Introduction to environment statistics

National Workshop on Environment Statistics and Climate Change Statistics

St. George's, Grenada, 12-14 November 2019

Outline

1. Overview of FDES and implementation tools: Basic Set, Methodology sheets, ESSAT, Blueprint for action, NAP (20 min)
2. Data collection methods (10 min)
3. GIS and Earth observation (10 min)
4. Compilation of statistics (10 min)
5. Quality control and validation of Environment Statistics (10 min)
6. Discussion (30 min)

Overview of FDES and implementation tools

Overview of FDES and implementation tools

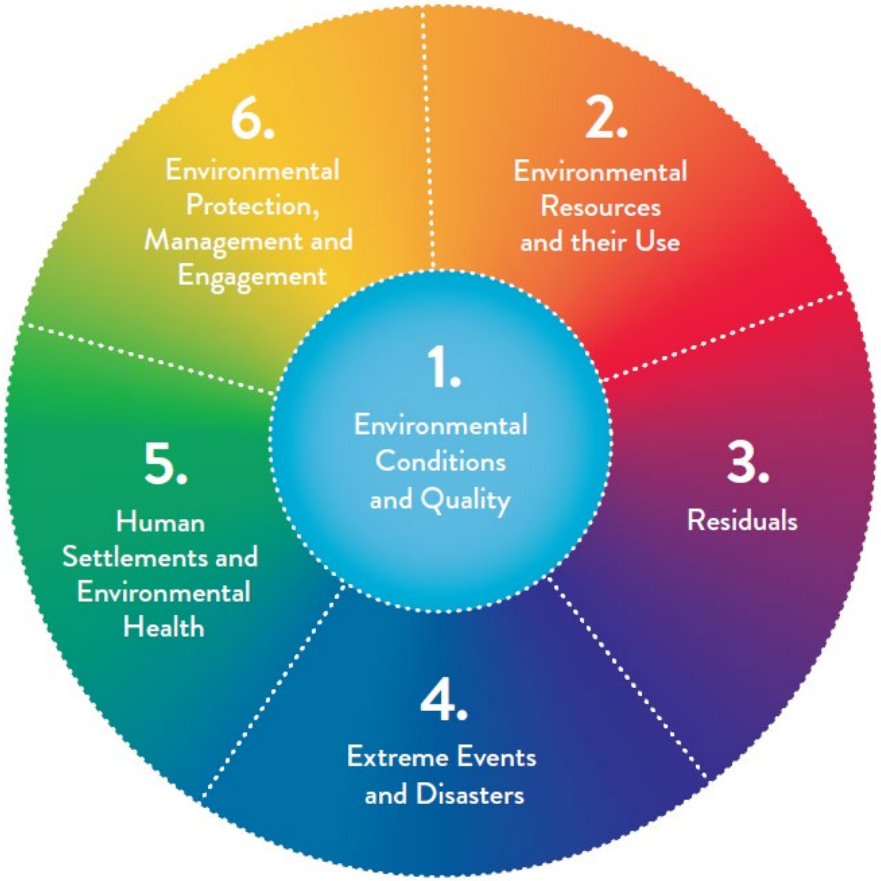
- The UN Statistical Commission endorsed the revised FDES 2013 at its 44th session in 2013 as the framework for strengthening environment statistics programmes in countries.
- The Statistical Commission also recognized the FDES 2013 as a useful tool in the context of sustainable development goals (SDGs) and the post-2015 development agenda.

- The objective are:
  - Help international and regional institutions to support strengthening capacity in countries to develop environment statistics
  - Enhance comparability and availability of environment statistics using a common framework
  - Better inform policy making decisions

FRAMEWORK FOR THE DEVELOPMENT OF ENVIRONMENT STATISTICS (FDES 2013)

https://unstats.un.org/unsd/environment/FDES/FDES-2015-supporting-tools/FDES.pdf

FDES is structured into 6 components

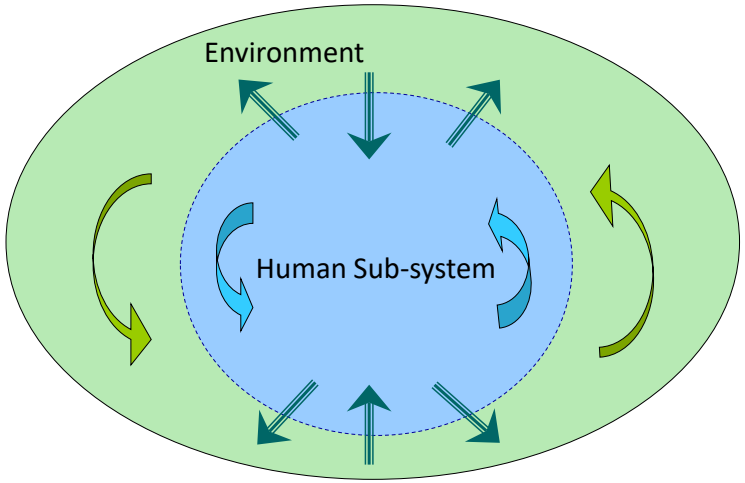


- 6 components
- At the centre: Component 1: Environmental Conditions and Quality
- All of the components relate to each other
- Multi-level (component, sub-component, topic, individual statistics)
- Flexible
- Adaptable

Description of the FDES

Scope of the FDES

- FDES covers biophysical aspects of the environment; aspects of the human sub-system that directly influence the state and quality of the environment, and the impacts of the changing environment on the human sub-system.
- It includes interactions within and among the environment, human activities and natural events.



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	Meteorological, hydrographical, geological, geographical, biological, physical and chemical conditions and characteristics of the environment that determine ecosystems and environmental quality	• ***Geospatial*** • ***Physical*** • ***Qualitative***	• Monitoring and remote sensing data • Environmental, meteorological, hydrological, geological and geographical authorities or 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, and 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 respective national authorities and institutions such as mining, energy, agriculture, water and forest	• *Driving force, Pressure and State elements in DPSIR* • *Asset and physical flow accounts of the SEEA-CF*
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-CF*

Main Attributes of the Components of the FDES (cont.)

FDES Component	Description	Types of Data	Main Sources and Institutions	Relation to DPSIR and the SEEA
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 that work with hazardous substances and processes • Insurance companies	• *Pressure, Impact and Response elements in DPSIR* • *Asset accounts of the SEEA-CF*
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 • Health and administrative records • Housing and urban planning and oversight authorities • Cartographic authorities • Transport authorities • Health authority	• *Driving force, Pressure and Impact elements in DPSIR*
6 Environmental Protection, Management and Engagement	Environmental protection and resource management expenditure, environmental regulation, both direct and via market instruments, disaster preparedness, environmental perception, awareness and engagement of the society	• ***Monetary*** • ***Qualitative***	• Administrative records • Surveys • Entity producing government expenditure statistics • Statistical entity in charge of national or sub-national surveys • Environmental authority and other sector authorities	• *Response element in DPSIR* • *Environmental activity accounts and related flows of the SEEA-CF*

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

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, and the Millennium Development Goals (MDGs), SDGs and the sustainable development indicator (SDI) frameworks.
- When applicable, it is based on existing statistical classifications.
- As such, the FDES facilitates data integration within environment statistics and with economic and social statistics.

Methodological Development and Dissemination of Knowhow

https://unstats.un.org/unsd/envstats/index.cshtml

Methodology

Methodological work includes the elaboration of frameworks, concepts, methods, definitions, and data compilation guidelines to support the development and harmonization of national and international statistics on the environment.

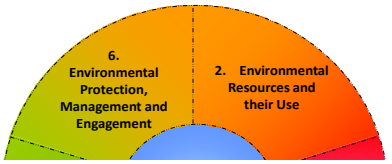
- FDES 2013
- Basic Set of Environment Statistics
- Environment Statistics Self-Assessment Tool
- Expert Group on Environment Statistics
- Manual on the Basic Set of Environment Statistics
- International Recommendations for Water Statistics
- Environmental surveys
- Concepts and Methods of Environment Statistics
- Glossary

Capacity Development

Technical cooperation, training and capacity building is provided through regional and sub-regional projects, international training workshops, fellowship arrangements and assistance to countries. Recent projects covered the countries of the CARICOM, ESCWA, ECOWAS and EAC regions.

- COMESA
- EAC project
- ECOWAS project
- ESCWA project
- CARICOM project
- Workshops

Basic Set of Environment Statistics
and
Manual of the Basic Set



Basic Set of Environment Statistics

28 August 2018

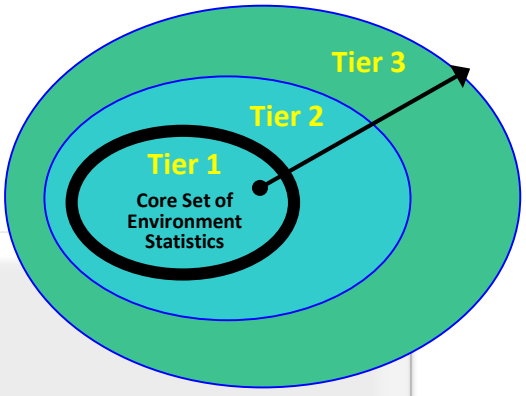
Component 1: Environmental Conditions and Quality

Sub-component 1.1: Physical Conditions

Topic	Statistics and Related Information (**Bold Text - Core Set/Tier 1**; Regular Text - Tier 2; *Italicized Text - Tier 3*)		Category of Measurement	Potential Aggregations and Scales	Methodological Guidance
Topic 1.1.1: Atmosphere, climate and weather	a.	Temperature		▪ National ▪ Sub-national	▪ World Meteorological Organization (WMO) ▪ Intergovernmental Panel on Climate Change (IPCC) ▪ National Oceanic and Atmospheric Administration (NOAA)/National Aeronautics and Space Administration (NASA)
		1. **Monthly average**	Degrees		
		2. **Minimum monthly average**	Degrees		
		3. **Maximum monthly average**	Degrees		
	b.	Precipitation (also in 2.6.1.a)			
		1. **Annual average**	Height		
		2. **Long-term annual average**	Height		
		3. Monthly average	Height		
		4. Minimum monthly value	Height		
		5. Maximum monthly value	Height		
	c.	Relative humidity			
		1. Minimum monthly value	Number		
		2. Maximum monthly value	Number		
	d.	Pressure		▪ National ▪ Sub-national ▪ By station	
		1. *Minimum monthly value*	Pressure unit		
		2. *Maximum monthly value*	Pressure unit		
	e.	Wind speed			
		1. *Minimum month*			
		2. *Maximum month*			
	f.	Solar radiation			
		1. *Average daily v*			
		2. *Average monthly*			

- BSES is available in all UN official languages: https://unstats.un.org/unsd/envstats/fdes/basicset.cshtml
- All statistical tables from chapter 3 included, on 44 pages document
- From Basic set to core set in chapter 4

Why do we need a Basic Set of Environment Statistics?



- The Basic Set was developed in response to:
  - country demand;
  - relevance of the statistics to environmental policies/issues;
  - corresponding FDES topics.

- The statistics contained in the Set are useful for:
  - generating national sets or databases of environment statistics.
  - reporting on environment (MEAs) or sustainable development (SDGs).
  - calculating environmental indicators.
  - generating environmental-economic accounts.

The Basic and the Core Set of Environment Statistics

Basic Set of Environment Statistics

- A comprehensive but not exhaustive set of statistics - supports national environment statistics programmes
- Map priority policy needs to statistics – helps determine priority environment statistics for national environment statistics programme
- It is flexible - 458 statistics – not all to be collected at once, structured at 3 tiers. Start with main priorities given available resources

Core Set of Environment Statistics

- Tier 1 of the Core Set of Environment Statistics
- Indicates the most relevant and available environment statistics, with sound methodological foundation
- Often initial focus for national environment statistics programmes

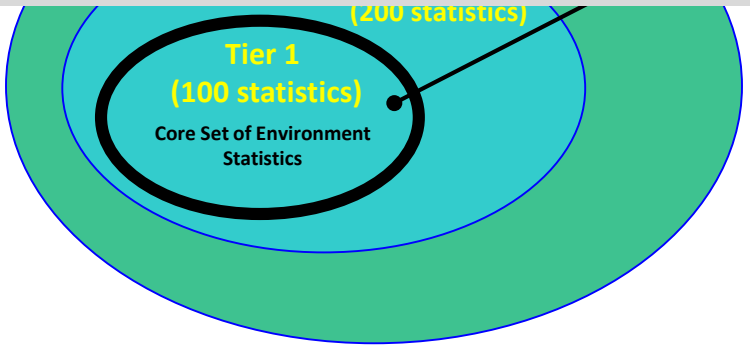
What were the selection criteria of the Core Set

- **Relevance:** meets needs of a variety of users and is responsive to changes in the environment and related human activities
- **Measurability:** sufficient supporting data and meta-data readily available, of accepted quality, and regularly updated, or possible to compile the statistics in the near term
- Methodological soundness: Core statistics should adhere to professional and scientific methods, as well as to internationally agreed concepts and definitions to the extent possible.

Do you remember what the components are?

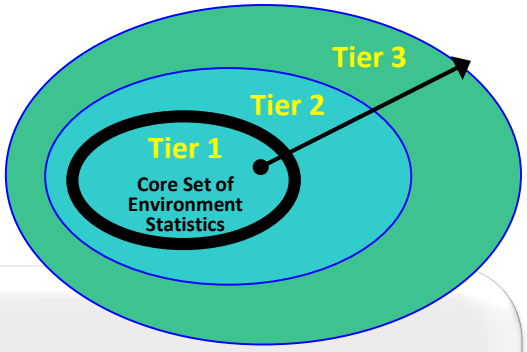
Component 1: Environmental Conditions and Quality
Component 2: Environmental Resources and their Use
Component 3: Residuals
Component 4: Extreme Events and Disasters
Component 5: Human Settlements and Environmental Health
Component 6: Environmental Protection, Management and Engagement

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
Total	141	124	58	31	54	50	458

The Basic Set and its three tiers of statistics



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**.

Core set statistics

- Temperature, precipitation, watersheds
- Coastal waters, coastlines, coastal areas
- Soil types, erosion, desertification
- Ecosystems and their extent, flora and fauna
- Protected areas, forest area, land cover types extent
- Air quality, freshwater quality, marine water quality

Number of Statistics	Component 1	Component 2	Component 3	Component 4	Component 5	Component 6	Total
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Tier 2	58	51	34	11	22	24	200
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Reason

FRAMEWORK FOR THE DEVELOPMENT OF ENVIRONMENT STATISTICS (FDES 2013)

- **Scope of environment statistics**
- **Organizing structure**
- **Comprehensive, though not extensive, list of statistics (Basic Set of Environment Statistics)**
- **Relevance of the statistical topics, the typical data sources and institutional partners and information on the most important aspects of temporal and spatial aggregation, as well as on existing methodology**

FDES 2013 does not include:

- Methodological guidance with regard to the collection and compilation of environmental data and its transformation into statistics.
- Practical and detailed guide to many of the Basic Set themes, including:
  - variable definitions,
  - description of sources and data collection,
  - methods of data compilation/processing for environment statistics production,
  - quality control and validation
  - methods of presentation and dissemination and
  - Applications in SDGs, SEEA, common indicators, etc.

Manual of the BSES
Guidance on Indicators using FDES Statistics

Manual on the Basic Set of Environment Statistics

The objective of the Manual is to produce and disseminate a set of methodology sheets or metadata for the collection or compilation of all environment statistics of the Basic Set of Environment Statistics embedded in the FDES 2013. The template for these methodology sheets has been agreed by the Expert Group on Environment Statistics (EGES).

These methodology sheets offer detailed and in-depth methodological guidance including definitions, classifications, statistical methods for collection and/or compilation, dissemination and main uses of the sets of the respective environment statistics. These aspects are provided by the standards and guidelines established by lead agencies in the relevant fields, such as FAO, UNFCCC and UN-HABITAT, which ensures that the methodology sheets utilize established international best practices. The references can be found with the respective definitions and classifications.

The work on the Manual is being coordinated by UNSD and is being carried out in a collaborative way with the EGES and other thematic experts from specialized agencies as needed. The experience of this global group is being utilized in order to construct up to date, hands-on guidance to benefit practitioners working in environment statistics in different countries.

As there are 458 environment statistics identified in the Basic Set of Environment Statistics, their methodology sheets are being developed in a modular and progressive manner. The available volumes (sets) of methodology sheets are disseminated below.

- MS 1.1.4 Soils new
- MS 1.2.2 Ecosystems and Biodiversity Statistics
- MS 1.2.1 & 2.3.1 Land Cover and Land Use
- MS 1.2.3, 2.3.2, 2.5.1 & 2.5.5 Forests
- MS 1.3.1 Air Quality new
- MS 2.1 Mineral Resources
- MS 2.2 Energy Resources
- MS 2.5 Crops and Livestock Statistics
- MS 2.6 Water Resources
- MS 3.3.1 & 3.3.2 Generation and Management of Waste new
- MS 5.1 Human Settlements
- MS 6.1.1 Environmental Protection Expenditures

Manual of the BSES

Manual on the Basic Set of Environment Statistics
of the FDES 2013

Water Resources
Statistics

(Sub-component 2.6 Water Resources
of the Basic Set of Environment Statistics of the FDES 2013)

Elaborated by the Environment Statistics Section
of the United Nations Statistics Division,
in collaboration with the
Expert Group in Environment Statistics.

Version 1.0
7 June 2017

Methodology sheet of the Basic Set of Environment Statistics of the FDES:
http://unstats.un.org/unsd/environment/FDES/Manual_BSES.htm
http://unstats.un.org/unsd/environment/fdes.htm

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

Component 2: Environmental Resources and their Use				
Sub-component 2.6: Water Resources				
Statistics and Related Information (**Bold Text - Core Set/Tier 1**; Regular Text - Tier 2; *Italicized Text - Tier 3*)		**Category of Measurement**	**Potential Aggregations and Scales**	**Methodological Guidance**
Topic 2.6.1: Water resources				
a.	Inflow of water to inland water resources		• National • Sub-national • By territory of origin and destination	• UNSD: IRWS • UNECE Standard Statistical Classification of Water Use (1989) • UNSD: MDG Indicator 7.5 Metadata • FAO AQUASTAT • SEEA Central Framework (2012) asset accounts • SEEA Water • UNSD: Environment Statistics Section-Water Questionnaire
	1. **Precipitation** (also in 1.1.1.b)	Volume		
	2. **Inflow from neighbouring territories**	Volume		
	3. *Inflow subject to treaties*	Volume		
b.	Outflow of water from inland water resources			
	1. **Evapotranspiration**	Volume		
	2. Outflow to neighbouring territories	Volume		
	3. Outflow subject to treaties	Volume		
	4. Outflow to the sea	Volume		
c.	Inland water stocks		• National • Sub-national	
	1. Surface water stocks in artificial reservoirs	Volume		
	2. Surface water stocks in lakes	Volume		
	3. *Surface water stocks in rivers and streams*	Volume		
	4. *Surface water stocks in wetlands*	Volume		
	5. *Surface water stocks in snow, ice*	Volume		

Contents of the Manuals

Plan of Work

1. Preparation

This stage includes the preparatory work to be carried out by UNSD, including the following tasks:

- Prepare work programme, metadata template
- Discuss with experts
- Distribute work among experts

2. Elaboration of draft methodology/metadata sheets

- Elaboration of methodology/metadata sheets (filling all fields of template) for the topics/statistics by responsible experts: UNSD, EGES, other experts from specialized agencies as needed.

3. Review and finalization

- The peer review of the drafts of the methodological sheets is carried out on a continuous basis as drafts become available. Both national and international experts are called upon to review submitted methodology/metadata sheets before their finalization.

4. Dissemination

- The methodology sheets when finalized is disseminated through the website.

https://unstats.un.org/unsd/envstats/fdes/manual_bses.cshtml

Topics covered by Methodology Sheets

Component 1: Environmental Conditions and Quality	Component 2: Environmental Resources and their Use	Component 3: Residuals
Sub-component 1.1: Physical Conditions	**Sub-component 2.1: Mineral Resources**	**Sub-component 3.1: Emissions to Air**
Topic 1.1.1: Atmosphere, climate and weather	Topic 2.1.1: Stocks and changes of mineral resources	Topic 3.1.1: Emissions of greenhouse gases
Topic 1.1.2: Hydrographical characteristics	Topic 2.1.2: Production and trade of minerals	Topic 3.1.2: Consumption of ozone depleting substances
Topic 1.1.3: Geological and geographical information	**Sub-component 2.2: Energy Resources**	Topic 3.1.3: Emissions of other substances
Topic 1.1.4: Soil characteristics	Topic 2.2.1: Stocks and changes of energy resources	**Sub-component 3.2: Generation and Management of Wastewater**
Sub-component 1.2: Land Cover, Ecosystems and Biodiversity	Topic 2.2.2: Production, trade and consumption of energy	Topic 3.2.1: Generation and pollutant content of wastewater
Topic 1.2.1: Land cover	**Sub-component 2.3: Land**	Topic 3.2.2: Collection and treatment of wastewater
Topic 1.2.2: Ecosystems and biodiversity	Topic 2.3.1: Land use	Topic 3.2.3: Discharge of wastewater to the environment
Topic 1.2.3: Forests	Topic 2.3.2: Use of forest land	**Sub-component 3.3: Generation and Management of Waste**
Sub-component 1.3: Environmental Quality	**Sub-component 2.4: Soil Resources**	Topic 3.3.1: Generation of waste
Topic 1.3.1: Air quality	Topic 2.4.1: Soil resources	Topic 3.3.2: Management of waste
Topic 1.3.2: Freshwater quality	**Sub-component 2.5: Biological Resources**	**Sub-component 3.4: Release of Chemical Substances**
Topic 1.3.3: Marine water quality	Topic 2.5.1: Timber resources	Topic 3.4.1: Release of chemical substances
Topic 1.3.4: Soil pollution	Topic 2.5.2: Aquatic resources	
Topic 1.3.5: Noise	Topic 2.5.3: Crops	
	Topic 2.5.4: Livestock	
	Topic 2.5.5: Other non-cultivated biological resources	
	Sub-component 2.6: Water Resources	
	Topic 2.6.1: Water resources	
	Topic 2.6.2: Abstraction, use and returns of water	

Complete
Draft under review
Not started

Topics covered by Methodology Sheets

Component 4: Extreme Events and Disasters	Component 5: Human Settlements and Environmental Health	Component 6: Environmental Protection, Management and Engagement
Sub-component 4.1: Natural Extreme Events and Disasters	**Sub-component 5.1: Human Settlements**	**Sub-component 6.1: Environmental protection and resource management expenditure**
Topic 4.1.1: Occurrence of natural extreme events and disasters	Topic 5.1.1: Urban and rural population	Topic 6.1.1: Government environmental protection and resource management expenditure
Topic 4.1.2: Impact of natural extreme events and disasters	Topic 5.1.2: Access to selected basic services	Topic 6.1.2: Corporate, non-profit institution and household environmental protection and resource management expenditure
Sub-component 4.2: Technological Disasters	Topic 5.1.3: Housing conditions	**Sub-component 6.2: Environmental Governance and Regulation**
Topic 4.2.1: Occurrence of technological disasters	Topic 5.1.4: Exposure to ambient pollution	Topic 6.2.1: Institutional strength
Topic 4.2.2: Impact of technological disasters	Topic 5.1.5: Environmental concerns specific to urban settlements	Topic 6.2.2: Environmental regulation and instruments
	Sub-component 5.2: Environmental Health	Topic 6.2.3: Participation in MEAs and environmental conventions
	Topic 5.2.1: Airborne diseases and conditions	Topic 6.3.1: Preparedness for natural extreme events and disasters
	Topic 5.2.2: Water-related diseases and conditions	Topic 6.3.2: Preparedness for technological disasters
	Topic 5.2.3: Vector-borne diseases	**Sub-component 6.4: Environmental Information and Awareness**
	Topic 5.2.4: Health problems associated with excessive UV radiation exposure	Topic 6.4.1: Environmental Information
	Topic 5.2.5: Toxic substance- and nuclear radiation-related diseases and conditions	Topic 6.4.2: Environmental Education
		Topic 6.4.3: Environmental Perception and Awareness
		Topic 6.4.4: Environmental engagement

Complete
Draft under review
Not started

More Tools to Support Implementation

Knowledge Portal

Methodology

Methodological work includes the elaboration of frameworks, concepts, methods, definitions, and data compilation guidelines to support the development and harmonization of national and international statistics on the environment.

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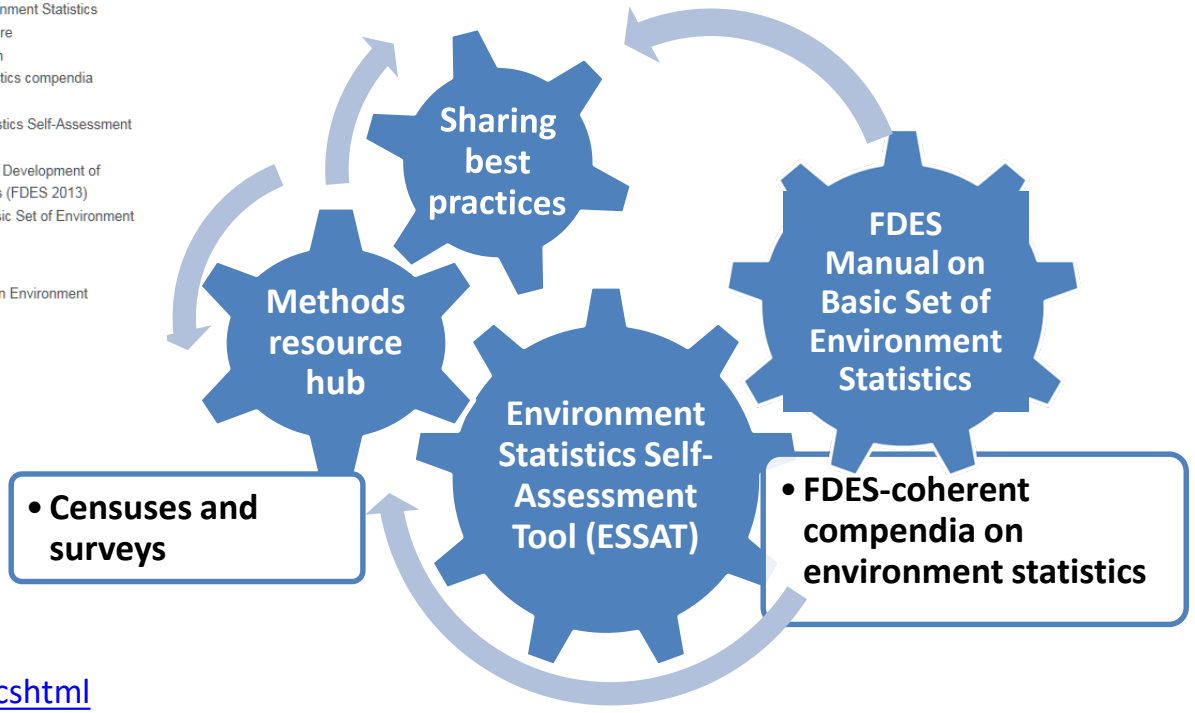
- COMESA
- EAC project
- ECOWAS project
- ESCWA project
- CARICOM project
- Workshops

FDES 2013

- Basic Set of Environment Statistics
- FDES 2013 brochure
- Blueprint for Action
- Environment statistics compendia applying FDES 2013
- Environment Statistics Self-Assessment Tool
- Framework for the Development of Environment Statistics (FDES 2013)
- Manual on the Basic Set of Environment Statistics

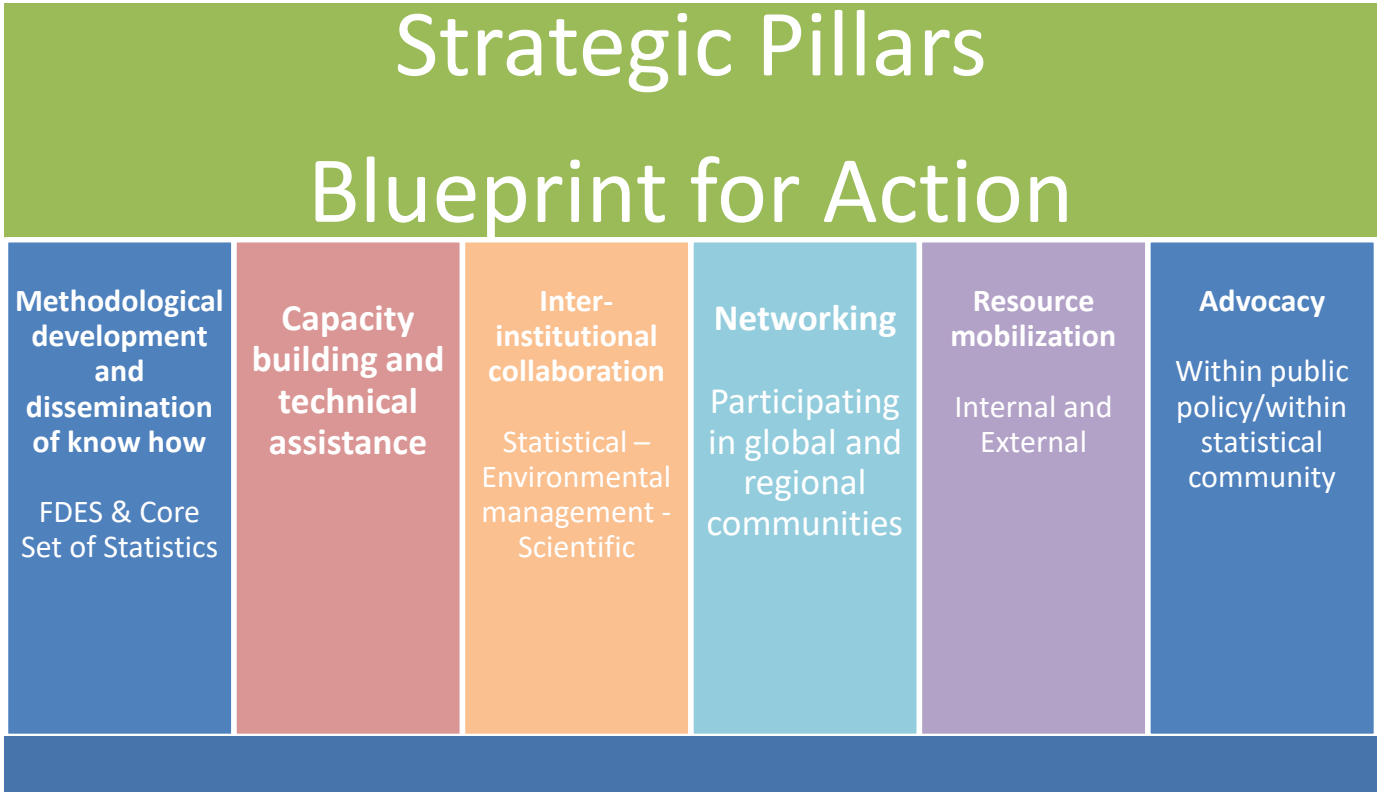
Expert Group on Environment Statistics



https://unstats.un.org/unsd/envstats/index.cshtml

Blueprint for Action, 2013

(also adopted at 44 Session of Stat. Commission)



https://unstats.un.org/unsd/statcom/doc13/BG-FDES-Environment_Blueprint.pdf

National Action Plan - template

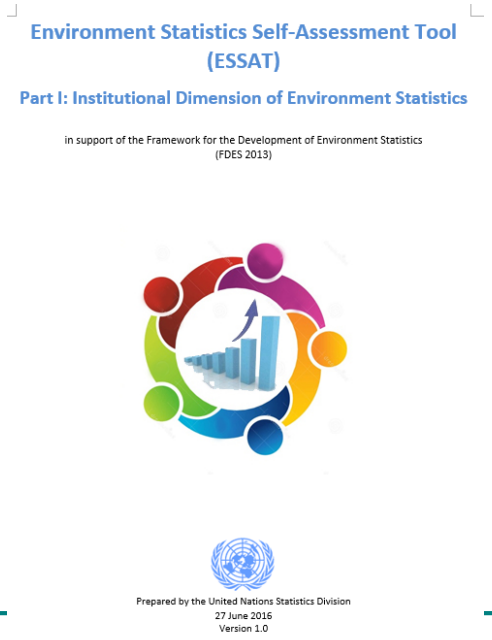
Key considerations

- National statistics system
- Data providers
- Data storage, management and quality control
- Statistics compilation dissemination
- Users needs and data services

The Environment Statistics Assessment & Environment Statistics Self-Assessment Tool

What is it?

- The full ESSAT is composed of two parts
  I. Institutional Dimension of Environment Statistics
  II. Statistics Level Assessment



United Nations Statistics Division

ESSAT Par
of E

A. Identification of institutions
B. Existing national policies rel
C. Mandate and organization
D. Mandate and organization
E. Production of environment
F. Uses of environment statist
G. Inter-institutional collabora
H. Existing and required resou
I. International and regional
J. Technical assistance and tra
K. The way forward in environ

Start date (dd/mm/yyyy):

Completion date (dd/mm/yyyy): Country:

G. Inter-institutional collaboration for the production of

K. The way forward in environment statistics

K1. In which areas are there plans to strengthen and develop environment statistics programmes, units and/or activities in the country?

Legal framework (describe)	
Institutional set up (describe)	
Budgetary resources (describe)	
Human resources (describe)	
Technical assistance and training (describe)	
Advocacy (describe)	
Other (describe)	

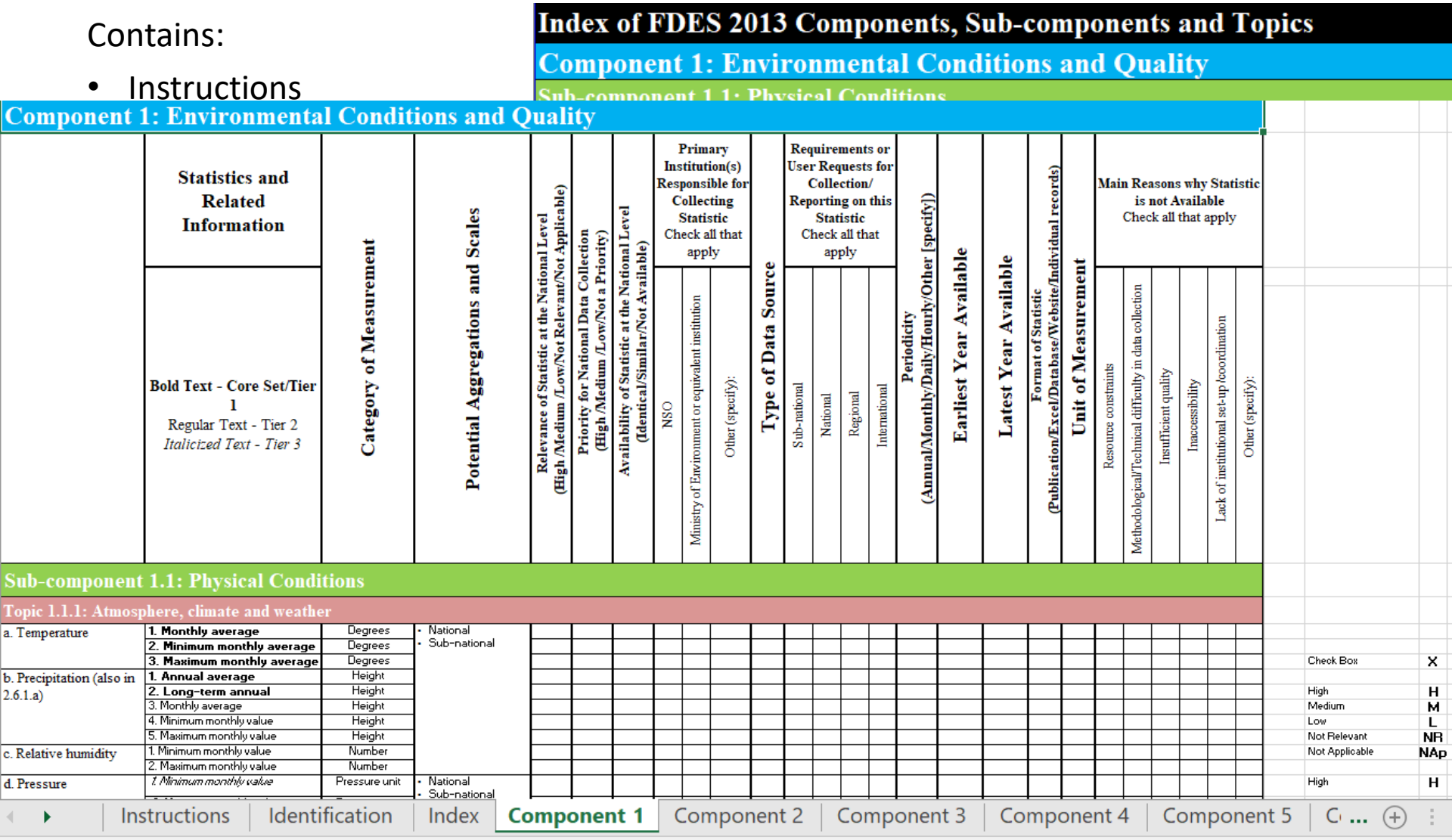
K2. What are the main vehicles through which the country requires technical assistance and capacity building to develop environment statistics?

- ☐ Manuals/technical guidance in the language used in the country
- ☐ Regional/sub-regional workshops
- ☐ National workshops
- ☐ Country visits/study tours
- ☐ Bilateral consultations
- ☐ E-learning
- ☐ Networking
- ☐ Other (describe)

ESSAT Part II: Statistics Level Assessment

Contains:

- Instructions



Index of FDES 2013 Components, Sub-components and Topics

Component 1: Environmental Conditions and Quality

Sub-component 1.1: Physical Conditions

Component 1: Environmental Conditions and Quality

	Statistics and Related Information Bold Text - Core Set/Tier 1 Regular Text - Tier 2 *Italicized Text - Tier 3*	Category of Measurement	Potential Aggregations and Scales	Relevance of Statistic at the National Level (High /Medium /Low/Not Relevant/Not Applicable)	Priority for National Data Collection (High /Medium /Low/Not a Priority)	Availability of Statistic at the National Level (Identical/Similar/Not Available)	Primary Institution(s) Responsible for Collecting Statistic Check all that apply: NSO	Primary Institution(s) Responsible for Collecting Statistic Check all that apply: Ministry of Environment or equivalent institution	Primary Institution(s) Responsible for Collecting Statistic Check all that apply: Other (specify):	Type of Data Source	Requirements or User Requests for Collection/ Reporting on this Statistic Check all that apply: Sub-national	Requirements or User Requests for Collection/ Reporting on this Statistic Check all that apply: National	Requirements or User Requests for Collection/ Reporting on this Statistic Check all that apply: Regional	Requirements or User Requests for Collection/ Reporting on this Statistic Check all that apply: International	Periodicity (Annual/Monthly/Daily/Hourly/Other [specify])	Earliest Year Available	Latest Year Available	Format of Statistic (Publication/Excel/Database/Website/Individual records)	Unit of Measurement	Main Reasons why Statistic is not Available Check all that apply: Resource constraints	Main Reasons why Statistic is not Available Check all that apply: Methodological/Technical difficulty in data collection	Main Reasons why Statistic is not Available Check all that apply: Insufficient quality	Main Reasons why Statistic is not Available Check all that apply: Inaccessibility	Main Reasons why Statistic is not Available Check all that apply: Lack of institutional set-up /coordination	Main Reasons why Statistic is not Available Check all that apply: Other (specify):
Sub-component 1.1: Physical Conditions																										
Topic 1.1.1: Atmosphere, climate and weather																										
a. Temperature	**1. Monthly average**	Degrees	• National • Sub-national																							
	2. Minimum monthly average	Degrees																								
	3. Maximum monthly average	Degrees																								
b. Precipitation (also in 2.6.1.a)	**1. Annual average**	Height																								
	2. Long-term annual	Height																								
	3. Monthly average	Height																								
	4. Minimum monthly value	Height																								
	5. Maximum monthly value	Height																								
c. Relative humidity	1. Minimum monthly value	Number																								
	2. Maximum monthly value	Number																								
d. Pressure	*1. Minimum monthly value*	Pressure unit	• National • Sub-national																							

Check Box	X
High	H
Medium	M
Low	L
Not Relevant	NR
Not Applicable	NAp
High	H

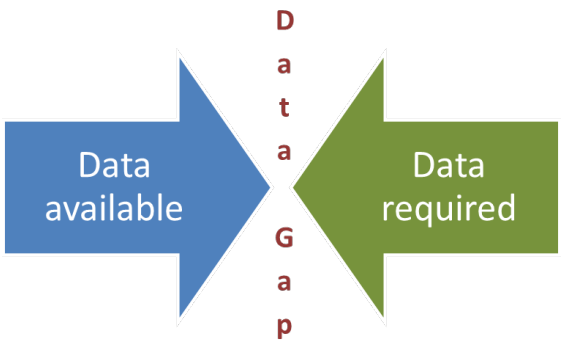
Instructions | Identification | Index | Component 1 | Component 2 | Component 3 | Component 4 | Component 5 | C ...

1. Aim of the assessment

- Which institutions are involved
- What data is available (ESSAT Part II)
- What data is needed
  - For national environment policies
  - Reporting for Multilateral Environment Agreements and SDGs

- To identify the data gaps/additional data needed by comparing data availability with need
- To identify the capacity development needs to meet existing needs and fill data gaps
- To prioritize data needed

1. Aim of the assessment



Data products

- Compendia
- Database
- Reporting to MEAs
- Reporting on SDGs

Action Plan

- Strategic Objectives
- Outputs and activities
- Budget and Workplan

Capacities needed to meet data gap

3. Data availability

- Existing compendia, year-books are good to start with
- Producers should identify which statistics they produce and record on ESSAT
- Statistics can go beyond those listed if related to the environment and nationally relevant
  - E.g. some countries include tourism related statistics

Use of the Environment Statistics Self-Assessment Tool Process

- Guides a multi-stakeholder consultation and discussion process.
- Process led by the National Statistical Office or the Ministry of Environment
- Joint effort by all main relevant stakeholders in environment statistics
- Convene stakeholders: agree on process, conduct assessment with each stakeholder
- Validation of assessment for each stakeholder and as a group – agree on picture of environment statistics in country as a group, in open and transparent manner
- Country can convene stakeholders under existing or new committee, inter-institutional working group or task force to bring together all the stakeholders

Capacity building and technical assistance

Capacity building and technical assistance

- Activities with DA 9 and 10 projects and UNSD regular programme of technical cooperation
- Delivering in kind contributions with partners
- Regional, sub-regional and national workshops, national capacity development
- Development of training material and delivery of e-learning course

UNSD activities

Regional workshops to disseminate FDES

- Common Market for Eastern and Southern Africa (COMESA), Mauritius (Jan 2015)
- East African Community (EAC), Tanzania (July 2015)
- Economic Community of West African States (ECOWAS), Togo (Oct 2015)
- Economic Community of Central African States (ECCAS), Gabon (Nov 2017)
- Economic and Social Commission for Western Asia (ESCWA), Lebanon (Nov 2018)
- UNECA regional workshop (Kenya)(Sep 2017)
- Caribbean Community (CARICOM) (Nov 2019)

National workshops such as: Kenya, Uganda, Egypt (with COMESA), Rwanda, Tanzania, Burundi, Gambia, Namibia, Equatorial Guinea, Grenada

Countries conducting or initiating Environment Statistics Self-Assessment Tool (ESSAT)

ESSAT: https://unstats.un.org/unsd/envstats/fdes/essat.cshtml

Countries compiling FDES-coherent compendia

All compendia available at: https://unstats.un.org/unsd/envstats/fdescompendia.cshtml

Data collection methods in Environment Statistics – Characteristics and Challenges

1. Main users of environment statistics

The type, the level of thematic, spatial and temporal aggregation, and the format of environment statistics depend on the type of user and the intended purpose of use.

Users	Main Types of Environment Statistics
Policy and Decision Makers	**Environmental indicators and more aggregated statistics**
General Public (including media and civil society)	**Environmental indicators and more aggregated statistics**
Analysts, Researchers, and Academia	**Extensive and detailed environment statistics**

Products of Environment Statistics

Common products of environment statistics are:

- Detailed descriptive environment statistics series
- Environmental indicators

Both can be:

- Stored in multi-purpose databases
- Disseminated in the form of:
  - Online databases
  - Publications (e.g. compendia, yearbooks)
  - Thematic reports
  - Analytical publications (e.g.,state of the environment reports)

2. Environmental information, data, statistics and indicators

Examples of quantitative environmental information
Environmental data
Environment statistics
Environmental indicators
Environmental indices
Environmental-economic accounts

2. Environmental information, data, statistics and indicators

Environmental information

- Environmental information describes quantitative, qualitative or geographically referenced facts representing the state of the environment and its changes.
- **Quantitative environmental information**
  - **Consists of data, statistics and indicators and is generally disseminated through databases, spreadsheets, compendia and yearbook type products.**
- Qualitative environmental information
  - Consists of descriptions (e.g. textual, pictorial) of the environment or its constituent parts that cannot be adequately represented by accurate quantitative or geographically referenced descriptors.
- Geographically referenced environmental information
  - Provides facts on the environment and its components using digital maps, satellite imagery and other sources linked to a location or map feature.

Environmental data

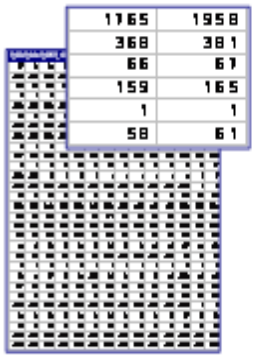
- Environmental data are large amounts of unprocessed observations and measurements about the environment (or its components) and related processes.
- They can be collected or compiled by:
  - NSOs, environmental ministries, sectoral authorities (water, forest, mining, etc.)
  - Using different types of sources:
    - Statistical surveys (censuses or sample surveys)
    - Administrative records, registers, and inventories
    - Monitoring networks, remote sensing, scientific research, and field studies.

Environment statistics

- Environment statistics structure, synthesize and aggregate environmental and other data according to statistical methods, standards and procedures.
- Environment statistics process environmental data into meaningful statistics describing the state and trends of the environment and the main processes affecting it.
- Not all environmental data are used in the production of environment statistics.
  - The FDES provides a framework that identifies environmental data that fall within its scope
  - The FDES contributes to structuring, synthesizing and aggregating data into statistical series and indicators

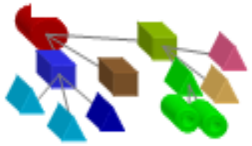
	LINK Transaction Volumes (millions)				
Month	2007	2008	2009	2010	2011
Jan	208.00	214.00	224.90	224.00	232.90
Feb	204.50	224.00	216.40	224.20	229.90
Mar	236.10	234.00	245.20	253.90	259.79
Apr	226.30	232.00	241.06	252.20	259.70
May	237.90	251.50	255.19	262.00	262.20
Jun	233.80	235.90	246.00	255.00	257.48
Jul	231.60	244.70	251.30	266.70	268.04
Aug	236.00	244.21	247.60	256.30	259.24
Sep	229.00	237.22	244.00	253.30	260.52
Oct	239.00	250.40	260.20	263.10	268.06
Nov	234.00	236.70	241.00	246.60	
Dec	230.00	237.20	244.00	242.00	
Total	2,746.20	2,841.83	2,916.85	2,999.30	2,557.83

Environment statistics units compile, collect, validate, describe and structure environmental data to produce environment statistics series



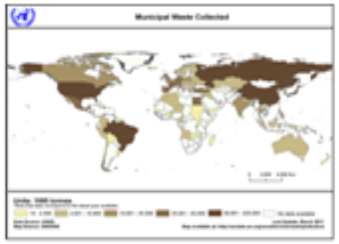
Data & Microdata

Validation



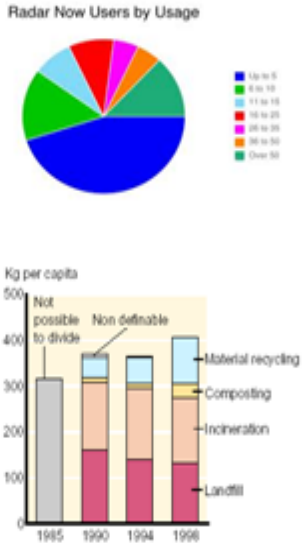
Structure

Metadata (description)



Statistics (Compendia & Databases)

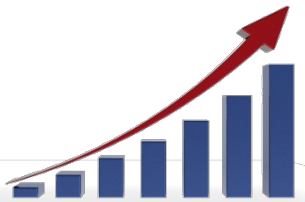
Statistics, selection & processing



Indicators

Statistical process: from raw data to statistics and indicators

Environmental indicators

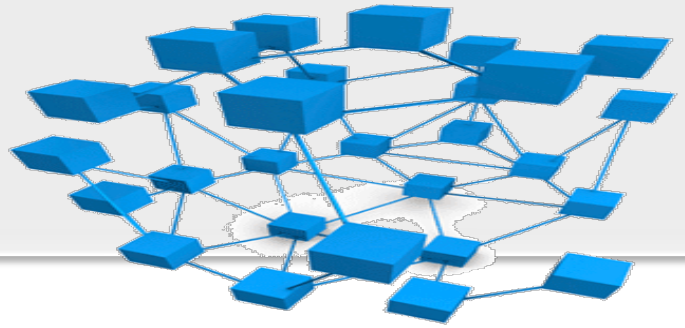


- Environmental indicators:
  - are environment statistics that are in need of further processing and interpretation. Environment statistics are usually too numerous and detailed to satisfy the needs of policy makers and the general public
- Environmental indicators:
  - Synthesize and present complex statistics
  - Are measures that summarize, simplify and communicate information
  - Define objectives, assess present and future direction with respect to goals and targets
  - Evaluate specific programmes, demonstrate progress, measure changes in a specific condition or situation over time.
  - Determine impact of programmes and conveying messages.

Policy frameworks such as the S**ustainable Development Goal indicator framework** are used for the identification and structuring of indicators

3. Sources of environment statistics

- Environment statistics synthesize data originating from a wide range of source types.
- Data used for the production of environment statistics are compiled by many different collection techniques and institutions.
- Understanding and knowing pros and cons of each source is key in environment statistics production

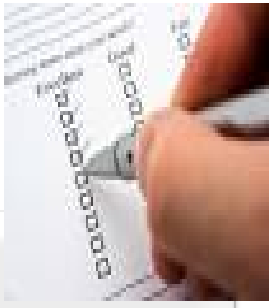


3. Sources of environment statistics

Types of sources

1. Statistical surveys (i.e., 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 in charge of natural resources as well as other ministries or authorities
3. Remote sensing and thematic mapping (i.e., satellite imaging of land use, water bodies or forest cover)
4. Monitoring systems (i.e., field-monitoring stations for water quality, air pollution, temperature, etc.)
5. Scientific research and special research projects undertaken to fulfill national or international demand

3. Sources of environment statistics



Statistical Surveys

(a) **Censuses**: collection of data from the entire population of interest

(b) **Sample Surveys**: carried out using a sampling method, in which data are collected from a representative portion of the population of interest

Environment statistics can be collected from surveys by:

(i) adding environment-related questions (modules) to surveys primarily intended to collect data on other topics

(ii) using surveys primarily intended to collect environment statistics

When environmental data are collected through environment statistics surveys, the survey is designed according to its objective of producing environment statistics.

- Environment statistics surveys are not always feasible or economical with restricted budgets
- Many environment-related surveys and censuses are available at: https://unstats.un.org/unsd/envstats/censuses/

Administrative records

Administrative data kept by **government agencies and other organizations** may be used for the production of environment statistics

Advantage:

- Cost of collecting such data is significantly less than establishing and conducting a survey
- Level of response burden is minimized
- Complete coverage is assured of units under administration

Possible Limitations:

- Differences between administrative and statistical terms and definitions
- Risk of deliberate misreporting
- Data may not be checked or validated for statistical purposes; there may be restrictions of access to the data
- Coverage of data, though complete for administrative purposes, might not match statistical requirements

Remote Sensing and Thematic Mapping

Remote sensing is the science of obtaining information about objects or areas from a distance, typically from aircraft or satellites.

Remote sensing makes it possible to:

- Collect data on dangerous or inaccessible areas
- Replace costly and slow data collection on the ground, ensuring in the process that areas or objects are not disturbed

- Uses: satellite, aircraft, spacecraft, buoy, ship, balloon and helicopter images
- Result can be: mapped, imaged, tracked and observed

Example:

Remote sensing data can be captured and analyzed to measure forest cover, compare the impact of natural disasters, changes in the area of soil erosion, the extension of pollution, changes in land cover **or** population estimates of different animal species.

Monitoring systems

Typically comprised of **field-monitoring stations** which are used to describe the qualitative and quantitative aspects of environmental media, i.e. air, water or soil quality; hydrological or meteorological parameters and characteristics.

Main advantages of these data are that they are:

(i) Usually collected using verifiable scientific methods
(ii) Usually validated
(iii) Often available as time series
(iv) Frequently use modeling to improve data quality

Possible limitations of data from monitoring systems are:

- Field-monitoring stations are usually located in "hot-spot" areas where there are
  (i) high levels of pollution
  (ii) highly sensitive areas
  (iii) large numbers of the population are affected

Consequently, the measurements will be location-specific and due to the limitations of their representativeness, they are difficult to aggregate over space

3. Sources of environment statistics

Scientific Research

Main advantages of using data from scientific research and special projects are:

(i) these data are usually available for free or for low cost

(ii) they minimize response burden

(iii) they can be used to fill in data gaps

(iv) they are useful for developing coefficients for models

Possible limitations of using these sources include:

(i) they often use terms and definitions that differ from those used in statistics

(ii) access to microdata may be limited

(iii) metadata may be missing

(iv) often data are available only for case examples (i.e. limited areas or industries)

(v) often data are available on a one-time basis

4. Institutional dimension of environment statistics

- The institutional dimension can be as important as technical capacity when developing environment statistics at the national level.
- Given the multi-disciplinary and cross-cutting nature of environment statistics, the production of environmental data and statistics involves numerous stakeholders, actors and producers.
- Insufficient institutional development, overlapping mandates and functions, inadequate interagency coordination and other institutional issues are very common in many countries.

These limitations also exist at international level: multiple partner agencies operate with different mandates, work programmes, and production timetables.

4. Institutional dimension of environment statistics

Resolving institutional concerns

- Identifying the primary institutional obstacles that impede the production of environment statistics and developing a strategy to overcome these is vital for countries keen on developing or strengthening their environment statistics programmes.
- Key elements pertaining to the institutional dimension:
  - The legal framework, clear mandate, clear Memoranda of Understanding
  - Institutional development
  - Inter-institutional collaboration
  - Institutional cooperation of national, regional and global bodies
- Applying the Environment Statistics Self-Assessment Tool (ESSAT) can help in this regard: https://unstats.un.org/unsd/envstats/fdes/essat.cshtml

4. Institutional dimension of environment statistics

Institutional development

- A well defined mandate and a specific unit in charge of carrying out the production of environment statistics is critical for the successful organization of a national environment statistics programme within the official institutions responsible for the production of statistics.

- This unit requires a regular budget for operations and a minimum number of trained personnel for the tasks entailed.

It is ideal for environment statistics units to have a capacity building programme for staff.

Inter-institutional collaboration

Institutions and people

- Environment statistics cover several topics for which the data are being generated by NSOs, specialized agencies, ministries, provincial and municipal governments and scientific institutions.
- Inherent to environment statistics: collaboration of these stakeholders, both at the strategic and technical level.

4. Institutional dimension of environment statistics

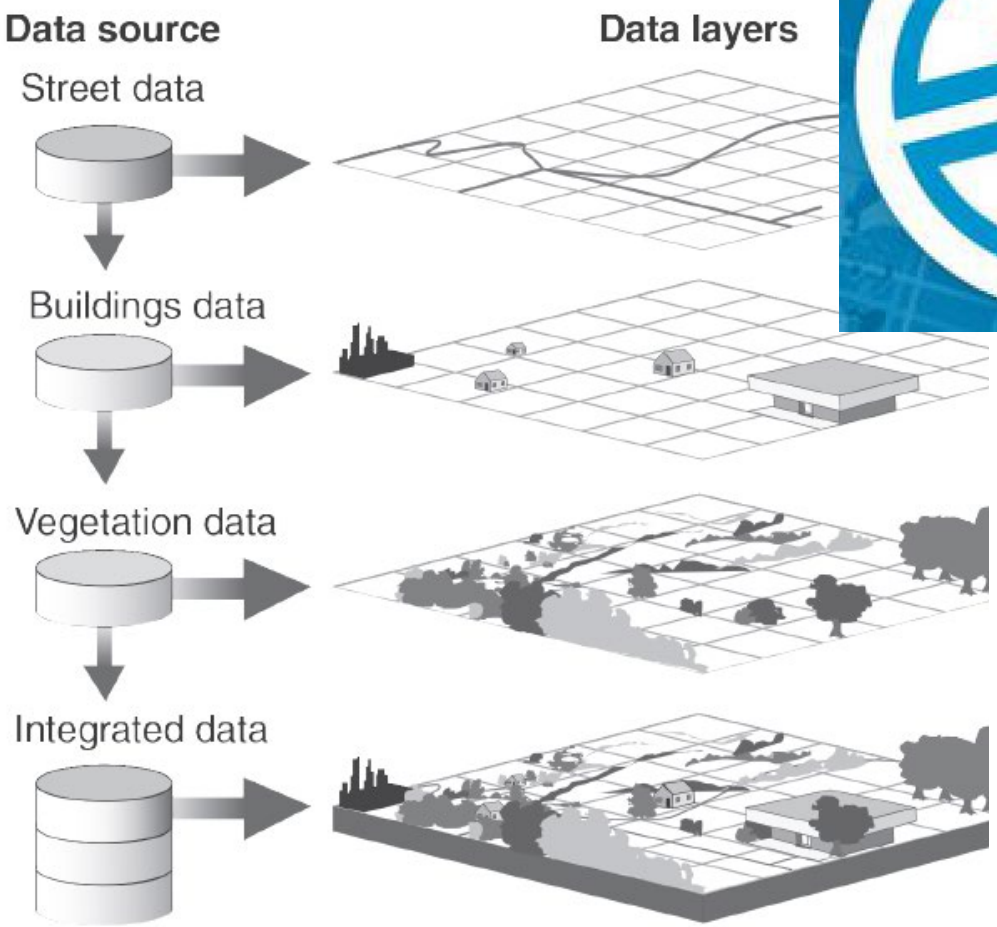
Inter-institutional collaboration

- Formalized by inter-agency platforms/committees tasked with coordinating the production of environment statistics: brings together all institutions that produce and use environmental data and statistics.
- One of the tasks of the platform is to ensure that common statistical methodology, protocols and tools are being used to ensure comparability and statistical soundness. Another relevant function is to preserve continuity over time, despite significant turnover of staff in the different partner institutions.
- Depending on the institutional set-up, in many developing countries the coordination role in such platforms lies with the NSO or the environmental ministry or equivalent institution.
- The NSO, if tasked with overseeing the national statistical system and coordinating these platforms, must have adequate authority, resources or capacities to lead the multi-stakeholder processes.

GIS and Earth observation

Geospatial information adds significant value and utility to environment statistics

Example of GIS data layers or themes[16]



UN-GGIM
UNITED NATIONS INITIATIVE ON GLOBAL GEOSPATIAL INFORMATION MANAGEMENT

Geological and geographical information and Statistics
(Topic 1.1.3)
of the Basic Set of Environment Statistics of the FDES 2013)

Draft Version 1.0
05April 2019

Government Accountability Office (2004). "Geospatial Information: Better Coordinat
Duplicative Investments", available from www.gao.gov/assets/250/243133.pdf

Elaborated by the Environment Statistics Section of the United Nations Statistics Division, in collaboration with the Expert Group on Environment Statistics.

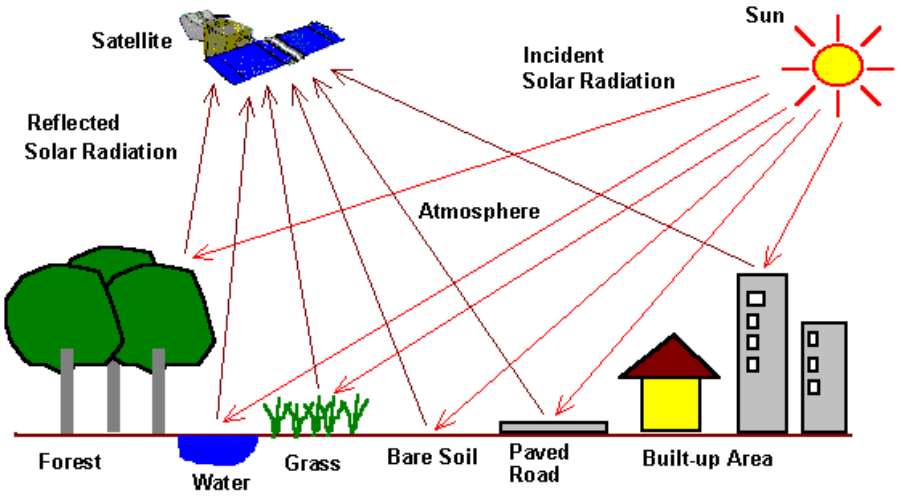
Main concepts and definitions on GIS

- GIS is “An integrated collection of computer software and data used to view and manage information about geographic places, analyze spatial relationships, and model spatial processes” Source: ESRI
- The underlying assumption is that any geographic entity can be depicted as a Feature (point, line or polygon), or group of Grid cells
- A set of feature data representing a concrete theme is called vector layer, for example layer of post offices (points), layer of roads, layer of rivers (lines), layer of cadastral properties (polygons). Multiple layers can be overlaid and visualized as composite landscape structures on a single layout map.
- A raster layer references a raster file as its data source and a raster renderer that defines how the raster data should be rendered and any additional display properties. Source: ESRI
- The single maps are ‘fixed’ as a Data frame (containing several layers and grids as separate files) and saved as a Project
- Geodatabase is a set of shapefiles (either points, lines, polygons) and grids linked in a single structure
- Complete list of terms available from ESRI here: http://webhelp.esri.com/arcgisserver/9.3/java/geodatabases/definition_frame.htm

Main concepts and definitions on Earth Observation

1. Remote sensing: the science and art of identifying, observing, and measuring an object without coming into direct contact with it. This process involves the detection and measurement of radiation of different wavelengths reflected or emitted from distant objects or materials, by which they may be identified and categorized by class/type, substance, and spatial distribution (NASA).

- **Measures continuous arrays of reflectance values and the (approximate!) geographic location of pixels or grid-cells**



2. Optical remote sensing: Satellite and Aerial: for land cover and use

3. Synthetic Aperture Radar: for biomass, peatlands, elevation

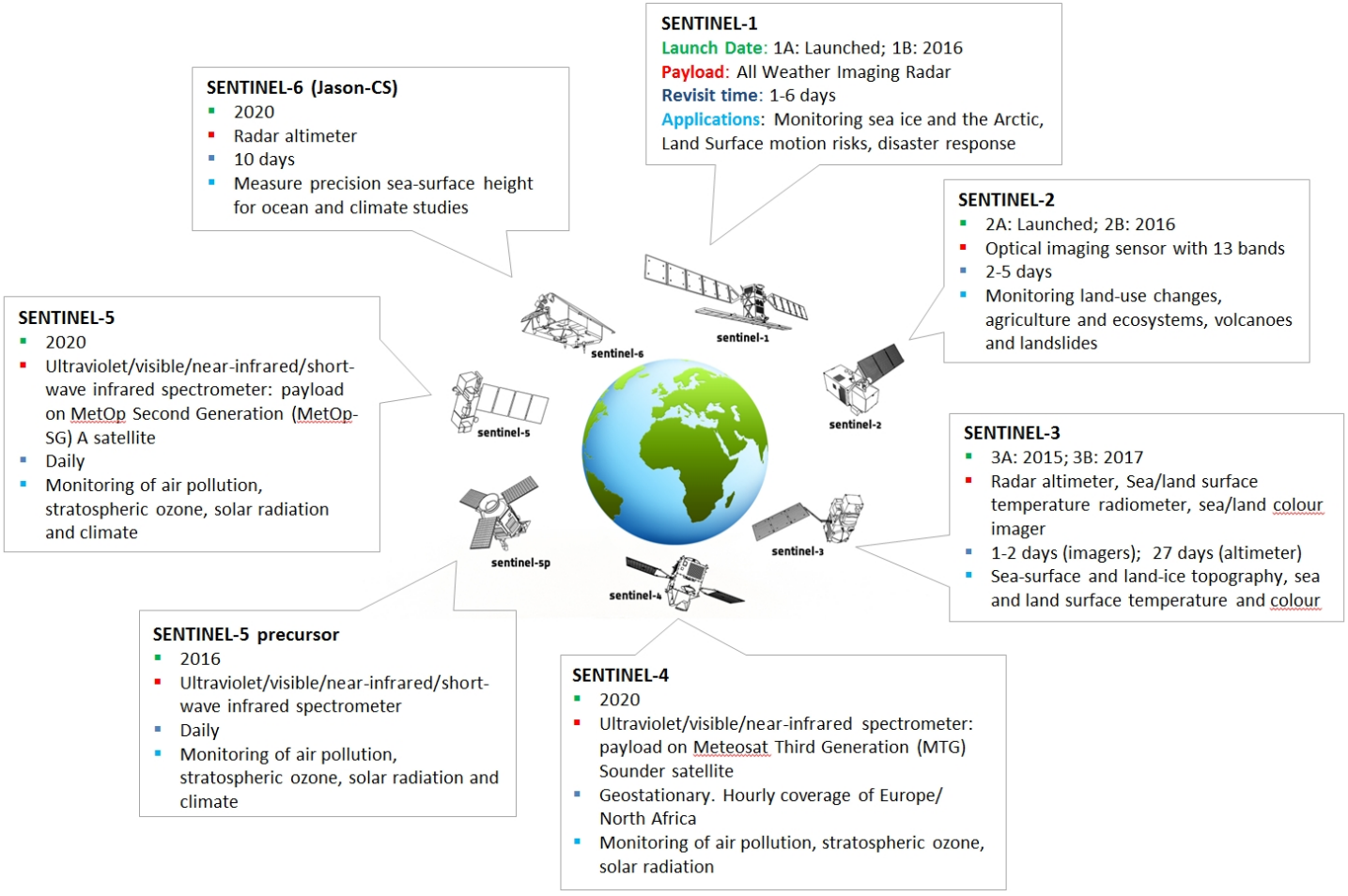
Satellite instruments

High resolution
- NASA's Landsat
- ESA's Sentinels
- SPOT

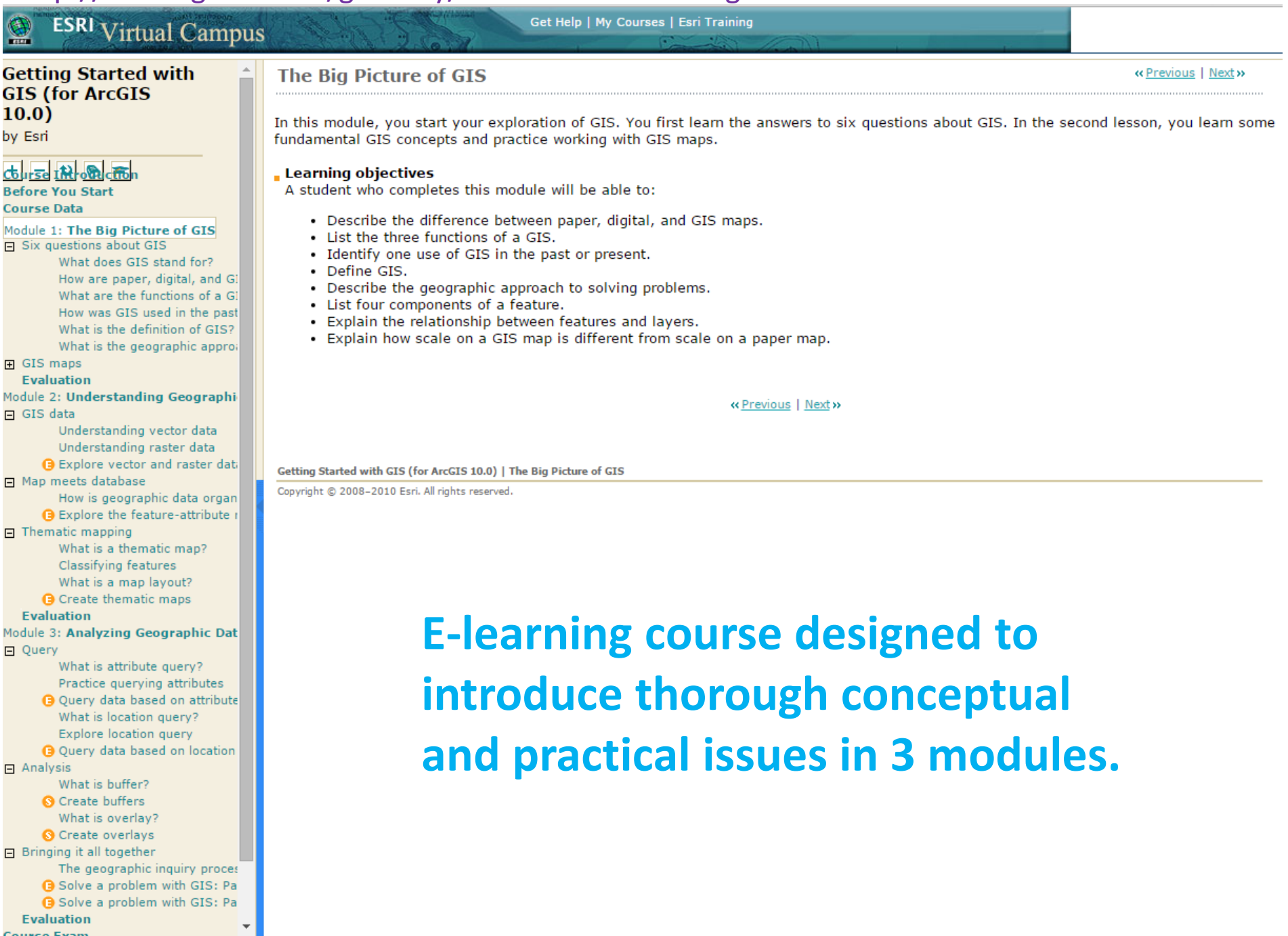
Very high resolutior
- QuickBird
- Ikonos

Moderate resolutio
- NASA's MODIS
- ESA's MERIS

SAR
- ALOS-PALSAR



http://training.esri.com/gateway/index.cfm?fa=catalog.webCourseDetail&CourseID=1911



E-learning course designed to introduce thorough conceptual and practical issues in 3 modules.

Compilation of Environment Statistics

How can we move from the existence of data sources spread across institutions to well compiled environment statistics?

Compilation of Environment Statistics

Let us look at some successful cases among CARICOM countries…

Examples of national compendia on environment statistics

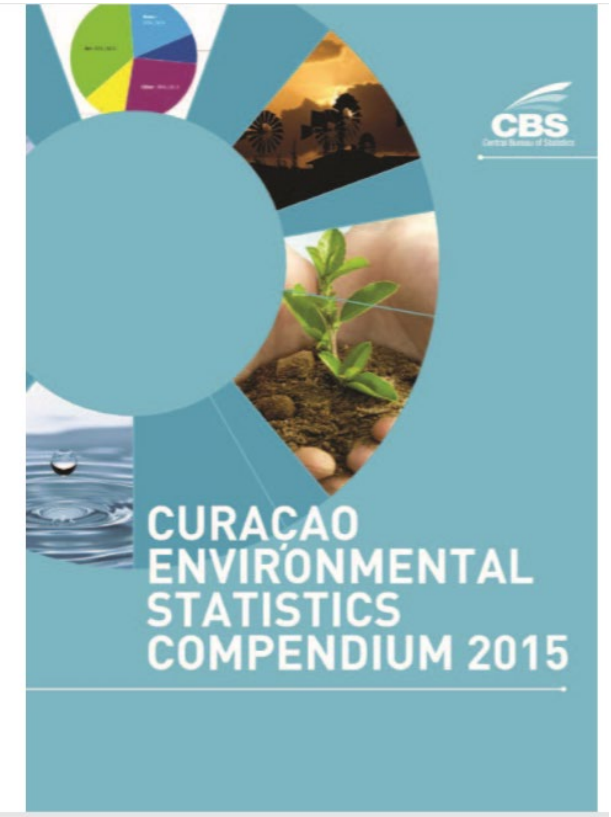
Belize
Bermuda
Dominica
Grenada
Saint Lucia
St. Vincent and the Grenadines

Examples of FDES-compliant compendia

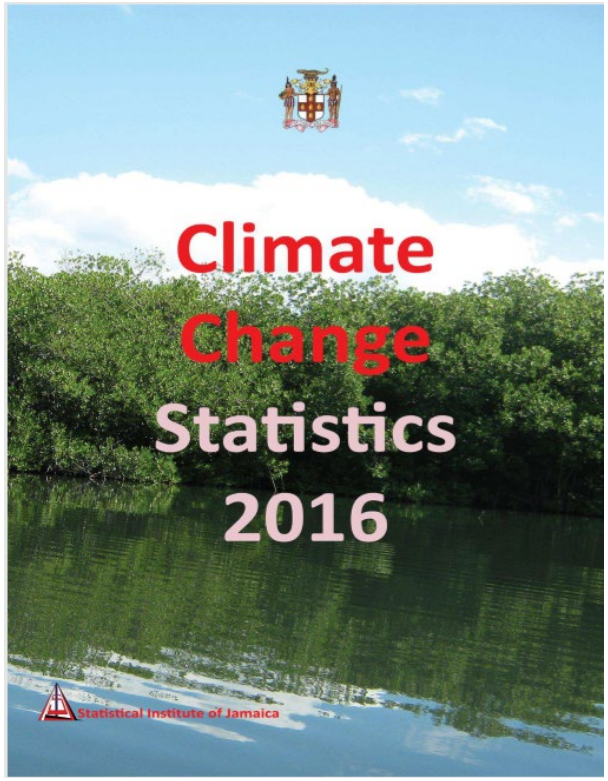
Curacao
Jamaica
Suriname

All compendia are available at: https://unstats.un.org/unsd/envstats/fdescompendia.cshtml and on each country's respective website.

Curacao (2015)



Jamaica (2016)



Suriname (2018)

All known compendia available here: https://unstats.un.org/unsd/envstats/fdescompendia.cshtml

Compendiums:

- Burkina Faso, Yearbook of Environmental Statistics, 2013, French - PDF Background Link
- Burkina Faso, Yearbook of Environmental Statistics, 2012, French - PDF Background Link
- Burundi, Directory of Statistics of the Burundi Environment, 2016, French - PDF Background Link
- Burundi, Directory of Statistics of the Burundi Environment, 2015, French - PDF Background Link
- Cabo Verde, Environmental Statistics, 2016, Portuguese - PDF Background Link
- Curacao, Environmental Statistics Compendium, 2015 - PDF Background Link
- Ethiopia, Compendium of Environment Statistics, 2016 - PDF Background Link
- Guatemala, Compendium of Environment Statistics, 2013, Spanish - PDF Background Link
- Guinea, Yearbook of Environmental Statistics, 2013, French - PDF Background Link
- Guinea, Yearbook of Environmental Statistics, 2016, French - PDF Background Link
- India, EnviStats India 2018 - PDF Background Link
- Indonesia, Environment Statistics of Indonesia, 2017, Indonesian and English - PDF Background Link
- Indonesia, Environment Statistics of Indonesia, 2015, Indonesian and English - PDF Background Link
- Jamaica, Climate Change Statistics, 2016 - PDF Background Link
- Jordan, Environment Statistics, 2014-15, Arabic - PDF Background Link
- Jordan, Environment Statistics, 2014-15 - PDF Background Link
- Madagascar, Yearbook of Environmental Statistics Under the Framework for the Development of Environment Statistics, 2016, French - PDF Background Link
- Mali, Information system data collection - Environmental statistics, 2016, French - PDF Background Link
- Mauritius, Digest of Environment Statistics, 2015 - PDF Background Link
- Nepal, Environment Statistics of Nepal, 2019 - PDF Background Link
- Nepal, Compendium of Environment Statistics, 2015 - PDF Background Link

Typical content of a compendium…

- Preamble
- Acknowledgements
- List of tables
- List of figures
- Abbreviations
- Introduction
- Methodology

Component 1: Environmental Conditions and Quality
Component 2: Environmental Resources and Their Use
Component 3: Residuals
Component 4: Extreme events and disasters
Component 5: Human settlements and environmental health
Component 6: Environmental protection, management and engagement

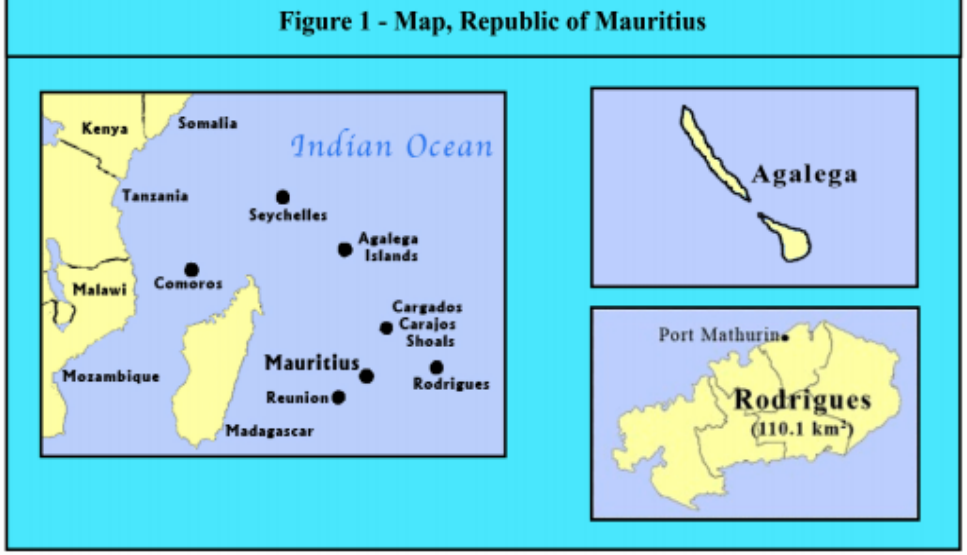
- References

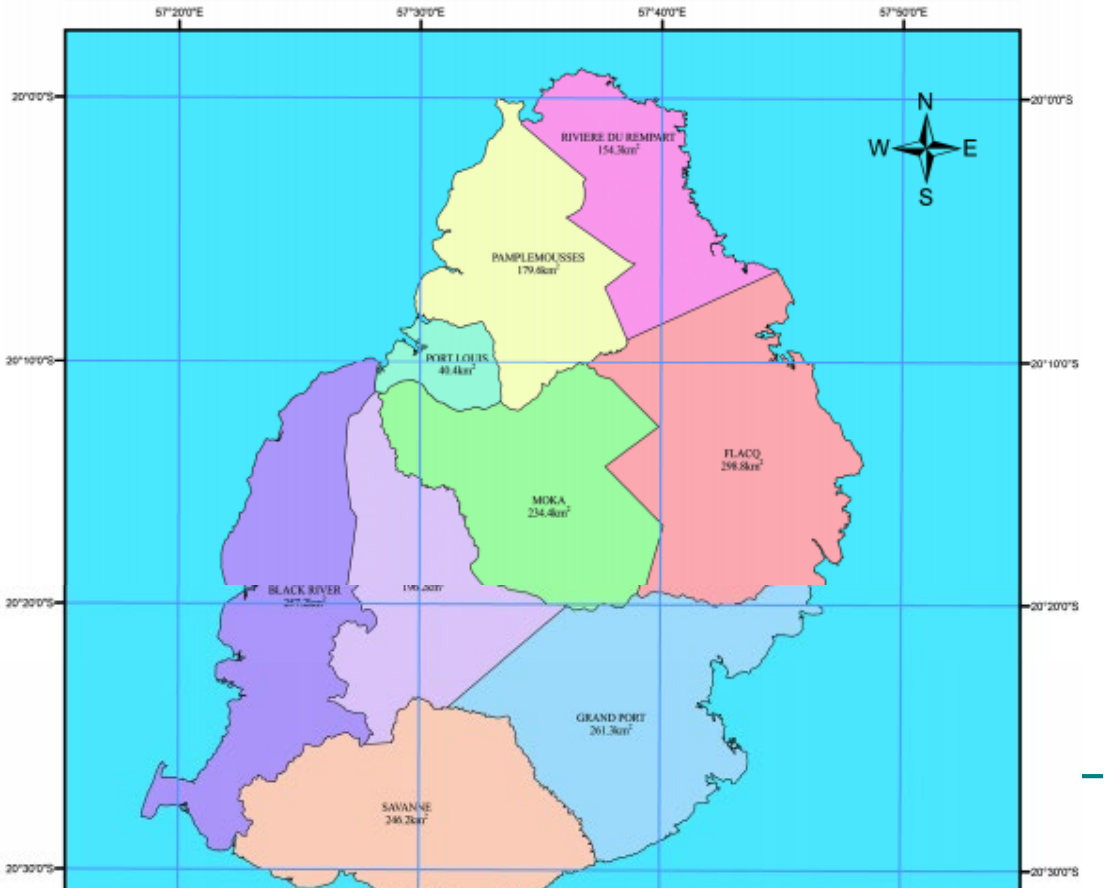
All of the above undertaken per the situation and needs of Grenada

Demonstration of the Mauritian example…

Contents

Demonstration of the Mauritian example… use of maps





Demonstration of the Mauritian example: descriptive text to complement data…

1.2 Temperature

In 2015, December was the warmest month in the Island of Mauritius with a mean of 26.7˚C and July, the coolest month with a mean of 21.5˚C (Table 1.2).

The mean maximum temperature was above the long term mean (1981-2010) for all the months of 2015 except for January and February. On the other hand, the mean minimum temperature was above the long term mean for all the months of 2015except for February which was same (Tables1.3&1.4).

The highest maximum temperature was 35.4˚C, recorded on 28February 2015 at Champs De Mars, Port Louis. The lowest minimum temperature was 9.7˚C, which was recorded on 7July 2015 at Mon Desir Alma.

1.3 Precipitation

During the year 2015, the mean amount of rainfall recorded around the Island of Mauritius was 2,377 millimetres (mm), representing an increase of 13.5% compared to 2,094 mm in 2014 and an increase of 18.7% compared to the long term mean (1981-2010) of 2,003 mm (Table 1.5).

Demonstration of the Mauritian example: descriptive text to complement data…

Table 1.2 Monthly Mean temperature, 2006 - 2015

Degrees celcius

Year \ Month	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sept		Oct		Nov		Dec		Mean annual temperature	
	LTM [1] (26.1)		LTM (26.2)		LTM (25.8)		LTM (24.9)		LTM (23.2)		LTM (21.4)		LTM (20.6)		LTM (20.7)		LTM (21.3)		LTM (22.3)		LTM (23.9)		LTM (25.3)		LTM (23.5)	
	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM
2006	25.8	*-0.2*	26.0	*-0.2*	25.9	*0.2*	25.2	*0.3*	23.1	*-0.1*	22.2	*0.8*	20.7	*0.1*	20.4	*-0.2*	21.4	*0.1*	22.5	*0.2*	24.5	*0.6*	26.2	*0.9*	23.7	*0.2*
2007	26.8	*0.7*	26.6	*0.4*	25.6	*-0.1*	25.2	*0.3*	23.7	*0.5*	21.3	*-0.1*	21.3	*0.7*	20.9	*0.3*	21.6	*0.3*	22.3	*0.1*	24.1	*0.3*	25.8	*0.6*	23.8	*0.3*
2008	26.1	*0.0*	26.2	*-0.1*	25.3	*-0.5*	25.0	*0.1*	23.1	*-0.1*	21.3	*-0.1*	20.4	*-0.2*	21.3	*0.6*	21.8	*0.5*	22.8	*0.5*	24.7	*0.8*	25.9	*0.7*	23.6	*0.1*
2009	26.9	*0.8*	26.8	*0.6*	26.2	*0.4*	25.8	*0.9*	23.8	*0.6*	22.4	*1.0*	21.0	*0.4*	20.9	*0.3*	21.5	*0.3*	23.0	*0.7*	24.2	*0.3*	25.8	*0.6*	24.0	*0.5*
2010	26.4	*0.4*	26.9	*0.7*	26.5	*0.7*	25.3	*0.4*	24.4	*1.2*	22.8	*1.4*	21.0	*0.4*	20.8	*0.2*	21.4	*0.1*	23.2	*1.0*	23.8	*0.0*	25.3	*0.1*	24.0	*0.5*
2011	26.2	*0.1*	26.6	*0.4*	26.1	*0.3*	25.5	*0.6*	23.7	*0.5*	22.9	*1.5*	21.4	*0.8*	21.1	*0.4*	21.8	*0.6*	22.9	*0.6*	24.8	*0.9*	25.5	*0.3*	24.0	*0.5*
2012	26.0	*0.0*	27.0	*0.8*	26.0	*0.3*	25.5	*0.6*	23.3	*0.1*	21.6	*0.2*	21.4	*0.8*	21.3	*0.7*	21.8	*0.5*	23.2	*0.9*	24.8	*0.9*	26.3	*1.0*	24.0	*0.5*
2013	26.4	*0.4*	26.7	*0.5*	26.1	*0.4*	25.0	*0.1*	23.0	*-0.2*	21.6	*0.2*	20.5	*-0.1*	21.1	*0.5*	22.2	*0.9*	23.6	*1.3*	24.6	*0.7*	25.9	*0.6*	23.9	*0.4*
2014	26.7	*0.6*	26.8	*0.6*	26.4	*0.6*	25.3	*0.4*	23.5	*0.3*	22.4	*1.0*	22.0	*1.4*	21.6	*0.9*	22.0	*0.7*	24.2	*2.0*	25.5	*1.6*	26.4	*1.1*	24.4	*0.9*
2015	26.4	*0.3*	26.2	*0.0*	26.0	*0.2*	25.3	*0.4*	24.0	*0.8*	22.7	*1.3*	21.5	*0.9*	21.6	*0.9*	22.1	*0.8*	23.7	*1.4*	24.5	*0.6*	26.7	*1.4*	24.2	*0.7*

Source: Mauritius Meteorological Services

[1] LTM: Long term mean, 1981-2010

Demonstration of the Mauritian example: descriptive text to complement data…

Table 1.5 - Mean annual rainfall [1] by region, 2006 - 2015

Region		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
West LTM [2] (912 mm)	Mean (mm)	740	1,012	1,154	1,200	609	1,050	631	971	906	1,242
	% of LTM	81	111	131	137	69	115	69	106	99	136
North LTM (1,294 mm)	Mean (mm)	1,463	1,094	1,645	1,688	1,062	1,443	963	1,262	1,264	1,386
	% of LTM	113	85	120	123	78	111	74	97	98	107
South LTM (2,572 mm)	Mean (mm)	2,200	2,355	2,943	2,828	2,400	2,213	1,996	2,668	2,607	2,958
	% of LTM	86	92	113	109	93	86	78	104	101	115
East LTM (2,568 mm)	Mean (mm)	2,646	2,736	2,999	3,155	2,756	2,794	2,289	2,716	2,758	2,959
	% of LTM	103	107	124	130	114	109	89	106	107	115
Centre LTM (2,568 mm)	Mean (mm)	2,433	2,744	3,043	2,959	2,153	2,228	2,158	2,898	2,833	3,238
	% of LTM	95	107	116	113	82	87	84	113	110	126
Whole Island LTM (2,003 mm)	Mean (mm)	1,914	1,946	2,381	2,383	1,806	1,948	1,621	2,126	2,094	2,377
	% of LTM	96	97	120	120	91	97	81	106	105	119

Source: Mauritius Meteorological Services

[1] Average of 23 stations for different regions

[2] LTM : Long Term Mean, 1981 - 2010

Demonstration of the Mauritian example: some (country-owned) definitions of terms used…

4. Extreme Events and Disasters

Warnings: The tropical cyclone warning system in Mauritius is as follows:

Class I: Issued 36 to 48 hours before Mauritius or Rodrigues is likely to be affected by gusts reaching 120 km/hr.

Class II: Issued so as to allow, as far as practicable, 12 hours of daylight before the occurrence of gusts of 120 km/hr.

Class III: Issued so as to allow, as far as practicable, 6 hours of daylight before the occurrence of gusts of 120 km/hr.

Class IV: Issued when gusts of 120 km/hr have been recorded and are expected to continue to occur.

Termination: Issued when there is no longer any appreciable danger of gusts exceeding 120 km/hr.

Demonstration of the Mauritian example: abbreviations used throughout…

ABBREVIATIONS AND SYMBOLS

Abbreviations

a.m.s.l	above mean sea level
%	Percentage
000	Thousand
c.i.f	Cost, insurance, freight
CFU/ ml	Colony-forming unit per millilitre
EIA	Environmental Impact Assessment
f.o.b	free on board
Gg	Gigagram (thousand tonnes)
GWh	Gigawatt hour (million kWh)
hPa	Hectopascal
IUCN	International Union for Conservation of Nature
ktoe	Thousand tonnes of oil equivalent
kWh	Kilowatt hour
LPG	Liquefied Petroleum Gas
mm	Millimetre
m^3	Cubic metres
Mm^3	Million cubic metres
n.e.s	Not elsewhere specified
NPCS	National Parks and Conservation Service
PER	Preliminary Environmental Report
Rs	Rupees
Rs mn	Rupees million
Toe	Tonne of oil equivalent
TSP	Total suspended particles
ug/m^3	Micrograms per cubic metre
mg/l	Milligram per litre
ug/l	Micrograms per litre

The value of an Environment Statistics Compendium

- Data and information can be shared with the public to inform perception and debate
- Data are more readily accessible to researchers, policy analysts, key decision makers
- Grenada is in ownership of its own data
- A compendium is a natural follow-up to an assessment (e.g. if a country applies the Environment Statistics Self-Assessment Tool (ESSAT))
- Compendium serves as a tool of coordination among the Statistical Office and ministries/agencies
- Behind the scenes of a glossy compendium, there is invariably a database or several databases on several environmental themes which can be developed in the long-term
- Compendium can improve quality of data

Process toward realising an Environment Statistics Compendium

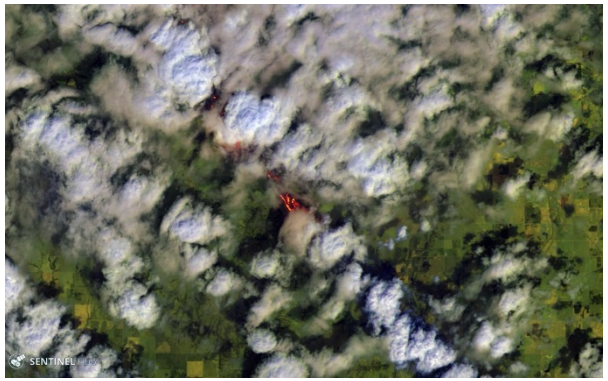
- Following an assessment, identification of who (which institution) collects data; at what periodicity; via which data collection instrument (survey/ monitoring station/ administrative data) etc. can be made
- Data may be centrally collected and compiled into a compendium by the NSO in collaboration with key stakeholders
- A National Committee on Environment or similar committee can provide forum for conversation between NSO and ministries/agencies

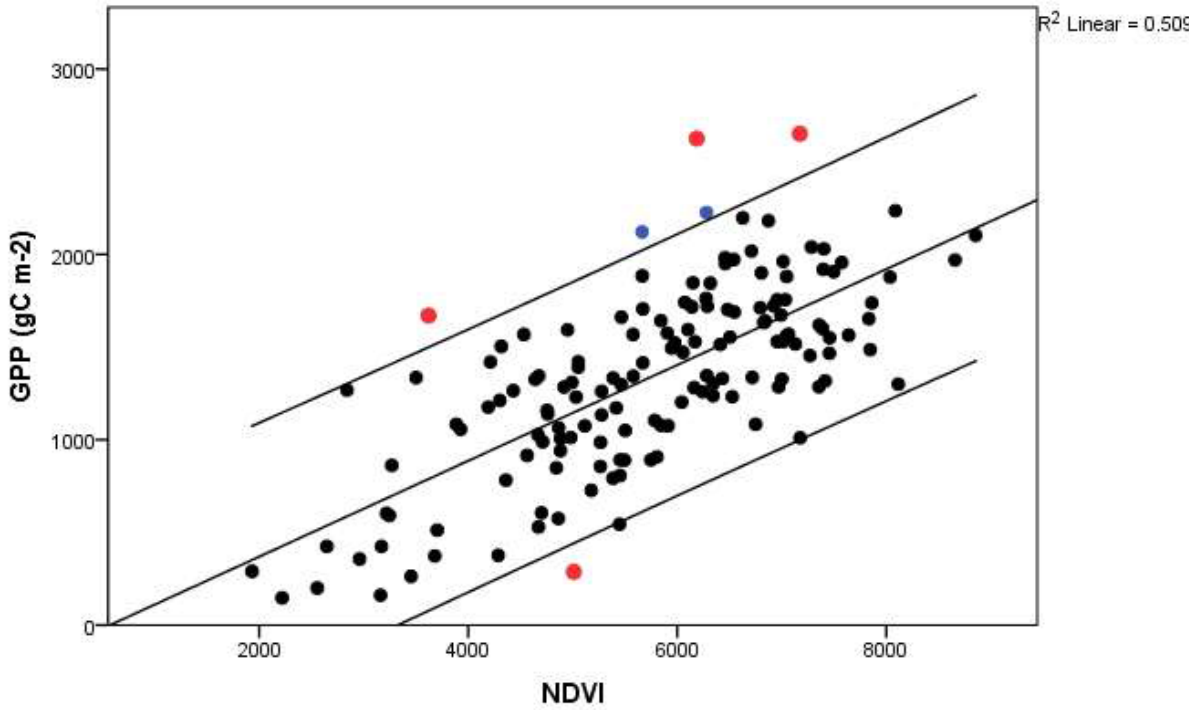
Quality control and validation of Environment Statistics

Uncertainty in environmental data and statistics

Unlike many areas of social and economic statistics, environment is subject of big uncertainties, because:

- Inherent strong variations (e.g. precipitation, temperatures)
- Often data is produced with small samples (for ex. vegetation sampling)
- Remote sensing inputs (on land cover)
- Modelling (if often needed to fill in gaps)





Fundamental Principles of Official Statistics

Principle 1. Official statistics provide an indispensable element in the information system of a democratic society, serving the Government, the economy and the public with data about the economic, demographic, social and environmental situation. To this end, official statistics that meet the test of practical utility are to be compiled and made available on an impartial basis by official statistical agencies to honour citizens' entitlement to public information.

Principle 2. To retain trust in official statistics, the statistical agencies need to decide according to strictly professional considerations, including scientific principles and professional ethics, on the methods and procedures for the collection, processing, storage and presentation of statistical data.

Principle 3. To facilitate a correct interpretation of the data, the statistical agencies are to present information according to scientific standards on the sources, methods and procedures of the statistics.

Principle 4. The statistical agencies are entitled to comment on erroneous interpretation and misuse of statistics.

Principle 5. Data for statistical purposes may be drawn from all types of sources, be they statistical surveys or administrative records. Statistical agencies are to choose the source with regard to quality, timeliness, costs and the burden on respondents.

Principle 6. Individual data collected by statistical agencies for statistical compilation, whether they refer to natural or legal persons, are to be strictly confidential and used exclusively for statistical purposes.

Principle 7. The laws, regulations and measures under which the statistical systems operate are to be made public.

Principle 8. Coordination among statistical agencies within countries is essential to achieve consistency and efficiency in the statistical system.

Principle 9. The use by statistical agencies in each country of international concepts, classifications and methods promotes the consistency and efficiency of statistical systems at all official levels.

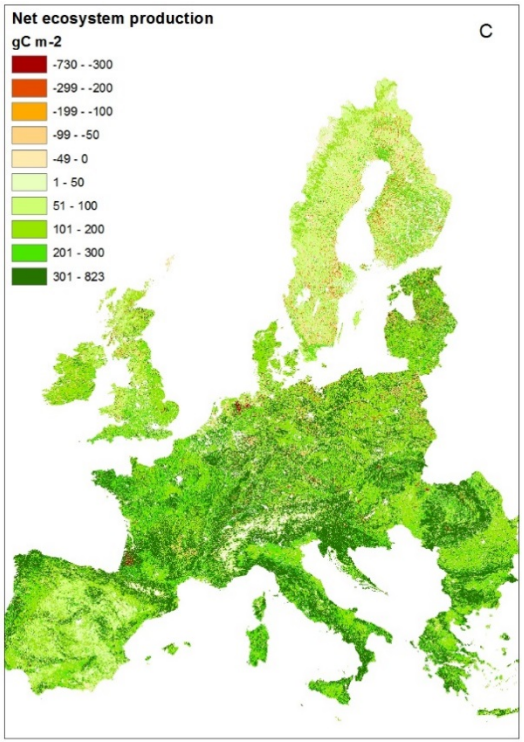
Principle 10. Bilateral and multilateral cooperation in statistics contributes to the improvement of systems of official statistics in all countries.

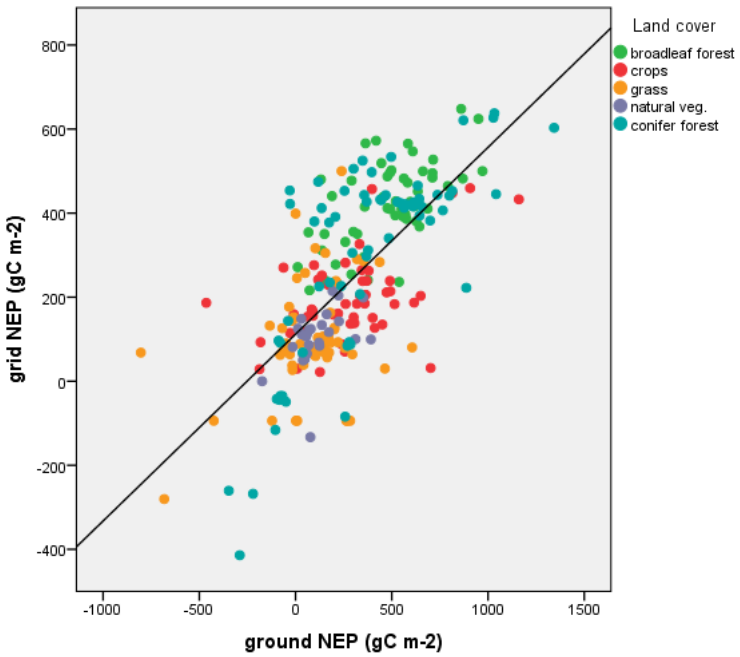
Source: United Nations Statistics Division. Fundamental Principles of Official Statistics, available from http://unstats.un.org/unsd/dnss/gp/fundprinciples.aspx

Six Quality Dimensions of official statistics

1. Relevance, considers the coverage and contents of the needed information;
2. Accuracy, is ‘The closeness between an estimated result and the (unknown) true value';
3. Timelines and punctuality, is the time-lapse between the publication of data and referred period
4. Accessibility and clarity, refer to clarity of metadata; easiness of users to understand the data;
5. Comparability, is 'the degree to which data can be compared over time and domain', spatial domains include sub-national, national and international;
6. Coherence, is 'the degree to which data derived from different sources or methods produce similar output.

Validation example: Net ecosystem production in Europe





r = 0.71
significant at
0.01 level

Dom. land cover	N	R	mean ground NEP	mean grid NEP	bias	bias (%)	RMSE
broadleaf forest	54	0.62	470	419	-51	-11	192
crops	51	0.51	286	197	-89	-31	248
grass	64	0.33	90	98	8	9	166
natural veg.	22	0.58	91	105	14	16	84
needle-leaf forest	67	0.74	366	297	-69	-19	238
Total	258	0.71	279	237	-42	-15	205

Thank you for your attention!

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

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website: http://unstats.un.org/unsd/ENVIRONMENT/