



# UN Framework for the development of Environment Statistics (FDES 2013)

How it support user's needs

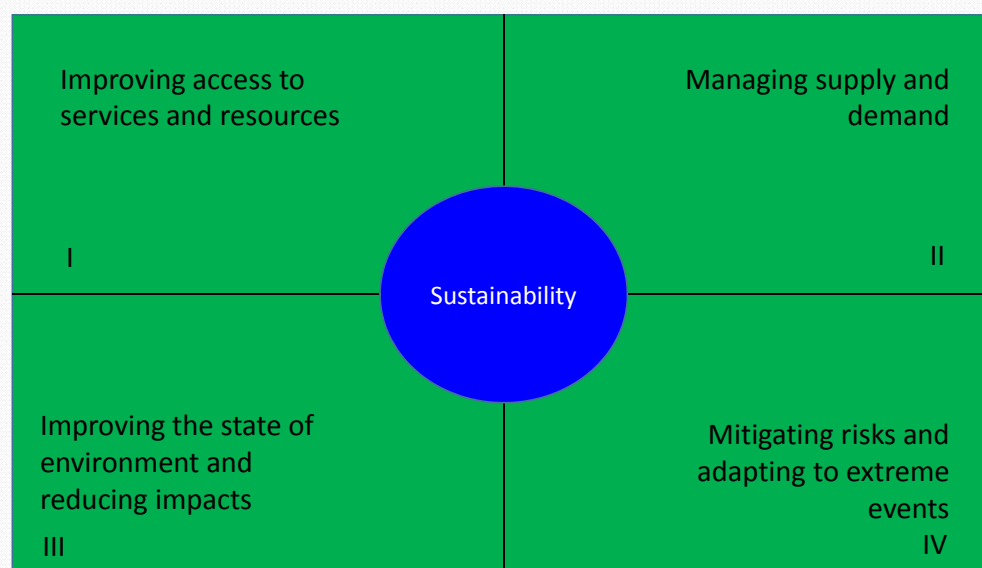
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## What are the main information needs?

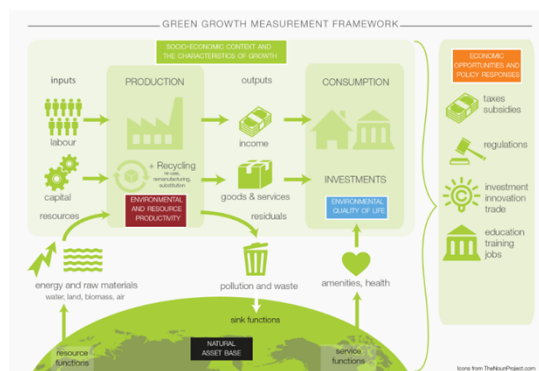
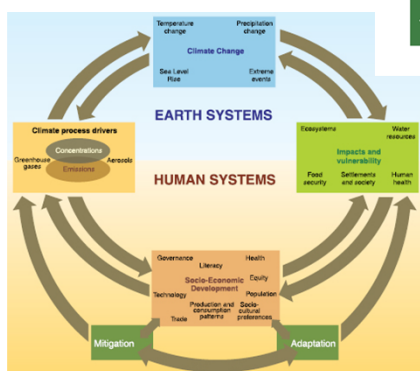
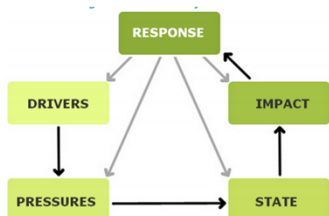
Informing different policy perspectives

STATISTICS



# What are the main information needs? Informing different policy and indicator frameworks

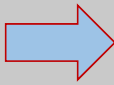
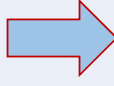
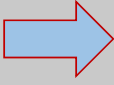
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## The United Nations Framework for Development of Environment Statistics (FDES 2013)

### Why was there a need for a framework?

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Environment statistics		Needs for a framework that:
multi- and interdisciplinary.		marks out the areas and the corresponding statistics that fall into its scope.
Different types of sources of environment statistics: <ul style="list-style-type: none"> <li>• statistical surveys</li> <li>• administrative records</li> <li>• remote sensing and thematic mapping</li> <li>• monitoring systems</li> <li>• scientific research</li> <li>• special projects</li> </ul>		provides common tools (definitions, classifications) that bring the different data together in an integrative manner.
multitude of sources means a multitude of stakeholders.		marks out the roles of the different stakeholders and brings them together to a common platform.

## Why environment statistics?

A single trusted source for multiple purposes

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- Improve **knowledge**
- Support evidence-based **policy**
- Provide **information** to the general public, media and other user groups

## Purpose of the FDES 2013



Biophysical aspects, related human sub-system, impacts and interactions

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Guide the formulation of environment statistics programmes by

- Delineating the scope of environment statistics and identifying its constituents
- Contributing to the assessment of data requirements, sources, availability and gaps
- Guiding the development of multipurpose data collection processes and databases
- Assisting in the coordination and organisation of environment statistics

## Important Terminology

Data, Statistics, Indicators

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### Environmental **DATA**:

- Unprocessed observations and measurements about the environment and related processes
- Sources: Surveys, administrative sources, research,...

### Environment **STATISTICS**:

- Statistical methods, standards, procedures applied
- Role of environment statistics to process environmental data into meaningful statistics

### Environmental **INDICATORS**:

- Synthesize and present complex statistics
- Define objectives, assessing present and future directions etc.
- Frameworks are e.g. Sustainable Development Goals, Drivers / Pressures / State / Impact / Response (DPSIR), Core set of climate change-related indicators etc.

## Sources of Environment Statistics

Multiple sources are used to produce official environment statistics



### STATISTICS

1. **Statistical surveys** (e.g., censuses or sample surveys of population, housing, agriculture, enterprises, households, employment, and different aspects of environment management)
2. **Administrative records** of government and non-government agencies responsible for natural resources, as well as other ministries and authorities
3. **Remote sensing and thematic mapping** (e.g., satellite imaging and mapping of land use and land cover, water bodies or forest cover)
4. **Monitoring systems** (e.g., field-monitoring stations for water quality, air pollution or climate)
5. **Scientific research and special projects undertaken to fulfill domestic or international demand**



## Classifications and other groupings

There is no single agreed classification for environment statistics



### STATISTICS

- There is no single overarching, internationally agreed classification of the environment for statistical purposes, such as International Standard Industry Classification (ISIC). There are coexisting and emerging classifications and categorizations for specific subject areas, which include standardized statistical classifications as well as less formalized groupings or categories.
  - Environment statistics uses specific classifications, e.g., FAO Land Cover Classification System, UN Framework Classification for Fossil Energy and Mineral Reserves and Resources (UNFC), Classification of Environmental Activities (CEA)
  - Also, environment statistics uses classifications, categories and groupings, e.g., the classification of natural and technological disasters (CRED-EMDAT), the classification of protected areas and of threatened species (UNEP-WCMC and IUCN), or the source categories for GHGs from the IPCC, that were not developed for statistical purposes.
- Environment statistics also uses economic and social-demographic classifications:
  - International Standard Industrial Classification of All Economic Activities (ISIC)
  - Central Product Classification (CPC)
  - International Classification of Diseases (ICD)
- The use of these classifications facilitates integration of environment statistics with economic and social-demographic statistics.

## Temporal considerations

Changes in the environment can happen within days or years

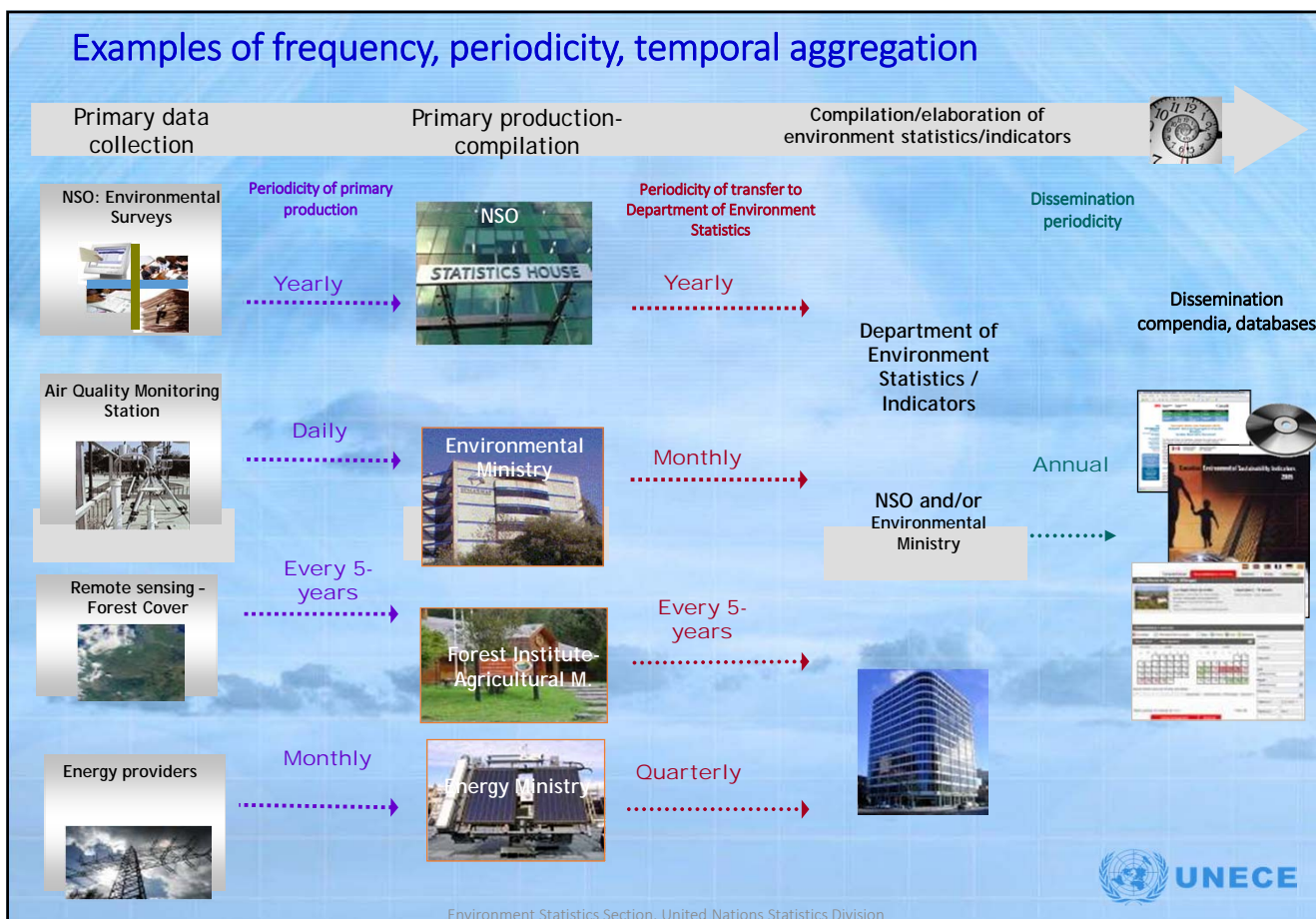


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- Different time scales or longer or shorter time periods must be used to aggregate environmental data over time.
  - For example air pollution daily... forest cover every 5 years
- Determining the appropriate temporal aggregation of environment statistics involves a variety of considerations depending on the nature of the measured phenomena
- Even when environmental data are produced at irregular intervals, environment statistics based on these data can still be produced at regular intervals if there are enough data points in each period to do so.



## Examples of frequency, periodicity, temporal aggregation



## Temporal considerations (cont.)

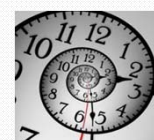
Be aware of seasonal variations!

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### Example:

- **Fluid environmental phenomena** call for careful consideration of the temporal dimension because ebbs and flows, droughts and floods, snow and runoffs can occur, which all influence measurements.
- Variations may be daily and, at other times, seasonal depending on what is being measured.
  - Seasonal variations may be seen in the fluctuations in certain types of fish biomass, surface water levels, ice cap surface or the incidence of fires. In such cases, monitoring must focus more on certain months than others.



## Spatial considerations

Identify meaningful spatial units!

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- The occurrence and impacts of environmental phenomena are distributed spatially without regard for political-administrative boundaries.
- **Meaningful spatial units for environment statistics are**
  - natural units, e.g., watersheds, ecosystems, eco-zones, landscape or land cover units; or
  - management and planning units based on natural units, such as protected areas, coastal areas or river basin districts.
- Economic and social statistics are aggregated traditionally according to administrative units.
  - This difference can complicate the collection and analysis of environment statistics particularly when they must be combined with data originating from social and economic statistics.
  - However, there is a trend towards producing more geo-referenced data, which would overcome some of the spatial complications of analysis.

## Institutional dimension

Resolve institutional concerns!

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- Identifying the primary institutional obstacles that impede the production of environment statistics and developing a strategy to overcome these is essential for countries that seek to develop or strengthen their environment statistics programmes.
- Key elements pertaining to the institutional dimension that should be considered and dealt with simultaneously while developing environment statistics include:
  - The legal framework
  - Institutional development
  - Inter-institutional collaboration
  - Institutional cooperation among national, regional and global bodies





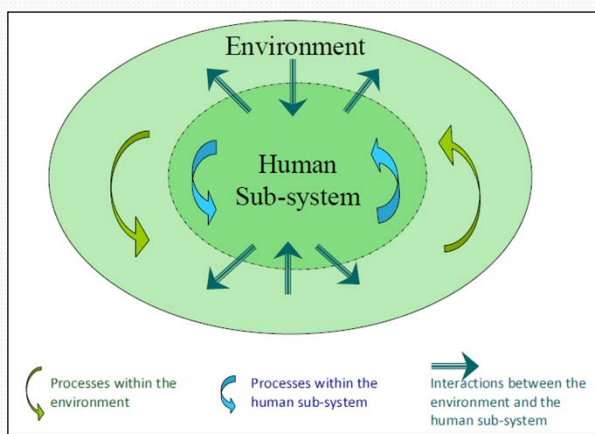
# Conceptual foundation of the FDES 2013



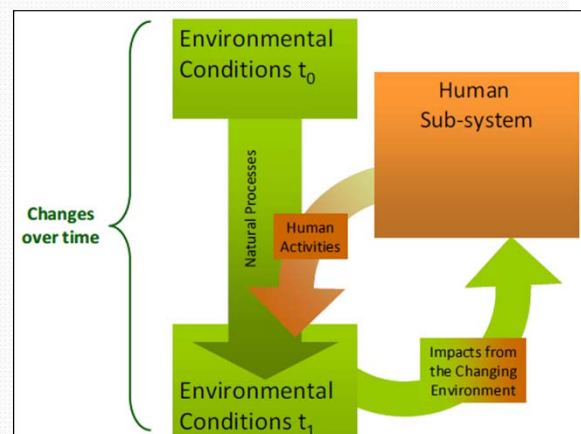
Environmental conditions, impacts and related human activities

STATISTICS

## Environment, Human Sub-system and Interactions



## Environmental conditions and their changes

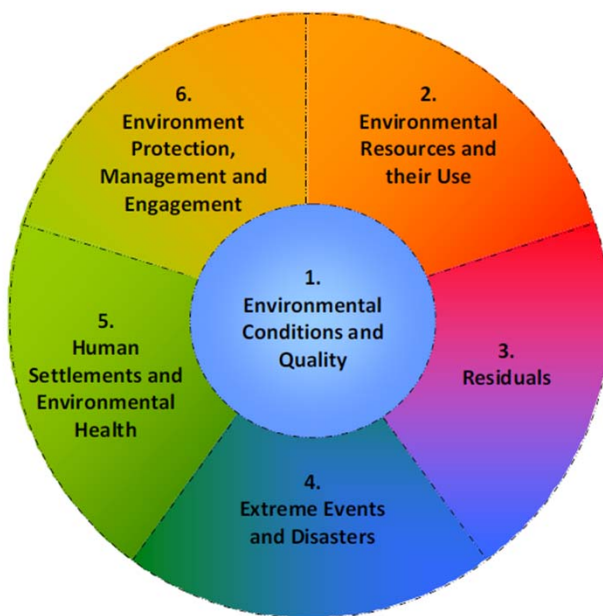


# Scope and structure of the FDES 2013

Biophysical aspects, related human sub-system, impacts and interactions



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## A multi-level approach of the FDES

### Levels of the FDES

1 digit	2 digits	3 digits	4 or 5 digits
<b>Component</b>	<b>Sub-component</b>	<b>Statistical Topic</b>	<b>Statistics</b>

<b>Component 1: Environmental Conditions and Quality</b>	Sub-component 1.1: Physical Conditions Sub-component 1.2: Land Cover, Ecosystems and Biodiversity Sub-component 1.3: Environmental Quality
<b>Component 2: Environmental Resources and their Use</b>	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
<b>Component 3: Residuals</b>	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
<b>Component 4: Extreme Events and Disasters</b>	Sub-component 4.1: Natural Extreme Events and Disasters Sub-component 4.2: Technological Disasters
<b>Component 5: Human Settlements and Environmental Health</b>	Sub-component 5.1: Human Settlements Sub-component 5.2: Environmental Health
<b>Component 6: Environmental Protection, Management and Engagement</b>	Sub-component 6.1: Environmental 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 Basic Set of Environment Statistics

Component 1: Environmental Conditions and Quality	
Sub-component 1.3: Environmental Quality	
Topic	Statistics and Related Information ( <b>Bold Text - Core Set/Tier 1</b> ; Regular Text - Tier 2; <i>Italicized Text - Tier 3</i> )
<b>Topic 1.3.1: Air quality</b>	<ul style="list-style-type: none"> <li>a. Local air quality                             <ul style="list-style-type: none"> <li>1. <b>Concentration level of particulate matter (PM<sub>10</sub>)</b></li> <li>2. <b>Concentration level of particulate matter (PM<sub>2.5</sub>)</b></li> <li>3. <b>Concentration level of tropospheric ozone (O<sub>3</sub>)</b></li> <li>4. <b>Concentration level of carbon monoxide (CO)</b></li> <li>5. <b>Concentration level of sulphur dioxide (SO<sub>2</sub>)</b></li> <li>6. <b>Concentration levels of nitrogen oxides (NO<sub>x</sub>)</b></li> <li>7. Concentration levels of heavy metals</li> <li>8. Concentration levels of non-methane volatile organic compounds (NMVOCs)</li> <li>9. <i>Concentration levels of dioxins</i></li> <li>10. <i>Concentration levels of furans</i></li> <li>11. Concentration levels of other pollutants</li> <li>12. Number of days where maximum allowable levels were surpassed per year</li> </ul> </li> <li>b. Global atmospheric concentrations of greenhouse gases                             <ul style="list-style-type: none"> <li>1. Global atmospheric concentration levels of carbon dioxide (CO<sub>2</sub>)</li> <li>2. Global atmospheric concentration levels of methane (CH<sub>4</sub>)</li> </ul> </li> </ul>

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

Flexibility and adaptability: tiers

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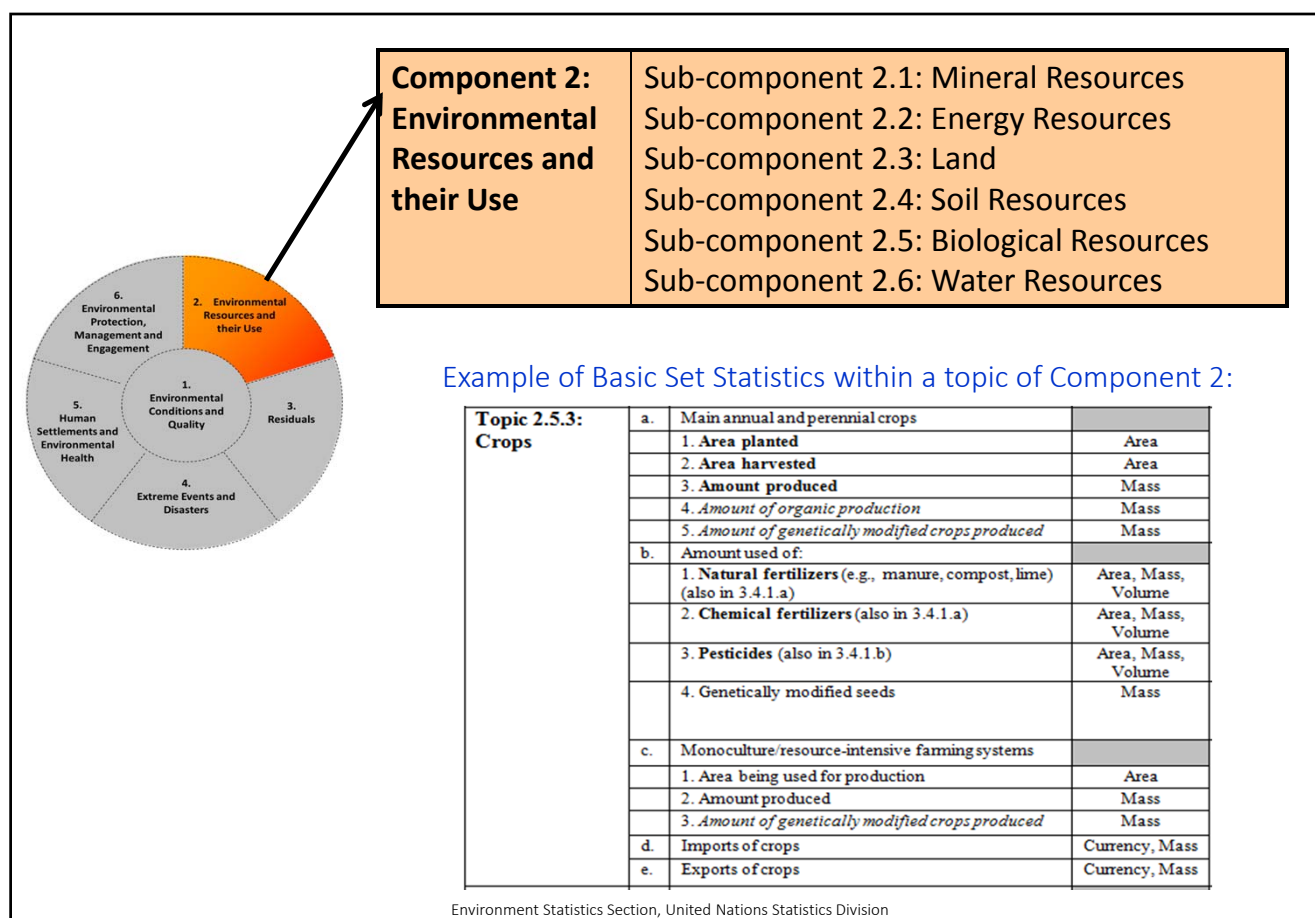


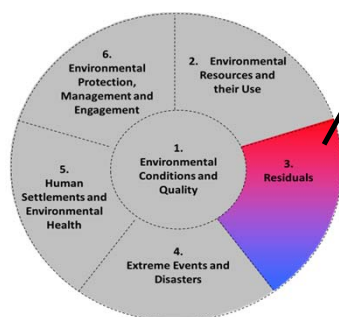
<b>Component 1: Environmental Conditions and Quality</b>	Sub-component 1.1: Physical Conditions Sub-component 1.2: Land Cover, Ecosystems and Biodiversity Sub-component 1.3: Environmental Quality
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Example of Core Set Statistics within a topic of Component 1:

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

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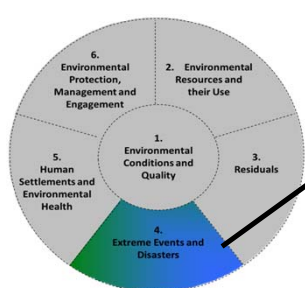


**Component 3:  
Residuals**

- 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:	<b>1. Carbon dioxide (CO<sub>2</sub>)</b>
		<b>2. Methane (CH<sub>4</sub>)</b>
		<b>3. Nitrous oxide (N<sub>2</sub>O)</b>
	b. Total emissions of indirect greenhouse gases (GHGs), by gas:	<b>1. Sulphur dioxide (SO<sub>2</sub>)</b>
<b>2. Nitrogen oxides (NO<sub>x</sub>)</b>		



**Component 4:  
Extreme Events  
and Disasters**

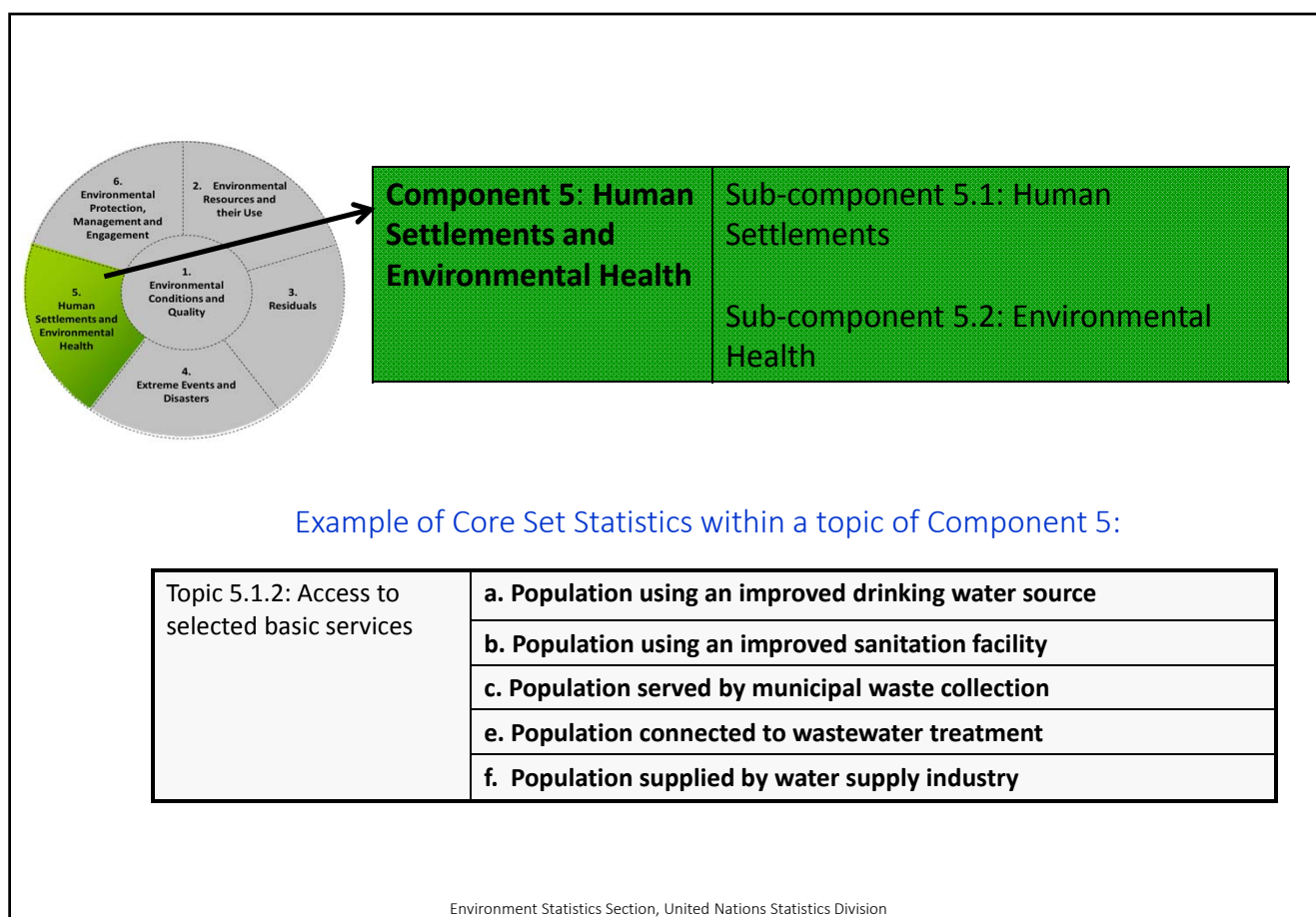
Sub-component 4.1: Natural Extreme Events and Disasters

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

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**Component 6:  
Environmental  
Protection,  
Management and  
Engagement**

Sub-component 6.1: Environmental 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:

<p>Topic 6.1.1: Government environment protection and resource management expenditure</p>	<p>a. Government environment protection and resource management expenditure</p>	<p><b>1. Annual government environmental protection expenditure</b></p>
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## The Basic and the Core Set of Environment Statistics

Implement the core set in the short term!

STATISTICS

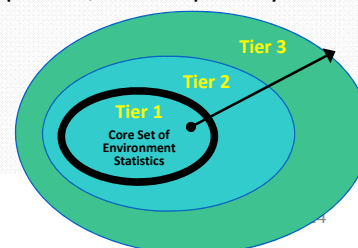


### The Basic Set of Environment Statistics is:

- a comprehensive, but not exhaustive, set of statistics designed to support countries developing environment statistics programmes according to their national priorities for statistical development.
- flexible enough to be adapted to individual countries' environmental concerns, priorities and resources.

3 tiers, based on the level of relevance, availability and methodological development of the statistics:

- Tier 1 corresponds to [the Core Set of Environment Statistics](#).
- As national priorities require and data availability and resources permit, the scope may be widened gradually to include the statistics in Tiers 2 and 3.





## The Basic and the Core Set of Environment Statistics

Implement the core set in the short term!

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The three tiers of statistics are defined as follows:

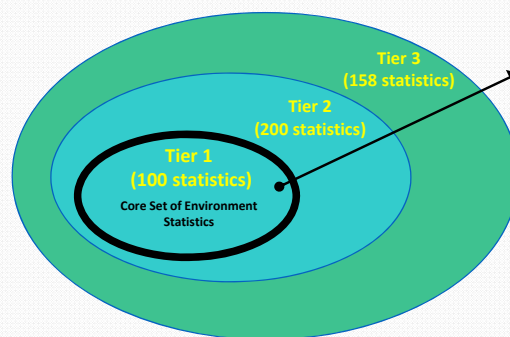
- Tier 1, corresponding to the **Core Set of Environment Statistics**, includes 100 statistics which are of high priority and relevance to most countries and have a sound methodological foundation. It is recommended that countries consider producing them in the **short-term**.
- Tier 2 includes 200 environment statistics which are of priority and relevance to most countries but require greater investment of time, resources or methodological development. It is recommended that countries consider producing them in the **medium-term**.
- Tier 3 includes 158 environment statistics which are either of lower priority or require significant methodological development. It is recommended that countries consider producing them in the **long-term**.

## The Basic and the Core Set of Environment Statistics

 Number of environment statistics in the Basic and Core Set

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Core Set or Tier 1 = 100 statistics  
Basic Set = 458 statistics



Number of Statistics	Component 1	Component 2	Component 3	Component 4	Component 5	Component 6	Total
Tier 1	32	30	19	4	12	3	100
Tier 2	58	51	34	11	22	24	200
Tier 3	51	43	5	16	20	23	158
<b>Total</b>	141	124	58	31	54	50	458

The Basic Set is presented in the FDES structure, supplemented with additional guidance

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Component 4: Extreme Events and Disasters					
Sub-component 4.1: Natural Extreme Events and Disasters					
Topic	Statistics and Related Information		Category of Measurement	Potential Aggregations and Scales	Methodological Guidance
		( <b>Bold Text</b> - Core Set/Tier 1; Regular Text - Tier 2; <i>Italicized Text</i> - Tier 3)			
<b>Topic 4.1.1: Occurrence of natural extreme events and disasters</b>	a.	Occurrence of natural extreme events and disasters		<ul style="list-style-type: none"> <li>• By event</li> <li>• National</li> <li>• Sub-national</li> </ul>	<ul style="list-style-type: none"> <li>• Centre for Research on the Epidemiology of Disasters Emergency Events Database (CRED EMDAT)</li> <li>• UN Economic Commission for Latin America and the Caribbean (UNECLAC) Handbook for Estimating the Socio-economic and Environmental Effects of Disasters</li> <li>• The United Nations Office for Disaster Risk Reduction (UNISDR)</li> </ul>
		<b>1. Type of natural extreme event and disaster</b> (geophysical, meteorological, hydrological, climatological, biological)	Description		
		<b>2. Location</b>	Location		
		<b>3. Magnitude</b> (where applicable)	Intensity		
		<b>4. Date of occurrence</b>	Date		
<b>Topic 4.1.2: Impact of natural extreme events and disasters</b>		<b>5. Duration</b>	Time period		
	a.	People affected by natural extreme events and disasters		<ul style="list-style-type: none"> <li>• By event</li> <li>• By ISIC economic activity</li> <li>• National</li> <li>• Sub-national</li> <li>• By direct and indirect damage</li> </ul>	
		<b>1. Number of people killed</b>	Number		
		<b>2. Number of people injured</b>	Number		
		<b>3. Number of people homeless</b>	Number		
		<b>4. Number of people affected</b>	Number		
	b.	<b>Economic losses due to natural extreme events and disasters</b> (e.g., damage to buildings, transportation networks, loss of revenue for businesses, utility disruption)	Currency	<ul style="list-style-type: none"> <li>• By event</li> <li>• By ecosystem</li> <li>• National</li> <li>• Sub-national</li> </ul>	
	c.	Physical losses/damages due to natural extreme events and disasters (e.g., area and amount of crops, livestock, aquaculture, biomass)	Area, Description, Number		
	d.	Effects of natural extreme events and disasters on integrity of ecosystems			
		<b>1. Area affected by natural disasters</b>	Area		
		<b>2. Loss of vegetation cover</b>	Area		
		<b>3. Area of watershed affected</b>	Area		
		<b>4. Other</b>	Description		
e.	<b>External assistance received</b>	Currency	<ul style="list-style-type: none"> <li>• By event</li> <li>• National</li> </ul>		

- The complete Basic Set can be found at: <http://unstats.un.org/unsd/environment/FDES/BasicSet.htm>



## Applications of the FDES to cross-cutting issues (Chapter 5 of 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



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Climate change statistics



Source: Intergovernmental Panel on Climate Change

Note: Also applicable for the CES Recommendations on CC-related Statistics.

Climate Process Drivers	
Sub-component 1.3: Environmental Quality 1.3.1 Air quality	Sub-component 3.1: Emissions to Air 3.1.1 Emissions of greenhouse gases 3.1.2 Consumption of ozone depleting substances

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

Climate Change Impacts and Vulnerability						
Sub-comp. 1.1: Physical Conditions 1.1.2 Hydrographical characteristics 1.1.4 Soil characteristics	Sub-comp. 1.2: Land Cover, Ecosystems and Biodiversity 1.2.1 Land cover 1.2.2 Ecosystems and biodiversity 1.2.3 Forests	Sub-comp. 1.3: Environmental Quality 1.3.3 Marine water quality	Sub-comp. 2.3: Land 2.3.1 Land use	Sub-comp. 4.1: Natural Extreme Events and Disasters 4.1.2 Impact of natural extreme events and disasters	Sub-comp. 5.1: Human Settlements 5.1.3 Housing conditions	Sub-comp. 5.2: Environmental Health 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 2.2.2 Production, trade and consumption of energy	Sub-comp. 6.1: Environment Protection and Resource Management Expenditure 6.1.1 Government environmental protection and resource management expenditure 6.1.2 Corporate, non-profit institution and household environmental protection and resource management expenditure	Sub-comp. 6.2: Environmental Governance and Regulation 6.2.2 Environmental regulation and instruments 6.2.3 Participation in MEAs and environmental conventions	Sub-comp. 6.3: Extreme Event Preparedness and Disaster Management 6.3.1 Preparedness for natural extreme events and disasters

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## Conclusion – take home messages



Environment statistics is powerful – and the FDES helps us to develop it!

### STATISTICS

**Environment Statistics provides a single set of trusted environmental information which can be used for multiple purposes:**

- Environment-related policy questions
- International comparisons and cross-boundary issues
- Sub-national, national, regional and global indicators
- Information of the general public
- Research
- Etc.

**Why do we need official environment statistics (e.g. next to administrative records)?**

- Official Statistics (fundamental principles applied)
- International framework (FDES) that tries to cover the complexity of the environment and its interactions as a whole
- Statistical quality standards
- Statistical classifications
- Can be integrated with other statistics (e.g. economic and social statistics)
- Accounting frameworks can be applied



Thank you!

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