: Air quality	a.	Local air quality
		1. **Concentration level of particulate matter (PM_{10})**
		2. **Concentration level of particulate matter ($PM_{2.5}$)**
		3. **Concentration level of tropospheric ozone (O_3)**
		4. **Concentration level of carbon monoxide (CO)**
		5. **Concentration level of sulphur dioxide (SO_2)**
		6. **Concentration levels of nitrogen oxides (NO_X)**
		7. Concentration levels of heavy metals
		8. Concentration levels of non-methane volatile organic compounds (NMVOCs)
		9. *Concentration levels of dioxins*
		10. *Concentration levels of furans*
		11. Concentration levels of other pollutants
		12. Number of days where maximum allowable levels were surpassed per year
	b.	Global atmospheric concentrations of greenhouse gases
		1. Global atmospheric concentration levels of carbon dioxide (CO_2)
		2. Global atmospheric concentration levels of methane (CH_4)

Flexibility and adaptability: prioritizing components, sub-components and topics

Flexibility and adaptability: tiers

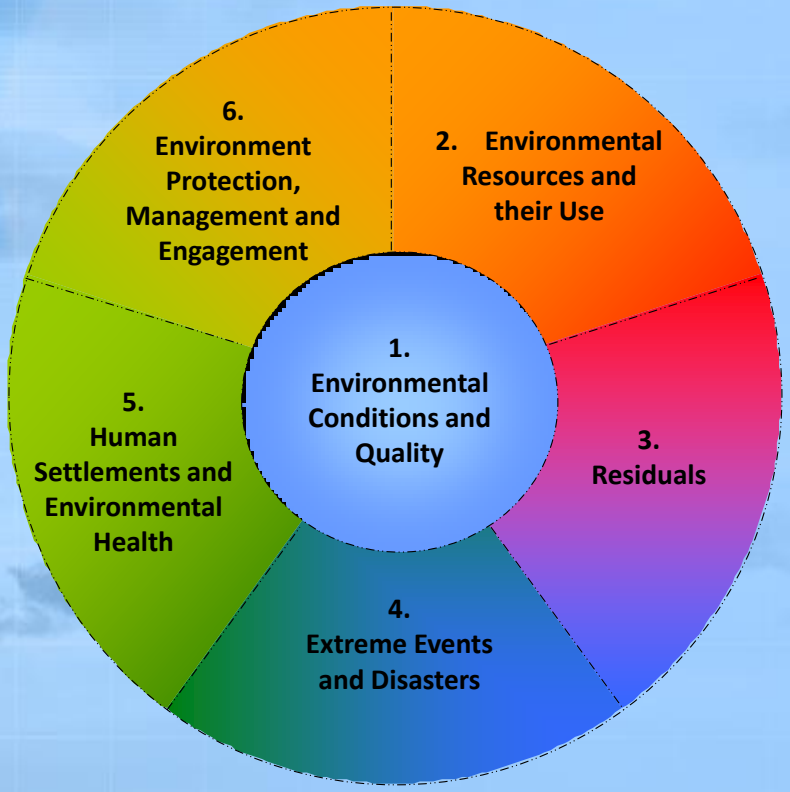
Main Attributes of the Components of the FDES

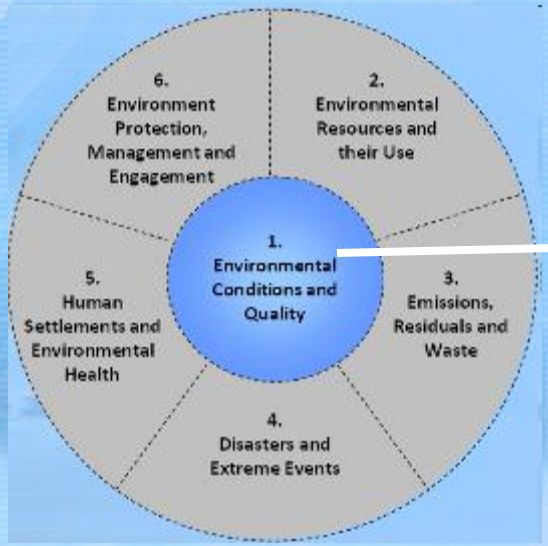
FDES Component	Description	Types of Data	Main Sources and Institutions	Relation to DPSIR and the SEEA
1 Environmental Conditions and Quality	Conditions/characteristics of the environment (meteorological, hydrographical, biological, physical and chemical, geological, geographical) that determine ecosystems and environmental quality	· ***Geospatial*** · ***Physical*** · ***Qualitative***	• Monitoring and remote sensing data • Environmental, meteorological, hydrological, geological and geographical authorities/ institutions	• *State and Impact element in DPSIR* • *Experimental ecosystem accounts of the SEEA*
2 Environmental Resources and their Use	Quantities of environmental resources and their changes; as well as statistics on activities related to their use and management	· ***Physical*** · ***Geospatial***	• Statistical surveys, administrative records, field surveys, land registers • Sector statistics on production and consumption activities, infrastructure • Remote sensing data • Statistics databases of national authorities, i.e. mining, energy, agriculture, water and forest	• *Driving force, Pressure and State elements in DPSIR* • *Asset and physical flow accounts of the SEEA Central Framework*
3 Residuals	Generation, management and discharge of residuals to air, water and soil	· ***Physical***	• Administrative records •Estimates based on activity statistics and technical coefficients •Sector statistics •Monitoring data	• *Pressure and Response elements in DPSIR* • *Physical flow accounts of the SEEA Central Framework*
4 Extreme Events and Disasters	Occurrence and impact of natural extreme events and disasters, and technological disasters	· ***Physical*** · ***Monetary*** · ***Geospatial*** · ***Qualitative***	• Administrative records • Remote sensing • National emergency and disaster authorities • Seismic, meteorological monitoring and research centres • Industrial complexes working w/ hazardous substances and processes	• *Pressure, Impact and Response* •*Elements in DPSIR* • *Asset accounts of the SEEA Central Framework*

Main Attributes of the Components of the FDES…continued

FDES Component	Description	Types of Data	Main Sources and Institutions	Relation to DPSIR and the SEEA
5 Human Settlements and Environmental Health	The built environment in which humans live, particularly with regard to population, housing, living conditions, basic services and environmental health	• ***Geospatial*** • ***Physical***	• Population and housing censuses, household surveys, administrative records, and remote sensing • Housing and urban planning and oversight authorities • Cartographic authorities • Transport authorities • For health, administrative records, the health Authority	• ***Driving force, Pressure and Impact elements in DPSIR***
6 Environment Protection, Management and Engagement	Environment protection and resource management expenditure; environment regulation both direct and via market instruments; disaster preparedness; environmental perception, awareness and engagement of the society	• ***Monetary*** • ***Qualitative***	• Administrative records • Surveys •The entity producing government expenditure statistics • The statistical entity in charge of national or sub-national surveys • The environmental authority and other sector authorities	• ***Response element in DPSIR*** • ***Environmental activity accounts and related flows of the SEEA Central Framework***

Overview of each Component of the FDES 2013





Component 1: Environmental Conditions and Quality	Sub-component 1.1: Physical Conditions Sub-component 1.2: Land Cover, Ecosystems and Biodiversity Sub-component 1.3: Environmental Quality

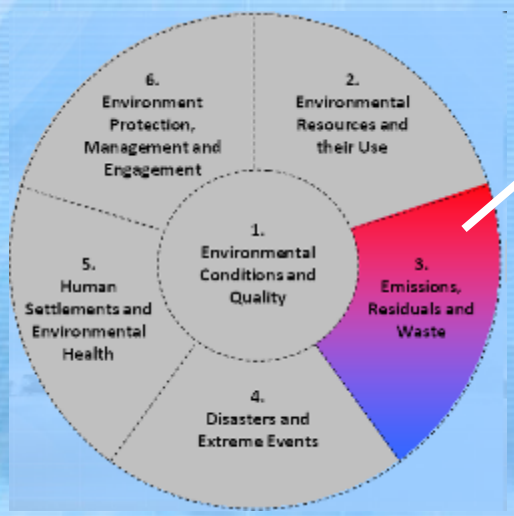
Example of Core Set Statistics within a topic of Component 1:

Topic 1.2.2: Ecosystems and biodiversity	a. General ecosystem characteristics, extent and pattern	**1. Area of ecosystems**
	c. Biodiversity	**1. Known flora and fauna species**

Component 2: Environmental Resources and their Use	Sub-component 2.1: 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

Example of Basic Set Statistics within a topic of Component 2:

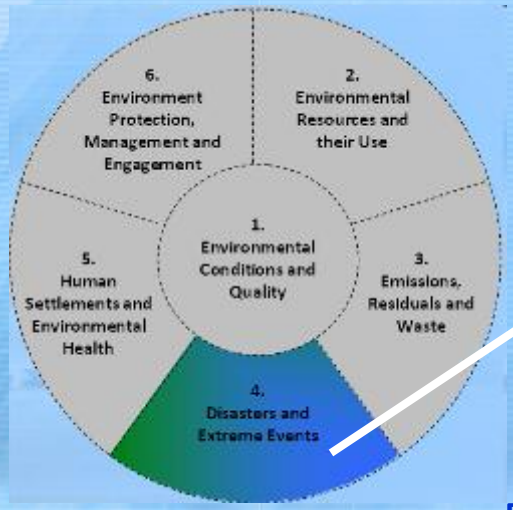
Topic 2.5.3: Crops	a.	Main annual and perennial crops	
		1. **Area harvested**	Area
		2. **Area planted**	Area
		3. **Amount produced**	Mass
		4. *Amount of organic production*	Mass
		5. *Amount of genetically modified crops produced*	Mass
	b.	Amount used of:	
		1. **Natural fertilizers** (e.g., manure, compost, lime) (also in 3.4.1.a)	Area, Mass, Volume
		2. **Chemical fertilizers** (also in 3.4.1.a)	Area, Mass, Volume
		3. **Pesticides** (also in 3.4.1.b)	Area, Mass, Volume
		4. Genetically modified seeds	Mass
	c.	Monoculture/resource-intensive farming systems	
		1. Area being used for production	Area
		2. Amount produced	Mass
		3. *Amount of genetically modified crops produced*	Mass
	d.	Imports of crops	Currency, Mass
	e.	Exports of crops	Currency, Mass



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 Sub-component 3.4: Release of Chemical Substances

Example of Core Set Statistics within a topic of Component 3:

Topic 3.1.1: Emissions of greenhouse gases	a. Total emissions of direct greenhouse gases (GHGs), by gas:	**1. Carbon dioxide (CO_2)**
		2. Methane (CH_4)
		3. Nitrous oxide (N_2O)
	b. Total emissions of indirect greenhouse gases (GHGs), by gas:	**1. Sulphur dioxide (SO_2)**
		2. Nitrogen oxides (NOx)



Component 4: Extreme Events and Disasters	Sub-component 4.1: Natural Extreme Events and Disasters Sub-component 4.2: Technological Disasters

Example of Core Set Statistics within a topic of Component 4:

Topic 4.1.1: Occurrence of natural extreme events and disasters	a. Occurrence of natural extreme events and disasters	**1. Type of natural extreme event and disaster** (geophysical, meteorological, hydrological, climatological, biological)
		2. Location
Topic 4.1.2: Impact of natural extreme events and disasters	a. People affected by natural extreme events and disasters	**1. Number of people killed**
	b. Economic losses due to natural extreme events and disasters (e.g., damage to buildings, transportation networks, loss of revenue for businesses, utility disruption, etc.)	

Component 5: Human Settlements and Environmental Health	Sub-component 5.1: Human Settlements Sub-component 5.2: Environmental Health

Example of Core Set Statistics within a topic of Component 5:

Topic 5.1.2: Access to selected basic services	**a. Population using an improved drinking water source**
	b. Population using an improved sanitation facility
	c. Population served by municipal waste collection
	e. Population connected to wastewater treatment
	f. Population supplied by water supply industry

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

Example of Core Set Statistics within a topic of Component 6:

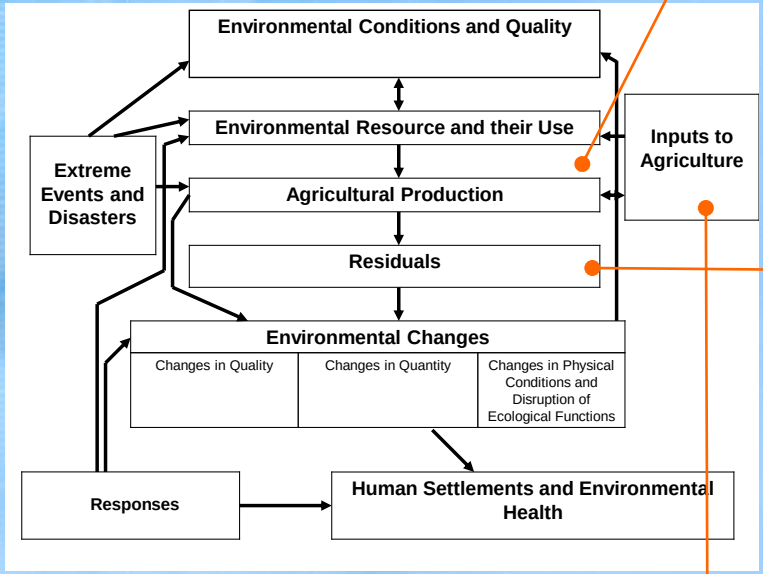
Topic 6.1.1: Government environment protection and resource management expenditure	a. Government environment protection and resource management expenditure **1. Annual government environment protection expenditure**

6. Applications of the FDES to cross-cutting issues
(Chapter 5 FDES 2013)

The FDES can be applied to inform about cross-cutting policy issues important to countries at any given time:

- Examples:
  - Water and the environment
  - Energy and the environment
  - Climate change
  - Agriculture and the environment

Agriculture and the environment



Agricultural Production

Sub-component 2.5: Biological Resources	
Topic 2.5.3: Crops	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.c: Monoculture/resource-intensive farming systems 2.5.3.c.1: Area being used for production 2.5.3.c.2: Amount produced *2.5.3.c.3: Amount of genetically modified crops produced*
Topic 2.5.4: Livestock	2.5.4.a: Livestock **2.5.4.a.1: Number of live animals** 2.5.4.a.2: Number of animals slaughtered

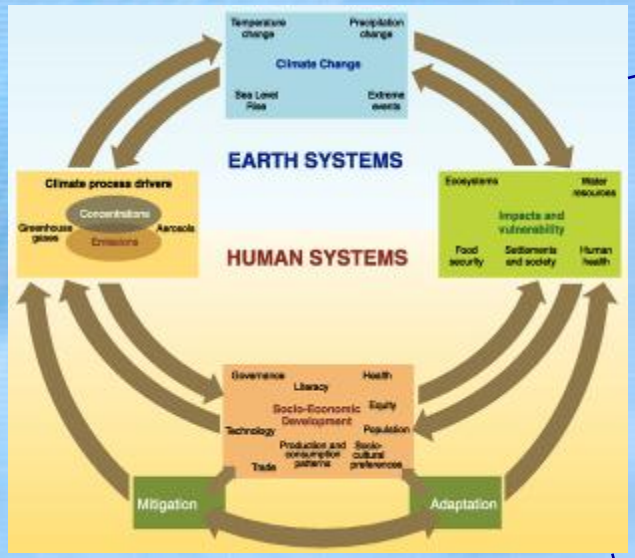
Inputs to Agriculture

Sub-component 2.5: Biological Resources	
Topic 2.5.3: Crops	2.5.3.b: Amount used of: **2.5.3.b.1: Natural fertilizers** (e.g. manure, compost, lime) (also in 3.4.1.a) **2.5.3.b.2: Chemical fertilizers** (also in 3.4.1.a) **2.5.3.b.3: Pesticides** (also in 3.4.1.b) 2.5.3.b.4: Genetically modified seeds
Topic 2.5.4: Livestock	2.5.4.b: Amount used of: *2.5.4.b.1: Antibiotics (also in 3.4.1.f)* *2.5.4.b.2: Hormones (also in 3.4.1.d)*

Residuals

Sub-component 3.1: Emissions to Air	
Topic 3.1.1: Emissions of greenhouse gases	3.1.1.a: Total emissions of direct greenhouse gases (GHGs), by gas: **3.1.1.a.1: Carbon dioxide (CO_2)** **3.1.1.a.2: Methane (CH_4)**
Topic 3.1.2: Consumption of ozone depleting substances	3.1.2.a: Consumption of ozone depleting substances (ODS), by substance: 3.1.2.a.6: Methyl bromide
Sub-component 3.2: Generation and Management of Wastewater	
Topic 3.2.1: Generation and pollutant content of wastewater	**3.2.1.a: Volume of wastewater generated** (from agriculture) 3.2.1.b: Pollutant content of wastewater
Sub-component 3.2: Generation and Management of Waste	
Topic 3.3.1: Generation of waste	**3.3.1.a: Amount of waste generated by source** (by agriculture) 3.3.1.b: Amount of waste generated by waste category (by agriculture) 3.3.1.c.: **Amount of hazardous waste generated** (by agriculture)

Climate Change statistics



Source: Intergovernmental Panel on Climate Change

Climate Process Drivers

Sub-component 1.3: Environmental Quality	Sub-component 3.1: Emissions to Air
1.3.1 Air quality	3.1.1 Emissions of greenhouse gases 3.1.2 Consumption of ozone depleting substances (ODS), by substance

Climate Change Evidence

Sub-comp. 1.1: Physical Conditions	Sub-comp. 4.1: Natural Extreme Events and Disasters
1.1.1 Atmosphere, climate and weather 1.1.2 Hydrographical characteristics	4.1.1 Occurrence of natural extreme events and disasters

Climate Change Impacts and Vulnerability

Sub-comp. 1.1: Physical Conditions	Sub-comp. 1.2: Land Cover, Ecosystems and Biodiversity	Sub-comp. 1.3: Environmental Quality	Sub-comp. 2.3: Land	Sub-comp. 4.1: Natural Extreme Events and Disasters	Sub-comp. 5.1: Human Settlements	Sub-comp. 5.2: Environmental Health
1.1.2 Hydrographical characteristics 1.1.4 Soil characteristics	1.2.1 Land cover 1.2.2 Ecosystems and biodiversity 1.2.3 Forests	1.3.3 Marine water quality	2.3.1 Land use	4.1.2 Impact of natural extreme events and disasters	5.1.3 Housing conditions	5.2.3 Vector borne diseases 5.2.4 Health problems associated with excessive UV radiation exposure

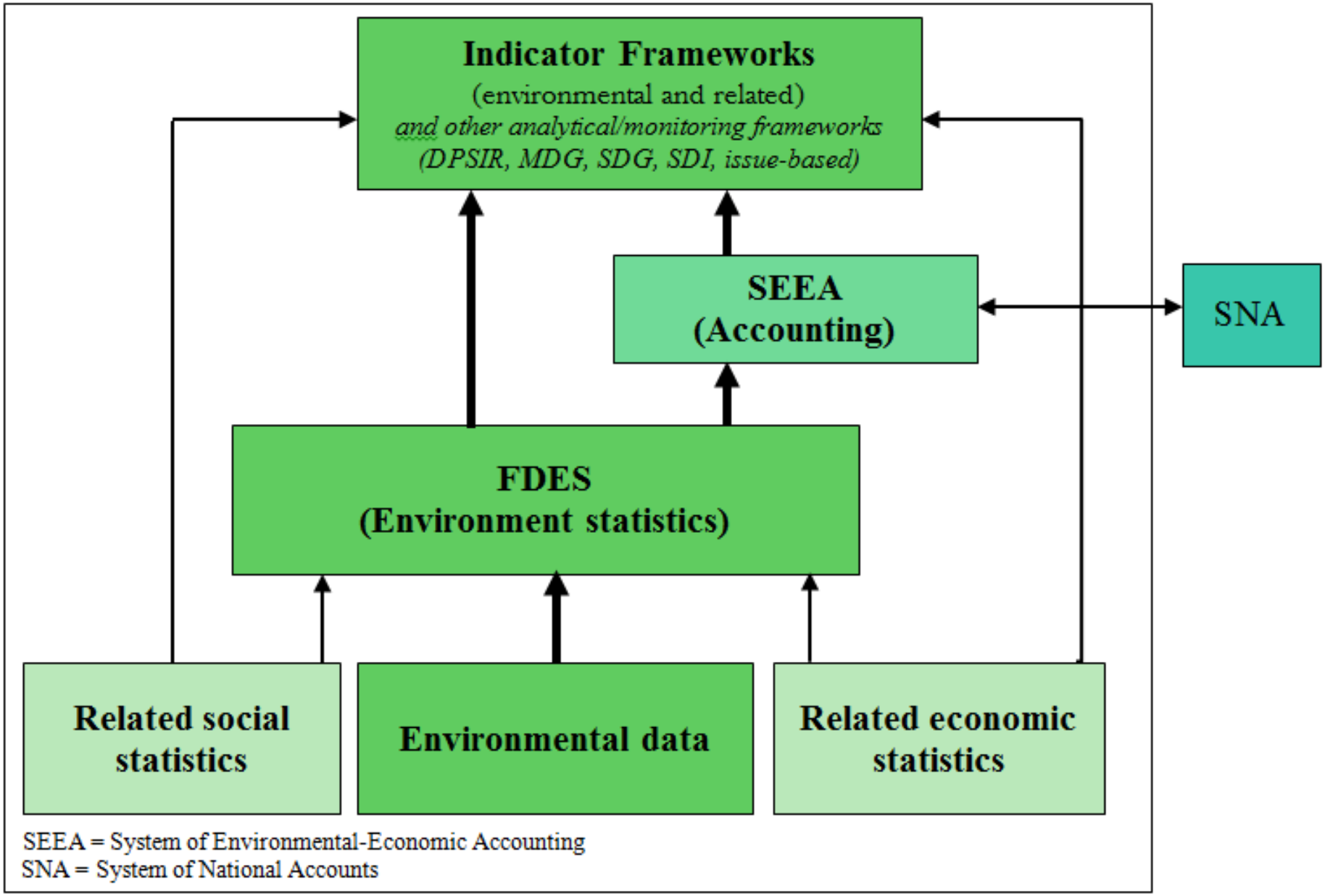
Mitigation and Adaptation

Sub-comp. 2.2: Energy Resources	Sub-comp. 6.1: Environment Protection and Resource Management Expenditure	Sub-comp. 6.2: Environmental Governance and Regulation	Sub-comp. 6.3: Extreme Event Preparedness and Disaster Management
2.2.2 Production, trade and consumption of energy	6.1.1 Government environment protection and resource management expenditure 6.1.2 Corporate, non-profit institution and household environment protection and resource management expenditure	6.2.2 Environmental regulation and instruments 6.2.3 Participation in MEAs and environmental conventions	6.3.1 Preparedness for natural extreme events and disasters

7. Links between the FDES and social and economic statistics

- The FDES 2013 is structured in a way that allows links to economic and social domains.
- It seeks to be compatible with other frameworks and systems, both statistical and analytical, such as the System of Environmental-Economic Accounting (SEEA), the Driving force – Pressure – State – Impact – Response (DPSIR) framework, or the Millennium Development Goals (MDGs) as well as the Sustainable Development Indicator frameworks. This compatibility allows that environment statistics from the FDES can feed into the SEEA or different indicator frameworks.
- It uses existing concepts and relies on existing statistical classifications (when applicable).
- As such, the FDES facilitates data integration within environment statistics and with economic and social statistics.

Relationship of the FDES to other frameworks, systems and indicator sets



Thank you for your attention!

For more information please contact the Environment Statistics Section at the United Nations Statistics Division:

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