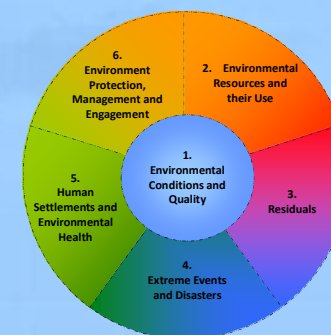# FDES toolkit
Tool 1: Manual on the Basic Set of Environment Statistics

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

Environment Statistics Section, United Nations Statistics Division

Tool 1: The Manual on the Basic Set of
Environment Statistics

What it is, audience
The method of work
The template of the methodological sheets
What we have done and learned so far
Examples

Manual
BSES

# Manual on the Basic Set of Environment Statistics

What?

• The manual will provide methodological guidance for developing countries with regard to the compilation and collection of environmental data and its transformation into statistics.

• The manual is a practical and detailed guide to each of the BCSES themes, including variable definitions, description of sources and data collection, methods of data compilation/processing for environment statistics production, dissemination and other relevant information. The manual will include boxes, diagrams and good practices.

• It is comprised of a series of methodology sheets.

• The methodology sheets therefore focus on statistical methods to be used in the collection and compilation of environment statistics and facilitate the promotion of the use of these methods by all providers of environmental data.
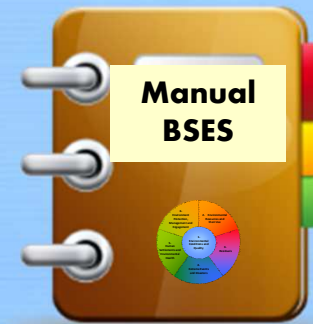
Manual of the Basic Set
of Environment Statistics

For who?

• Practitioners working in environment statistics programmes or within specific areas of environment statistics. They may work at NSOs, Ministries of Environment or other relevant line ministries at the national and sub-national levels. This manual can also serve sub-regional and regional agencies working or planning to work in environment statistics production and dissemination.

• The main target audience of the Manual are environmental statisticians and environmental specialists who work in data analysis and reporting.
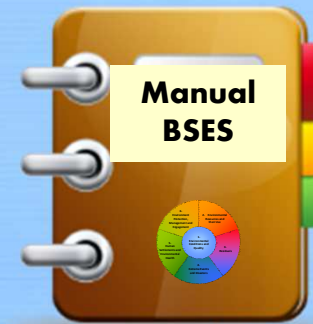
Proposed outline of Manual

Introduction
• Present the main objective and audience of the Manual and briefly describe how it can be used.

The Basic and Core Set of the FDES 2013
• Describe what the BSES and the CSES are, what their main objectives are and how they were built and structured according to the FDES 2013.
• Describe how the BCSES can be adapted and completed according to each country´s priorities, data availability and developmental path.

Methodology and metadata sheets for the BCSES statistics
• Brief Introduction about how the template works, describing the fields, and its organization
• Collection of methodological sheets following the template (see later).

Compilation of good practices
• A selection of national practices used in the collection/compilation of environment statistics.

Concept of Manual

Objective

To develop a set of methodological and metadata sheets in support of the collection/compilation of the variables included in the Basic and Core Sets of Environment Statistics contained in the FDES 2013. (i.e.: definitions, classifications, the most important attributes, data sources, data collection methods, etc.).

Method

This work is being coordinated by UNSD and being carried out in a collaborative way with the Expert Group on Environment Statistics (EGES) and other thematic experts from specialized agencies as needed, using a common template.

Concept of manual
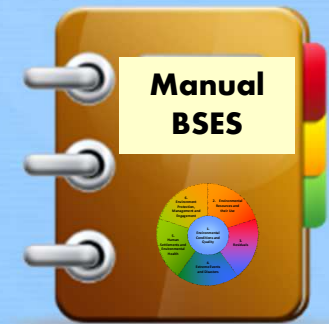
Time Frame 2014-2015

The aim is to complete the first set of methodological sheets or metadata for the Basic and Core Set of Environment Statistics by the end of 2015. The methodological sheets that are ready will be disseminated through the webpage of UNSD on a first come first uploaded basis.

Partners

UNSD Section of Environment Statistics, EGES members, Experts from other specialized agencies as needed.

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 will be carried out on a continuous basis as drafts become available. Both national and international experts will be called upon to review submitted methodology/metadata sheets before their finalization.

4. Dissemination

• Those methodology sheets that have been finalized will be disseminated through the webpage and finally all will be part of the Manual which, after editing, will also be disseminated electronically and in hard copy.

Current Process in developing the Methodology Sheets

- Develop the methodology sheet grouping variables at the topic or sub-component level as appropriate, including tier 1-3 statistics, in one single methodological sheet.

- Currently working on 13 methodology sheets: water resources, freshwater quality, waste, energy resources, minerals, land cover/land use, biodiversity, environment protection expenditure, human settlements, forests and timber resources, air quality, crops and livestock, emissions of GHGs, natural extreme events and disasters.

Template of the Methodology Sheet

FDES 2013 Methodological Manual on the Basic and Core Sets of Environment Statistics

Template of Methodology Sheets (as of 21 April, 2014)

[As discussed in the EGES meeting, the general contents of each of the fields of this template are illustrated in the example for Waste, please refer to it. Additional suggestions are presented in red between brackets]

Code and location in the FDES 2013

Component	Sub-Component	Topic	Code and Environment Statistic

[In general, where there is more than one option (i.e. for definitions, sources, international recommendations and classifications), they can all be referenced and/or described providing the source, usefulness, and value added by each choice; but whenever possible, these methodology sheets should make a choice and recommend one of the options, since it is important to provide proper guidance to countries]

1. Introduction/ Relevance
[Please explain the context and the importance of the cluster of statistics described in this methodology sheet. When appropriate, mention the environmental international agreement and convention relating to the statistics. When important, please identify and explain why the methodology sheet does not include some statistics that someone would expect to be included in this topic/sub-component]

2. Definitions and description of the statistics
[whenever possible, provide internationally agreed/accepted definitions, otherwise describe the statistics to the extent possible]

2A. Definition of the statistics
[please list the definitions of statistics preceded by its FDES code and present the Core Set statistics in bold]

3. International sources and recommendations
[In general, whenever possible, link should be made to specific chapters/sections of the referenced documents. When the international environmental agreements and convention provide methods/ classifications to produce the statistics, please make reference to them.]

3A. Classifications and groupings
[Please refer to all relevant statistical classifications and commonly used groupings for the statistics of this methodology sheet, include relevant groupings and taxonomies originated in scientific or policy arenas. Please include non- environmental but relevant classifications such as ISIC (see chapter 1.6 and Annex D of the FDES), explain the value of each and which one is recommended and for what purpose.]

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3B. Reference to international statistical recommendations, frameworks and standards
[Please refer to all relevant statistical recommendations, frameworks and standards for the statistics of this methodological sheet, explain the value of each and its applicability to the statistics contained in this sheet.]

3C. Sources of global and regional environment statistics and indicators series
[Please refer to all relevant sources of data, statistics and indicators series containing the statistics of this methodology sheet, explain the value of each and when possible what regions/countries are included and for what period of time]

4. Transforming data into environment statistics

4A. Data collection and sources of data
[Please describe how primary data are produced, the usual source type, the institutional partners, the general availability of data sets and quality issues. Please use FDES source typology, i.e Censuses and Sample Surveys, Administrative Records, Monitoring Systems, Remote Sensing, Scientific Research, and combination of the foregoing methods]

    Source type
    Institutional partners
    Availability of data
    Data quality
    Temporal and Spatial considerations

4B. Data compilation (procedures and instruments) and transformation into environment statistics series
[Please describe the methods for compiling the data and transforming them into environment statistics mentioning procedures, instruments, aggregation/disaggregation, validation, structuring, and description in metadata, that are commonly used/recommended to produce environment statistics series]
[When appropriate, use decision trees and provide examples and good practices to illustrate]

    Processing of data into statistics
    Statistical unit
    Measurement category and unit
    Statistical population
    Validation
    Periodicity and seasonal variations
    Aggregation/disaggregation
    Metadata

5. Uses and dissemination

5A. Potential presentation/dissemination formats
[please provide examples of tables, charts or map from countries or links to them, to illustrate potential formats for dissemination]

5B. Commonly used indicators that incorporate this statistic
[please provide a list of the commonly used indicators and specify how this statistics feeds into its calculation]

5C. SEEA accounts/tables that use this statistic
[when applicable, identify the SEEA Central Framework account and when possible table that use this statistic]

2

Template Structure

Code and location in the FDES 2013			
Component	**Sub-Component**	**Topic**	**Environment Statistic codes and denomination**

1. **Introduction/Relevance**

2. **Definitions and description of the statistics**
2A.   **Definition of the statistics**

3. **International sources and recommendations**
3A.   **Classifications and groupings**
3B.   **Reference to international recommendations, frameworks and standards**
3C.   **Sources of global and regional environment statistics and indicators series**

4. **Transforming data into environment statistics**
4A.   **Data collection and sources of data**
Source type, Institutional partners, Availability of data, Data quality, Temporal and Spatial considerations
4B.   **Data compilation (procedures and instruments) and transformation into environment statistics series**
   Processing of data into statistics, Statistical unit, Measurement unit, Statistical population, Validation, Periodicity and seasonal variation, Aggregation/dissagregation, Metadata

5. **Uses and dissemination**
5A.   **Potential presentation/dissemination formats**
5B.   **Commonly used indicators that incorporate this statistic**
5C.   **SEEA accounts/tables that use this statistic**

Examples: Waste, Energy Resources

Methodological Manual
Core Set / Basic Set of Environment Statistics
FDES 2013

Draft Methodological Sheets

Example 'WASTE'

Waste

Component	Sub-Component	Topic	Environment Statistic Codes
3. Residuals	3.3 Generation and Management of Waste	3.3.1 Generation of waste	3.3.1.a Amount of waste generated by economic activity
			3.3.1.b Amount of waste generated by waste category
			3.3.1.c Amount of hazardous waste generated
		3.3.2 Management of waste	3.3.2.a Municipal waste
			3.3.2.a.1 Total municipal waste collected
			3.3.2.a.2 Amount of municipal waste treated by type of treatment
			3.3.2.a.3 Number of municipal waste treatment and disposal facilities
			3.3.2.a.4 Capacity of municipal waste treatment and disposal facilities
			3.3.2.b Hazardous waste
			3.3.2.b.1 Total hazardous waste collected
			3.3.2.b.2 Amount of hazardous waste treated by type of treatment
			3.3.2.b.3 Number of hazardous waste treatment and disposal facilities
			3.3.2.b.4 Capacity of hazardous waste treatment and disposal facilities
			3.3.2.c Other/industrial waste
			3.3.2.c.1 Total other/industrial waste collected
			3.3.2.c.2 Amount of other/industrial waste treated by type of treatment
			3.3.2.c.3 Number of other/industrial waste treatment and disposal facilities
			3.3.2.c.4 Capacity of industrial waste treatment and disposal facilities
			3.3.2.d Amount of recycled waste
			3.3.2.e Imports of waste
			3.3.2.f Exports of waste
			3.3.2.g Imports of hazardous waste
			3.3.2.h Exports of hazardous waste

1. Introduction

Environment statistics on Waste provide important information to policymakers to support the protection of the environment, which may be compromised by waste generation and treatment. Understanding the quantity of waste generated and, importantly, whether the waste is hazardous or not, is required to plan for present and future waste management, in terms of transportation and treatment facilities required. More importantly, waste can also be a resource when recycled or used as a fuel source.

Statistics on waste generation and management allow for the preparation of environmental impact assessments and are useful in developing strategies to encourage waste prevention, reduction, reuse and recycling. Statistics on municipal waste, already produced by many countries for many years, allow for the monitoring of household consumption patterns and management practices by municipalities.

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FDES 2013 Methodological Manual on the Basic and Core Sets of Environment Statistics

Methodology Sheet for 2.2 Energy Resources

UNSD Draft Oct 8 2014

Code and location in the FDES 2013			
Component	Sub-Component	Topic	Code and Environment Statistic
2. Environmental Resources and their Use	2.2 Energy Resources	2.2.1 Stocks and changes of energy resources	a. Energy resources
			1. **Stocks of commercially recoverable resources**
			2. New discoveries
			3. *Upward reappraisals*
			4. *Upward reclassifications*
			5. **Extraction**
			6. *Catastrophic losses*
			7. *Downward reappraisals*
			8. *Downward reclassifications*
			9. Stocks of potentially commercially recoverable resources
			10. *Stocks of non-commercial and other known resources*
			11. **Imports of energy minerals**
			12. **Exports of energy minerals**
		2.2.2 Production and consumption of energy from non-renewable and renewable sources	a. Production of energy from non-renewable and renewable sources
			1. **Total**
			2. **Non-renewable sources**
			3. **Renewable sources**
			b. Production of energy
			1. **Primary energy production**
			2. **Secondary energy production**
			c. **Total consumption of energy**
			d. Electric energy
			1. **Electricity production**
			2. **Installed capacities**

(BSES legend: **Bold Text** - Core Set/Tier 1; Regular Text - Tier 2; *Italicized Text* - Tier 3)

1. Introduction/ Relevance

Energy resources and their use are key to development and also to sustainability. Energy is indispensable to all ecosystems and is a necessary input for human controlled processes. In physical terms, energy is always being transformed, from "available energy" to "unavailable energy" (e.g., burning of hydrocarbons) and conversion from an "unusable" to a "usable" form (e.g., hydropower to electricity). Energy, unlike all other natural resources, is not a material substance but instead is the capacity of a physical system to perform work.

For statistical purposes, energy is measured in its "usable form" embedded in energy products. Although physically speaking there would be no such thing as "energy production" or "energy consumption", in statistics these terms refer to the extraction/manufacturing and use of energy products, respectively.

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...ork and thus to make them comparable and compatible. (UNFC 2009)

...tal initial resources in a country include the produced, the remaining ...ies of the resource remaining in place:

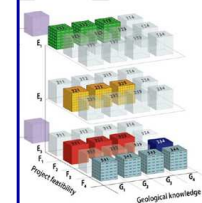...quantities + remaining recoverable quantities + additional quantities

...resources initially in-place is constant. In inventories, material balance ...appears, this must be explained by a re-evaluation. (ECE 2009)

...and energy resources by looking at whether, and to what extent, ...ration of the resources have been confirmed, developed or planned. ...the underlying resources are classified. The UNFC-2009 is based on a ...to three criteria affecting their extraction:

...(E)
...bility (F)

...favourability of economic and social conditions in establishing the ...erion F designates the maturity of studies and commitments necessary ...opment projects, extending from early exploration efforts occurring ...osit or accumulation exists, to projects involving extraction and sale of ...evel of certainty of geologic knowledge and of potential recoverability ...d.30"

...NFC-2009 categories and sub-categories [31]

UNFC Definition of Categories and Sub-categories[32]

[30] UN, EC, FAO, IMF, OECD and WB (2014). *System of Environmental-Economic Accounting 2012- Central Framework*, page 161. Available from http://unstats.un.org/unsd/env/accounting/seeaRev/SEEA_CF_Final_en.pdf

[31] United Nations, Economic Commission for Europe (2010). *United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources 2009*. Available from http://www.unece.org/fileadmin/DAM/energy/se/pdfs/UNFC/unfc2009/UNFC2009_ES39_epdf

[32] ibid, Annex I and Annex II

Examples: Water Resources

Water Resources

Code and location in the FDES 2013			
Component	Sub-Component	Topic	Environment Statistic Code
2. Environ-mental Resources and their Use	2.6 Water Resources	2.6.1 Water resources	2.6.1.a Inflow of water to inland water resources
			2.6.1.a.1 Precipitation (also in 1.1.1.b)
			2.6.1.a.2 Inflow from neighbouring countries
			2.6.1.b Outflow of water from inland water resources
			2.6.1.b.1 Evapotranspiration
			2.6.1.b.2 Outflow to neighbouring countries
			2.6.1.b.3 Outflow subject to treaties
			2.6.1.b.4
			2.6.1.c In
			2.6.1.c.1 reservoir
			2.6.1.c.2
			2.6.1.c.3 streams
			2.6.1.c.4
			2.6.1.c.5 glaciers
			2.6.1.c.6
			2.6.1.c.7
		2.6.2 Abstraction, use and returns of water	2.6.2.a T
			2.6.2.b W
			2.6.2.c W
			2.6.2.c.1 resource
			2.6.2.c.2 resource
			2.6.2.d W
			2.6.2.e W
			2.6.2.f De
			2.6.2.g R
			2.6.2.h W
			2.6.2.i Ra
			2.6.2.j W
			2.6.2.k Lc
			2.6.2.l Ex
			2.6.2.m I
			2.6.2.n R

1. Introduction

Management of water resources, in terms of quantities, distribution priorities in the world today. Environment statistics on water resourc needed by policy makers for a number of reasons, which include: resources; monitoring abstraction from key water bodies to prevent o abstracted water; and tracking the volume of water returned to the env

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2. Definitions and description of the variables and related important terms

Several international agencies, among the UNSD, FAO, Eurostat, OECD, have developed their own definitions over time. In most cases they describe the same phenomena, but there might be some important differences of which producers and users of water statistics have to be aware of.

The International Recommendations for Water Statistics (IRWS) were developed by UNSD as a reference document for water statistics and water accounting. The drafting process of IRWS involved the major international agencies dealing with water statistics and water accounts. Therefore, IRWS is used as a main reference document for the following terms and definitions. Other definitions are taken from the UNSD/UNEP water questionnaire, the OECD/Eurostat Joint Questionnaire on Inland Waters and SEEA-Water.

2A. Definition of important terms

Fresh surface water: Water which flows over, or rests on the surface of a land mass, natural watercourses such as rivers, streams, brooks, lakes, etc., as well as artificial watercourses such as irrigation, industrial and navigation canals, drainage systems and artificial reservoirs., bank filtration (induced infiltration of river water through bankside gravel strata (by pumping from wells sunk into the gravel strata to create a hydraulic gradient) with the intention of improving the water quality) is **included under (fresh)** surface water. [Source: OECD/Eurostat: Data Collection Manual for the Joint Questionnaire on Inland Waters]

Fresh groundwater:

Water which is being held in, and can usually be recovered from, or via, an underground formation. All permanent and temporary deposits of water, both artificially charged and naturally, in the subsoil, of sufficient quality for at least seasonal use. This category includes phreatic water-bearing strata, as well as deep strata under pressure or not, contained in porous or fracture soils., groundwater includes springs, both concentrated and diffused, which may be subaqueous.

[Source: OECD/Eurostat: Data Collection Manual for the Joint Questionnaire on Inland Waters]

Notes: Freshwater is usually defined by a relative low salinity (expressed as conductivity or concentration of dissolved substances). If inland waters (surface waters or groundwater) contain a higher concentration of salts they are referred to as "saline water", which could be for example salt lakes, saline lakes or saline aquifers. Internationally often used is a threshold value of 1,000 mg/liters dissolved substances to distinguish between freshwater and saline water. However, different national threshold values are used.

2B. Definition of the statistics (core set statistics in bold)

2.6.1   Topic: Water resources
Notes:
- Main data source is usually the national hydrometeorological institute or water administrations.
- Information on water resources may not be available for a calendar year (or month if further temporally disaggregated). Instead some countries use a "hydrological year" for their water balances which is not necessarily identical with the calendar year. If this is the case check whether data can be re-calculated for calendar years. Otherwise provide metainformation about the hydrological year (beginning and end).
- Water resources information is requested in terms of volume (usually million m³ per year).
- In cases where no annual statistics on water resources are available there might be LTAA (long-term annual average) statistics available. If this is the case provide additionally the metainformation about the time-period (often 30 years averages are used).

2.6.1.a Inflow of water to inland water resources:
Inflow of water to a territory's inland water resources consists of precipitation and inflows from neighbouring territories. [Source: UNSD: International recommendations for Water Statistics - IRWS, Annex I, page 135]
Notes:
- Inflow excludes water and sewage imported from the rest of the world by resident economic units.

2.6.1.a.1 Precipitation: The volume of water that flows from the atmosphere to inland water resources via rain, snow, sleet, hail, dew, mist, etc., per year. [Source: UNSD: International recommendations for Water Statistics - IWRS, Annex I, page 135, page 150]
Notes:

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Statistical unit

The statistical units of the environment are the parts of the environment about which information is collected and statistics are compiled. In the case of water in the environment, these units are the inland water resources or water bodies (the areas or spaces that contain the water).

For the purposes of IRWS, the statistical units of the environment for inland waters are classified as surface water bodies (including artificial reservoirs) and aquifers, with a number of divisions below these levels. For example, a river may be divided into stretches or segments and a large lake may be divided into parts.

Information may be collected and compiled regarding river basins or sub-basins (for example, resident population, land cover, land use or economic activities in these areas) and therefore such river basins and sub-basins may constitute statistical units. Water is also contained in soils and although they are also part of water resources, it is not necessary to include soil as a statistical unit for the purposes of water statistics.

It is essential to understand and define the statistical units of the economy as they interact with water. The economy abstracts water from the environment. Water is exchanged and used within the economy and discharged into the environment. The statistical units of the economy about which information is sought (e.g., how much water they abstract from the environment) and from which this information may be collected (e.g., via survey) are the establishments and households. These are referred to as economic units in IRWS (e.g., in the definition of data items). Economic units are units which can also report information about environment units.

[Source: UNSD: International recommendations for Water Statistics - IWRS]
[Source: UNSD: Statistical Units (2007)]

Reporting unit

The reporting unit is the unit of the economy that reports information about the statistical unit. For example, a lake can be a statistical unit but any information about the lake will have to be reported by a unit of the economy that owns, manages or monitors the lake or any part thereof. Reporting units are public and private enterprises and establishments, or parts of thereof, and municipalities that abstract and/or use water. [Source: UNSD: International recommendations for Water Statistics - IWRS]

Measurement unit

In water statistics the measurement unit for water volumes is cubic metres (m³), except for the waterborne emissions, which use measures of mass (grams, kilograms, tonnes) or measured physical properties (e.g., chemical oxygen demand (COD)) of emissions. For the collection of primary data, other units of measure may also be used, such as units typically used by farmers to measure abstraction, but for the purposes of presenting data and for comparison, it is important to convert data into standard scientific measurement units (i.e., the metric system). A list of measurement units and conversion factors is provided in Annex VI of the UNSD: International recommendations for Water Statistics - IWRS

Validation

After collection of primary data from informants, or compiling these data sets from an existing primary source, the environmental statistician would need to perform the usual statistical validation and description procedures. In addition, some degree of aggregation and disaggregation of the statistics will be necessary depending on the information objectives of such statistical operations.

Examples of good validation practices are:

Check of expected order of magnitude

For most of the data items a certain order of magnitude can be expected. For example water use by households is directly linked with the number of population in a country. Assuming a range of water use between roughly 100 l/capita/day and 500 l/capita/day an expected band-width could be identified. Another example is the calculation of precipitation in terms of height (mm) by dividing the precipitation volume by the concerned area. The resulting figure can be compared with average precipitation data as provided on websites or other publications of national meteorological services. National averages between 50 mm/year (extremely dry countries, such as Egypt) up to about 3,500 mm/year (in tropical countries such as Costa Rica) are realistic. Annual average figures can be found on the website of the World Bank: http://data.worldbank.org/indicator/AG.LND.PRCP.MM

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