Components, sub-components and statistical topics of the FDES 2013
Part 1

6. Environment Protection, Management and Engagement

2. Environmental Resources and their Use

1. Environmental Conditions and Quality

5. Human Settlements and Environmental Health

3. Residuals

4. Extreme Events and Disasters
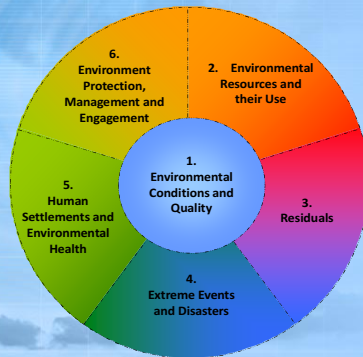
Environment and Energy Statistics Workshop for the Arab Region.
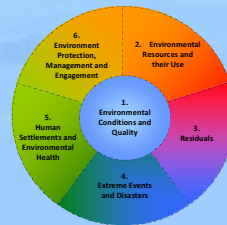
Amman, Jordan 8-12 September 2013

Environment and Energy Statistics Branch, United Nations Statistics Division
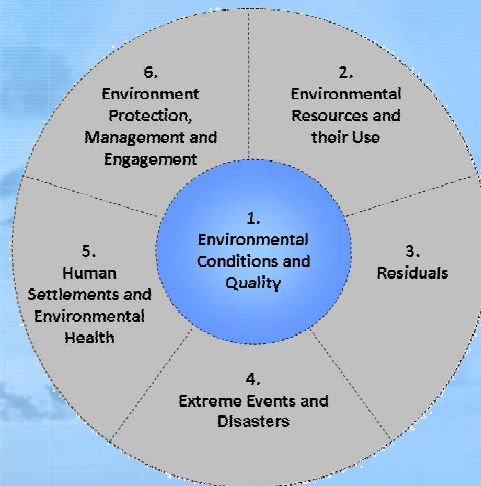

- This presentation has been elaborated by the Environment Statistics Section of the United Nations Statistics Division.

- It is mainly based on Chapter 3 of the Framework for the Development of Environment Statistics (FDES) 2013 that can be downloaded here:
http://unstats.un.org/unsd/statcom/doc13/BG-FDES-Environment.pdf

- All presentations, handouts and background materials for the workshop can be downloaded here:
http://unstats.un.org/unsd/ENVIRONMENT/otherworkshops.htm

Table of Contents

Component 1

Contents of Component : Environmental Conditions and Quality

- Component 1 is at the centre of the FDES structure. Other components of the FDES are structured in their relationship to it.
- It encompasses conditions and quality of environment and their change.
  - It includes statistics about the physical, biological and chemical characteristics of the environment over time.
  - These characteristics are strongly interrelated and determine the types, extent, conditions and health of ecosystems.

Component 1: Environmental Conditions and Quality

Scope and Content

- Meteorological, hydrographical, geological, geographical, biological, physical and chemical conditions.

- Characteristics of the environment that determine ecosystems and environmental quality.

- Contains statistics relevant to the State and Impact elements of the Driving force- Pressure- State- Impact- Response (DPSIR) framework

- Relates to the Experimental Ecosystem Accounts of the SEEA which measure ecosystems, marine ecosystems and the atmosphere.

Exclusions

- Environmental resources stocks and flows are covered in Component 2

Component 1: Environmental Conditions and Quality

Types of Data

- Geospatial
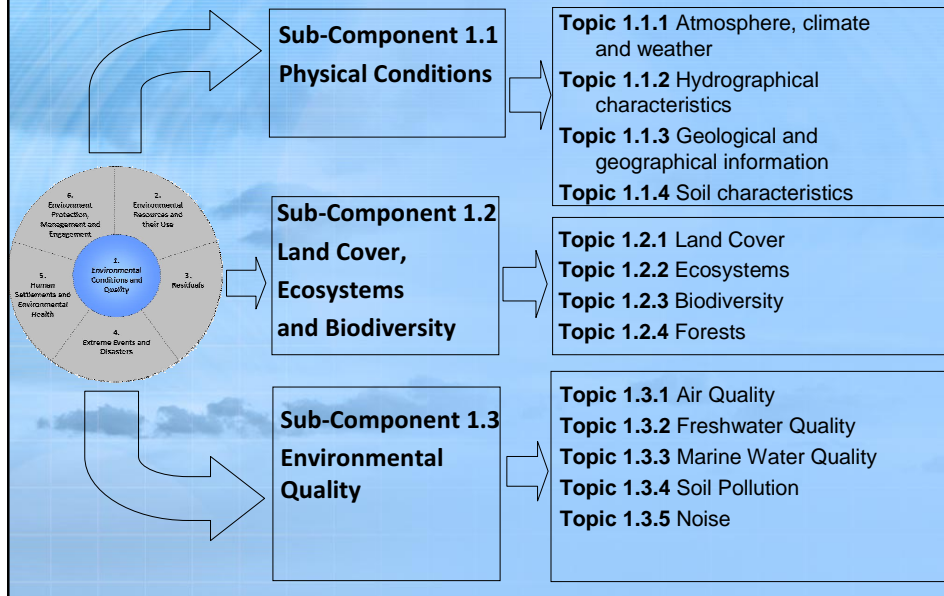- Physical
- Qualitative

Main Sources

- Monitoring and remote sensing data, cartographic data
- Inventories
- Environmental, meteorological, hydrological, geological and geographical authorities or institutions.

Institutional partners

- Environmental, meteorological, hydrological, geological and geographical authorities or institutions.

Structure FDES 2013:
Components, Sub-Components & Topics

Sub-Component 1.1

Physical Conditions

Topic 1.1.1 Atmosphere, climate and weather

Topic 1.1.2 Hydrographical characteristics

Topic 1.1.3 Geological and geographical information

Topic 1.1.4 Soil characteristics

Sub-Component 1.2

Land Cover, Ecosystems and Biodiversity

Topic 1.2.1 Land Cover

Topic 1.2.2 Ecosystems

Topic 1.2.3 Biodiversity

Topic 1.2.4 Forests

Sub-Component 1.3

Environmental Quality

Topic 1.3.1 Air Quality

Topic 1.3.2 Freshwater Quality

Topic 1.3.3 Marine Water Quality

Topic 1.3.4 Soil Pollution

Topic 1.3.5 Noise

Component 1: Environmental Conditions and Quality Overview

Component 1 Environmental Conditions and Quality	**Sub-Component 1.1 Physical Conditions** (four topics, 69 statistics)	**Topic 1.1.1:** Atmosphere, climate and weather **Topic 1.1.2:** Hydrographical characteristics **Topic 1.1.3:** Geological and geographical information **Topic 1.1.4:** Soil characteristics
	Sub-Component 1.2 Land Cover, Ecosystems and Biodiversity (four topics, 37 statistics)	**Topic 1.2.1:** Land Cover **Topic 1.2.2:** Ecosystems **Topic 1.2.3:** Biodiversity **Topic 1.2.4:** Forests
	Sub-Component 1.3 Environmental Quality (five topics, 76 statistics)	**Topic 1.3.1:** Air Quality **Topic 1.3.2:** Freshwater Quality **Topic 1.3.3:** Marine Water Quality **Topic 1.3.4:** Soil Pollution **Topic 1.3.5:** Noise

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Sub-Component 1.1: Physical Conditions

Sub-Component 1.1 Physical Conditions

Topic 1.1.1
Atmosphere, climate and weather

Topic 1.1.2
Hydrographical characteristics

Topic 1.1.3
Geological and geographical information

Topic 1.1.4
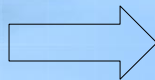Soil characteristics

Sub-Component 1.1: Physical Conditions

• Designed to capture those physical aspects of the environment which change slowly due to human influence. Other sub-components may be part of the physical environment, but their characteristics can be influenced in the short- to medium-term by humans.

• Contains statistics on meteorological, hydrographical, geological, and geographical conditions.

Sub-Component 1.1: Physical Conditions
Topics 1.1.1-1.1.4

Sub-Component 1.1
Physical Conditions

→

Topic 1.1.1

Atmosphere, climate and weather

Topic 1.1.2

Hydrographical characteristics

Topic 1.1.3

Geological and geographical information

Topic 1.1.4

Soil characteristics

Sub-Component 1.1: Physical Conditions
Topic 1.1.1: Atmosphere, climate and weather

• Covers data on atmospheric, climatic and weather conditions across territories and over time.
• Information on weather describes atmospheric behaviour over a given territory in the short term (recorded through a network of monitoring stations). Climate is determined by long-term weather conditions.
•Weather data usually include aspects such as: temperature, precipitation, humidity, pressure, wind speed, solar radiation, ultraviolet (UV) radiation, and occurrence of El Niño and La Niña events.
•Atmospheric, weather/climate authorities monitor/record these env.data over long periods of time using a network of monitoring stations.
• *Statistics on air quality are excluded as they belong to Topic 1.3.1*

Example statistics:

• Temperature (monthly average)

• Precipitation (long-term annual averages)

Sub-Component 1.1: Physical Conditions
Topic 1.1.2: Hydrographical characteristics

• Includes hydrographical information on the extent, location and characteristics of lakes, rivers, reservoirs, watersheds, seas, groundwater bodies and glaciers.
• Best presented in the form of maps.
•Primary sources are hydrographical and hydrological information systems managed by national geographical, hydrological institutions and water authorities.
•*Exclusions are water quality statistics (covered in topic 1.3.2) and freshwater resources and their use (covered in sub-component 2.6).*

Example statistics:

•Watersheds (description of main watersheds)

•Lakes (surface area)

•Reservoirs (surface area)

Sub-Component 1.1: Physical Conditions
Topic 1.1.3: Geological and geographical information

• Includes general geological (e.g. bedrock, fault lines, volcanoes) and topographic (territorial borders, area of a country) information, presenting statistics that inform on the extent and characteristics of the country's territory and relief.
• Data are often presented in the form of maps.
• Main data sources are information systems run by national geographical and geological institutions / authorities.
•*Exclusions are statistics on stocks of mineral resources and their extraction (covered in sub-component 2.1).*

Example statistics:

• Geological, geographical and geomorphological conditions of territorial areas and islands (area of country or region, length of border)

• Coastal area

• Length of marine coastline

Sub-Component 1.1: Physical Conditions
Topic 1.1.4: Soil characteristics

• Includes information on soil degradation and nutrient content for specific types of soil. Degradation includes erosion, salinization and compacting; nutrient content measures levels of Nitrogen, Phosphorous, Calcium, etc.
• Soil types can be defined using information on different combinations of soil components and properties.
• Soil provides the physical base to support production and cycling of biological resources, and is source of nutrients and water for agriculture and forestry systems, and is important in carbon sequestration.
• Statistics on soil characteristics are very important for policy makers, especially regarding agriculture and forestry.
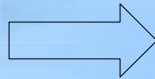• *Soil pollution statistics are excluded, as they are covered in topic 1.3.4*

Example statistics:

• Soil characterization (area of soil types)

• Degradation (area affected by soil erosion, area affected by desertification)

Sub-Component 1.2: Land Cover, Ecosystems and Biodiversity

Sub-Component 1.2

Land Cover, Ecosystems and Biodiversity

Topic 1.2.1

Land Cover

Topic 1.2.2

Ecosystems

Topic 1.2.3

Biodiversity

Topic 1.2.4

Forests

Sub-Component 1.2: Land Cover, Ecosystems and Biodiversity

• Includes land cover, ecosystems and biodiversity, as well as their recordable changes over time and across locations.

• Protected areas and species are included .: inherent relation to maintaining biodiversity and ecosystem health.

• Land cover statistics can be used to systematically record the biophysical characteristics of land (includes inland water, coastal water bodies and inter-tidal areas).

• Statistics related to ecosystems and biodiversity are critical given increasing understanding of ecosystems role in human wellbeing and evidence of biodiversity loss.
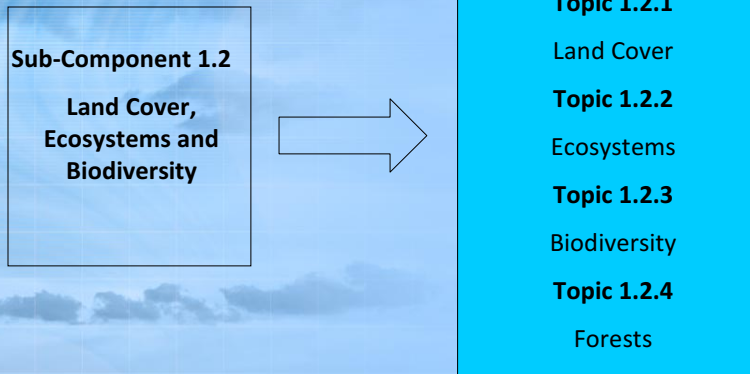
Exclusions

Stock and use of resources as they are covered in Component 2

Sub-Component 1.2: Land Cover, Ecosystems and Biodiversity
Topics 1.2.1 – 1.2.4

Sub-Component 1.2

Land Cover, Ecosystems and Biodiversity

→

Topic 1.2.1

Land Cover

Topic 1.2.2

Ecosystems

Topic 1.2.3

Biodiversity

Topic 1.2.4

Forests

Sub-Component 1.2: Land Cover, Ecosystems & Biodiversity
Topic 1.2.1: Land Cover

• Includes statistics on the extent, as well as physical and spatial characteristics of land cover.
• FAO' s Land Cover Classification System (LCCS): SEEA LC classification based on FAO is used. It comprises 14 classes and provides a common framework to compile and aggregate land cover information available at the national level and make it comparable at the international level.
• Main source of land cover information is remote sensing data, usually satellite images or aerial photographs, and statistics which are combined to map the different categories of land cover. These sources are interpreted and transformed into geospatial data and statistics.

Example statistics:

• Extent and distribution of main land cover categories (area and location of land cover)

Sub-Component 1.2: Land Cover, Ecosystems & Biodiversity

Topic 1.2.2: Ecosystems

• Includes physical, descriptive and qualitative information and statistics about a country's main ecosystems and its conditions reflecting their state (extent – location/area and patterns, chemical and physical characteristics, biological components).

• The extent and conditions of ecosystems determine their capacity to produce ecosystem services.

• National classifications could be used and described for statistical purposes or internationally used ecosystem categories like the Millennium Ecosystem Assessment (i.e. forest, mountain, cultivated, dryland, polar, inland water, marine, coastal, island, urban, etc.). Ongoing work SEEA/EEA on e.classification.

• Ecosystems are complicated to describe (complexity, scale).

• Ecosystems can also be denominated as biomes, biogeographical regions, ecoregions, habitats, etc.

Sub-Component 1.2: Land Cover, Ecosystems & Biodiversity

Topic 1.2.3: Biodiversity

Contains statistics on the diversity of flora and fauna species (biota), on protected areas, and on protected flora and fauna species.

• Flora & fauna: descriptive information on their existence, variety and trends in various populations and communities. Also quantitative and complementary information on biodiversity in terrestrial and marine environments.

• Protected areas: physical and descriptive information and statistics on protected terrestrial and marine areas within the country. The IUCN Protected Area Management Categories are based on the strictness of protection and serve as the classification for protected areas.

• Status of vulnerability of species is also included.

• Main sources of data on protected areas are administrative records. Environmental authorities' reports on the state of ecosystems or the state of the environment at the national and sub-national levels also provide data. Protected species' data are often acquired on an ad-hoc basis from studies, assessments, NGO research, etc. Data can therefore be scattered and non-systematised.

Sub-Component 1.2: Land Cover, Ecosystems & Biodiversity
Topic 1.2.4: Forests

- Include forest area which can be organized by different forest type categories. Further statistics are forest biomass and its carbon storage, and a characterization of forest ecosystems.
- Forest area statistics can be disaggregated by different forest types (e.g. natural forest, planted forest, etc.).
- Sources include data obtained via remote sensing, forest inventories and forestry statistics from forest management agencies (e.g., agricultural and forestry authorities).
- Forests play a central role in human societies, providing livelihoods for millions of people around the world.
- *Timber and other forest resources and their use are excluded as they are covered in subcomponent 2. 5 Biological Resources.*

Example statistics:

• Forest area

Total (natural, planted)

Sub-Component 1.3: Environmental Quality

Sub-Component 1.3

Environmental Quality

→

Topic 1.3.1
Air Quality

Topic 1.3.2
Freshwater Quality

Topic 1.3.3
Marine Water Quality

Topic 1.3.4
Soil Pollution

Topic 1.3.5
Noise

Sub-Component 1.3: Environmental Quality

- Organizes statistics on the concentration of pollutants in air, freshwater, marine water, soil, as well as on noise levels.
- Statistics on environment quality are required by policy makers, analysts and civil society to monitor and make evidence-based policies to maintain and improve environmental quality.
- Pollution impacts both the human sub-system and ecosystems.
- Because of spatial and temporal considerations, and the fluidity of pollution through environmental media, collaboration between statistical offices and environmental agencies regarding design (sampling pattern) is important.
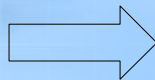
Exclusions

Emissions of pollutants from human activities (rather than concentrations), they are covered in Component 3

Sub-Component 1.3: Environmental Quality
Topics 1.3.1 – 1.3.5

Sub-Component 1.3

Environmental Quality

→

Topic 1.3.1
Air Quality

Topic 1.3.2
Freshwater Quality

Topic 1.3.3
Marine Water Quality

Topic 1.3.4
Soil Pollution

Topic 1.3.5
Noise

Sub-Component 1.3: Environmental Quality
Topic 1.3.1: Air Quality

- Includes statistics on the ambient concentration of the most important air pollutants (suspended solid particles, gases and other relevant pollutants) that can have a negative effect on human and ecosystem health and climate change.
- Monitoring of air quality is carried out in targeted ecosystems or habitats of high vulnerability. Statistics based on these measurements can be used to describe certain aspects of ecosystem health in specific locations.
- Sources are monitoring stations (impact, regional or background). National monitoring of air quality is usually limited to urban settlements where polluting activities affect a concentrated population.

Sub-Component 1.3: Environmental Quality
Topic 1.3.2: Freshwater Quality

- Described by concentrations of nutrients and chlorophyll, organic matter, pathogens, metals, and organic contaminants, as well as by physical and chemical characteristics in surface water and groundwater.
- Without good quality freshwater, ecosystems and humans cannot survive. Precipitation, aquifers, groundwater, lakes, rivers, coastal zones and oceans are all interconnected. Therefore, the choice of where to measure or monitor the pollutants and which pollutants to monitor will depend on local and national priorities, ecosystem characteristics and resources available.
- Data for water quality statistics are primarily produced by monitoring stations.

Example statistics

- Nutrients and chlorophyll
- Organic matter in freshwater bodies

Sub-Component 1.3: Environmental Quality
Topic 1.3.3: Marine Water Quality

- Relevant statistics can include nutrients and chlorophyll, organic matter, pathogens, metals, organic contaminants, and physical and chemical characteristics, as well as coral bleaching.
- Analysed as locally, nationally or supranationally relevant, in terms of the type of pollution and effect (e.g. eutrophication and red tide)
- Sources are typically national or international monitoring stations associated with scientific research. Monitoring programmes are usually constructed when there is scientific interest for research
- Oceans cover about 70% of the earth surface. They play a critical role in regulating weather and atmospheric processes, absorb 30% of emitted CO_2, are a fundamental part of the water cycle, and are home to species and varied ecosystems worldwide.
- Important to the health of ecosystems as well as to humans.

Example statistics

- Concentration of nitrates in marine water bodies
- Area affected by coral bleaching

Sub-Component 1.3: Environmental Quality
Topic 1.3.4: Soil Pollution

- Soil pollution is typically caused by chemicals and other residuals disposed of by humans. It includes the number and area of contaminated, potentially contaminated, remediated and other sites. Most commonly measured soil pollutants include petroleum hydrocarbons (e.g., oil residuals and solvents), pesticides and heavy metals. Statistics on pollution of contaminated sites is included here.
- Soil pollution directly affects human and environmental health, and the productivity of land, depending on the pollutant concentration, depth of contact with biota and density of humans in polluted areas.
- Sources are primarily produced by monitoring stations related to those specific locations. Such data requires further processing to produce environment statistics. Data available for statistical purposes are usually limited and not systematic.

Sub-Component 1.3: Environmental Quality
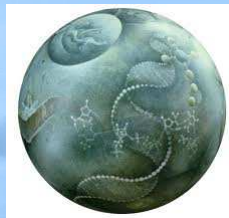
Topic 1.3.5: Noise

- Noise pollution exists in cities, adjacent to highways, near airports and marine ports and around manufacturing, metal processing and mining establishments and at construction sites.
- Statistics on noise levels and intensity, are produced for and are relevant to the specific local areas where the most problematic conditions of noise pollution exist.
- Noise pollution is typically measured using calibrated instruments in specific spatially located stations. Monitoring stations are typically run by pertinent national or local environment authority.
- Noise pollution negatively affects the welfare and health of humans and also affects and changes biota and fauna.
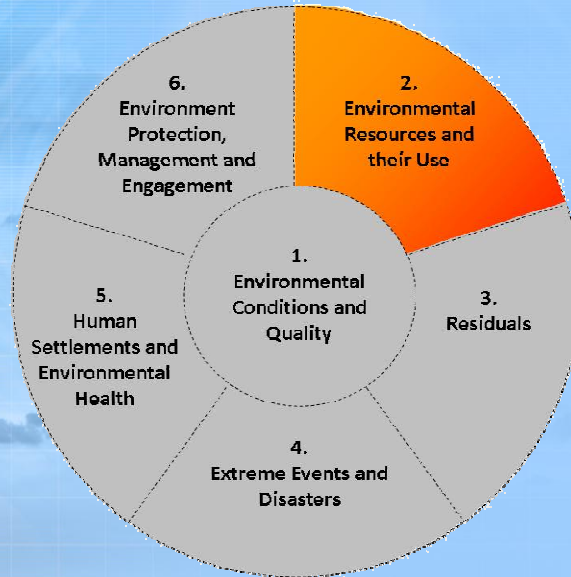
Example statistics:

- Levels of noise from specific sources
- Levels of noise in specific locations

Questions, comments for Component 1?

Component 2

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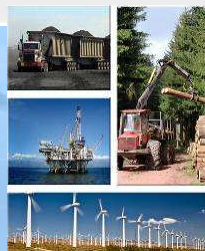
Contents of Component 2

- Environmental resources are the living and non-living constituents of the earth together comprising the biophysical environment that may provide benefits to humanity. Environmental resources include: subsoil resources (non-energy and energy minerals), land, soil, biological and water resources. They can be naturally renewable (timber, water) or non-renewable (minerals)

- In Component 2, statistics on environmental resources and their use are focused on measuring stocks and changes in stocks of these resources.

- Includes activities that directly extract, abstract, harvest or restructure individual environmental resources.

- Closely related to the asset and physical flow accounts of the SEEA Central Framework on which, where relevant, FDES terms and definitions are based.
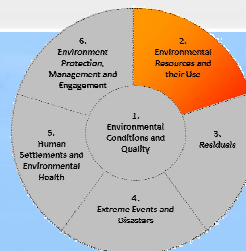
Component 2: Environmental Resources and their Use

Scope and Content

- Environmental resources include: subsoil resources (non-energy and energy minerals); land; soil resources; biological resources; and water resources. They can be naturally renewable (fish, timber or water) or non-renewable (minerals).
- Activities that directly extract, abstract, harvest or restructure individual environmental resources.

Exclusions

•*Statistics on the generation, management and discharge of residuals related to the use of environmental resources are covered in Component 3: Residuals.*
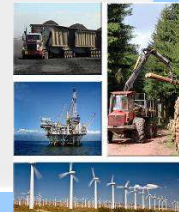

Component 2: Environmental Resources and their Use
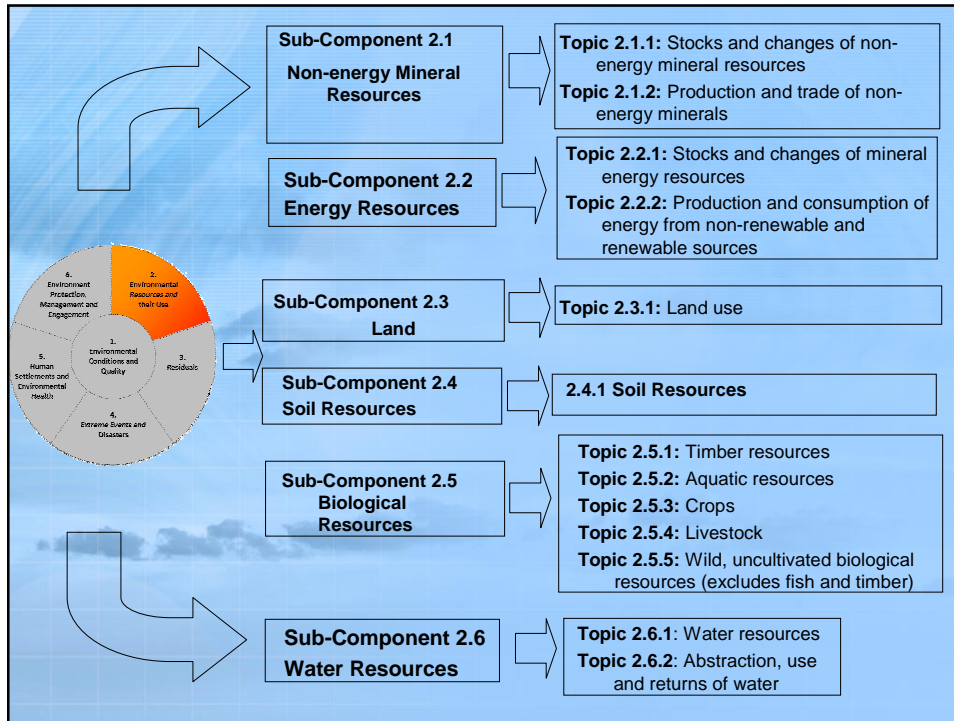
Relevance: Necessary for policy makers to make informed decisions, to avoid shortage or restriction of use, to ensure availability for new and emerging applications, to determine import dependence and other risks, as well as to generally enable continued use over time

Types of Data: Physical and Geospatial, Monetary data can be used as well.

Main Sources and Institutional Partners

- Geological surveys and inventories, national energy authorities, NSOs (economics, mining and quarrying statistics), agricultural authorities, environmental, natural resources and wildlife authorities.
- System of national accounts (SNA), supply and use tables
- Sectoral statistics
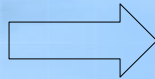- System of Environmental-Economic Accounting (SEEA)

Sub-Component 2.1
Non-energy Mineral Resources

Topic 2.1.1: Stocks and changes of non-energy mineral resources
Topic 2.1.2: Production and trade of non-energy minerals

Sub-Component 2.2
Energy Resources

Topic 2.2.1: Stocks and changes of mineral energy resources
Topic 2.2.2: Production and consumption of energy from non-renewable and renewable sources

Sub-Component 2.3
Land

Topic 2.3.1: Land use

Sub-Component 2.4
Soil Resources

2.4.1 Soil Resources

Sub-Component 2.5
Biological Resources

Topic 2.5.1: Timber resources
Topic 2.5.2: Aquatic resources
Topic 2.5.3: Crops
Topic 2.5.4: Livestock
Topic 2.5.5: Wild, uncultivated biological resources (excludes fish and timber)

Sub-Component 2.6
Water Resources

Topic 2.6.1: Water resources
Topic 2.6.2: Abstraction, use and returns of water

(Central wheel diagram labels:)
6. Environmental Protection, Management and Engagement
2. Environmental Resources and their Use
1. Environmental Conditions and Quality
3. Residuals
5. Human Settlements and Environmental Health
4. Extreme Events and Disasters

Component 2: Overview

Component 2 Environmental Resources and Their Use	Sub-Component 2.1 Non-Energy Mineral Resources (one topic, 13 statistics)	Topic 2.1.1: Stocks and changes of non-energy mineral resources Topic 2.1.2: Production and trade of non-energy minerals
	Sub-Component 2.2 Energy Resources (two topics, 20 statistics)	Topic 2.2.1: Stocks and changes of mineral energy resources Topic 2.2.2: Production and consumption of energy from non-renewable and renewable sources
	Sub-Component 2.3 Land (one topic, 12 statistics)	Topic 2.3.1: Land use
	Sub-Component 2.4 Soil Resources	2.4.1 Soil Resources *(under dev)*
	Sub-Component 2.5 Biological Resources (five topics, 38 statistics)	Topic 2.5.1: Timber resources Topic 2.5.2: Aquatic resources Topic 2.5.3: Crops Topic 2.5.4: Livestock Topic 2.5.5: Wild, uncultivated biological resources (excludes fish and timber)
	Sub-Component 2.6: Water Resources (two topics, 29 statistics)	Topic 2.6.1: Water resources Topic 2.6.2: Abstraction, use and returns of water

Sub-Component 2.1: Non-energy Mineral Resources

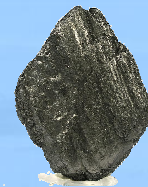| Sub-Component 2.1 Non-energy Mineral Resources	→	Topic 2.1.1: Stocks and changes of non-energy mineral resources Topic 2.1.2: Production and trade of non-energy minerals

Sub-Component 2.1: Non-energy Mineral Resources

- Defined as the amount of known deposits of non-metallic and metallic mineral resources
- Classes of known deposits include:
  - Commercially recoverable deposits
  - Potential commercially recoverable deposits
  - Non-commercial deposits.

Examples include:
- Metal ores (including precious metals and rare earths)
- Stone, sand and clay,
- Chemical and fertilizer minerals,
- Salt, gemstones,
- Graphite, natural solid bitumen, quartz and mica.

Sub-Component 2.1: Non-energy Mineral Resources

Topics 2.1.1 – 2.1.2

Sub-Component 2.1 Non-energy Mineral Resources	→	Topic 2.1.1: Stocks and changes of non-energy mineral resources Topic 2.1.2: Production and trade of non-energy minerals

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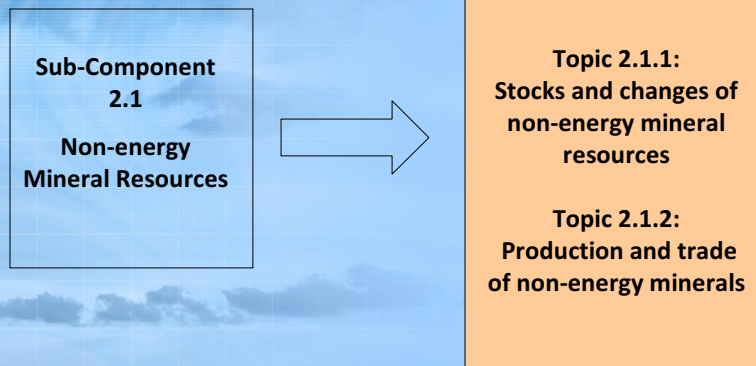
Sub-Component 2.1: Non-energy Mineral Resources

Topic 2.1.1: Non-energy Mineral Resources

- Defined as the amount of known deposits of non-metallic and metallic mineral resources. They include commercially recoverable deposits, potentially commercially recoverable deposits, non-commercial and other known deposits.
- Non-energy mineral resources are not renewable so depletion reduces their availability over time. The scale of extraction can determine the amount of stress placed on the environment.
- Extraction can be achieved by underground or surface mining.
- Statistics on their stocks are required to assist in the sustainable management of these resources.
- Main sources are geological surveys and inventories and economic statistics on mining and quarrying.
- Institutional Partners include mining authorities at the national and sub-national levels, governing commercial bodies (e.g. gemstone and metallic mineral bourses and manufacturers' associations).

Sub-Component 2.1: Non-energy Mineral Resources

Topic 2.1.2: Production and trade of non-energy minerals

- Contribution of mining and quarrying of non-energy minerals to the value of goods and services produced by many countries is substantial.
- Statistics on the amounts of non-energy minerals produced, their imports and exports are important in order to measure the pressure on these resources and to understand the significance of these resources in the national economy.
- Industrial Partners for primary activity data include the ministries responsible for mining and NSOs.

Sub-Component 2.2: Energy Resources

Sub-Component 2.2

Energy Resources

Topic 2.2.1
Stocks and changes of mineral energy resources

Topic 2.2.2
Production and consumption of energy from non-renewable and renewable sources

Sub-Component 2.2: Energy Resources

- Refers to the capture, extraction or manufacture of fuels or energy in forms which are ready for general consumption.
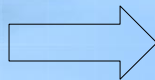
Importance:

  - Energy production, transformation, distribution and consumption are done with different efficiency rates and these processes cause distinct environmental impacts.
  - Producing statistics to describe these activities is key to environmental sustainability policy.

Sub-Component 2.2: Energy Resources
Topics 2.2.1 – 2.2.2

Sub-Component 2.2

Energy Resources

→

Topic 2.2.1
Stocks and changes of mineral energy resources

Topic 2.2.2
Production and consumption of energy from non-renewable and renewable sources

Sub-Component 2.2: Energy Resources
Topic 2.2.1: Stocks and Changes of Mineral Energy Resources

- Stocks of mineral energy resources are defined as the amount of known deposits of mineral energy resources, including fossil fuels, peat, uranium, thorium ores, etc. They cannot be renewed on a human timescale, therefore depletion limits their availability for future generations.
- Classes of known deposits include commercially recoverable deposits, potential commercially recoverable deposits, and non-commercial deposits.
- Sources are geological surveys and inventories, and national economic and energy statistics departments.
- Institutional partners in data collection are mining and energy authorities at the national and sub-national levels.

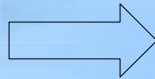## Sub-Component 2.2: Energy Resources

Topic 2.2.2: Production & consumption of energy from non-renewable & renewable sources

- Energy production refers to the capture, extraction or manufacture of fuels or energy in forms which are ready for general consumption.
- Includes total energy production from non-renewable and renewable sources.
- Provides environment statistics that can assist when analyzing the sustainability of the energy mix at the national level.
- Sources are energy statistics and energy balances from national energy authorities or NSOs.
- Energy production, transformation, distribution and consumption are done with different efficiency rates therefore statistics describing these activities are key to environmental sustainability policy.
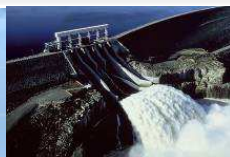
Sub-Component 2.3: Land

Sub-Component 2.3 Land	→	Topic 2.3.1: Land use

Sub-Component 2.3: Land

- Land is a unique environmental resource that delineates the space in which economic activities and environmental processes take place and within which environmental resources and economic assets are located.

- The total area of a country is the area enclosed by its inland borders and, if applicable, the sea. Marine water areas can be included only in a broader concept of land use.

- Statistics on land use fulfil a basic informational need of governments, policy makers, analysts and civil society.

- The two primary aspects of land are land cover and land use.

Sub-Component 2.3: Land
Topic 2.3.1

Sub-Component 2.3 Land	→	Topic 2.3.1: Land use

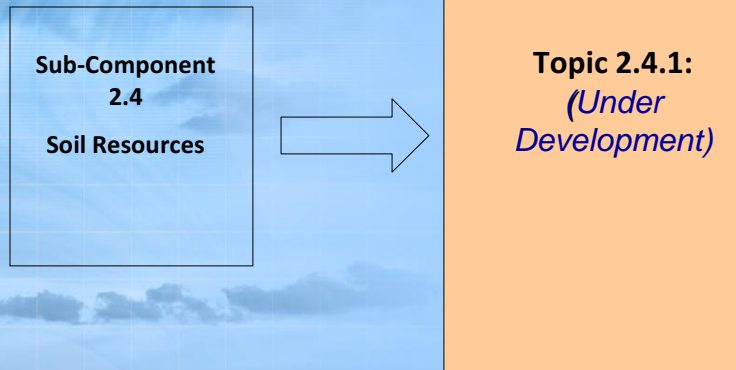## Sub-Component 2.3: Land

Topic 2.3.1: Land Use

- Reflects both the activities undertaken and the institutional arrangements put in place for a given area for the purposes of economic production, or the maintenance and restoration of environmental functions. Land being "used" means the existence of some kind of human activity or management.
- There are areas of land that are "not in use" by human activities which are important from an ecological point of view. Land use statistics cover both land in use and land not in use.
- Statistics on land cover and its changes also give information about the extent of different ecosystems.
- Reference framework for the interim classification of land use is provided in the SEEA Central Framework
- Sources are field surveys and remote sensing, mostly satellite images, and administrative land registers

Example statistics:

- Land use area
- Coastal area

Sub-Component 2.4: Soil Resources
Topic 2.4.1

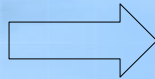| Sub-Component 2.4 Soil Resources	→	Topic 2.4.1: *(Under Development)*

Sub-Component 2.4: Soil Resources

- Accounting for soil resources provides information on area and volume of soil resources lost due to erosion, degradation, or made unavailable by changes in land cover and other sources.
- Accounting for soil resources in terms of their types, nutrient content, carbon content and other characteristics is relevant for more detailed examination of the health of soil systems, and their connections between soil resources and production in agriculture and forestry.
- Statistics related to the area, and changes in the area under soil types are covered under Topic 1.1.4: Soil characteristics.
- Changes in the volume of soil resources and other aspects of accounting for soil resources are conceptually included in the FDES but the development of the necessary statistics is subject to further research.

Sub-Component 2.5: Biological Resources

Sub-Component 2.5

Biological Resources

→

Topic 2.5.1
Timber resources
Topic 2.5.2
Aquatic resources
Topic 2.5.3:
Crops
Topic 2.5.4:
Livestock
Topic 2.5.5:
Wild, uncultivated biological resources (excludes fish and timber)
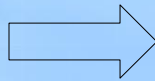
Sub-Component 2.5: Biological Resources

- Biological resources are renewable resources that are capable of regeneration through natural (non-managed or managed) processes. Biological resources form an important part of biodiversity and ecosystems.
- Biological resources include timber resources, aquatic resources, crops, livestock as well as wild, uncultivated biological resources, provided by natural or cultivated ecosystems.
- Collection of statistics related to both natural and cultivated biological resources are required in order to provide policy makers with the data needed to monitor the sustainable usage of these resources.
- Cultivated biological resources can impact the environment differently than natural ones. For Example: Mono-cultivated, intensive crops that utilize irrigation, and increasing amounts of fertilizers and pesticides.

Sub-Component 2.5: Biological Resources
Topics 2.5.1 - 2.5.5

Sub-Component 2.5

Biological Resources

→

Topic 2.5.1
Timber resources
Topic 2.5.2
Aquatic resources
Topic 2.5.3:
Crops
Topic 2.5.4:
Livestock
Topic 2.5.5:
Wild, uncultivated biological resources (other than fish and timber)

Sub-Component 2.5: Biological Resources

Topic 2.5.1: Timber resources

- Timber resources are natural or cultivated and are important environmental resources.
- They are defined by the volume of trees, living and dead, which can still be used for timber or fuel. This includes all trees regardless of diameter or tops of stems. The general proxy that should be considered for determining the volume of timber resources is the volume that is commercially usable.
- Sources include physical and monetary supply and use tables from national accounts, and forestry, manufacturing, energy and trade statistics.
- Timber serves as a source of fuel and an important sink for carbon. Timber resources provide inputs for construction and the production of furniture, cardboard, cellulose, paper and other products.

Sub-Component 2.5: Biological Resources

Topic 2.5.2: Aquatic resources

- Include fish, crustaceans, mollusks, shellfish and other aquatic organisms such as sponges and seaweed, as well as aquatic mammals.
- Aquatic resources may be either cultivated or natural biological resources. Those produced within aquaculture facilities (for breeding or for harvest) are considered cultivated. All other aquatic resources harvested as part of capture production processes are considered natural.
- Changes in the stocks of aquatic resources are the result of growth in stocks, total removals, natural and catastrophic losses.
- Sources include monetary supply and use tables in the national accounts, and the FAO International Standard Statistical Classification for Aquatic Animals and Plants (ISSCAAP).
- Statistics on aquaculture are very important to assess their impact on the environment.

Example statistics:

- Fish capture production
- Aquaculture production

Sub-Component 2.5: Biological Resources

Topic 2.5.3: Crops

- Include plants or agricultural produce grown at a large scale for food or other economic purposes (clothes or livestock fodder).
- Both the area used for cultivated crops as well as yields are important. Methods of production used in crops, which can have different environmental consequences, are highly relevant.
- Covers statistics on the area used for, and the production of main crop types, annual and perennial crops, different planting methods, monoculture and resource-intensive crops, the application of genetically modified organisms and organic farming.
- Statistics on the use of pesticides (e.g. fungicides, herbicides, insecticides, rodenticides, etc.) are also considered essential to environment statistics.
- Because of their effect on biodiversity, invasive pests and pollution and pesticides are essential.
- Sources include National Statistics Organizations and agricultural authorities.
- Area harvested is especially important when measuring sown or planted areas (gross) versus harvested areas (net).

Example statistic:

- Main annual and perennial crops (area harvested, area planted)

Sub-Component 2.5: Biological Resources

Topic 2.5.4: Livestock

- Environmentally relevant statistics on livestock include the number and characteristics of live animals, as well as antibiotics and hormones used for them.
- Livestock are animal species raised by humans for commercial purposes, consumption, or labour. Typical livestock species include cows, poultry, pigs and sheep.
- Sources include agricultural authorities and National Statistics Offices.
- Rising incomes and growing populations, especially in the developing world, have led to higher demands in livestock products, including milk, eggs and meat, driving growth in the livestock sector. livestock contributes to the livelihoods of millions of the world's poor, providing an income source (sometimes the only source) for many. Therefore, measuring livestock impacts and driving efficiency in the production line is vital.

Example statistic:

- Livestock (number of live animals)

Sub-Component 2.5: Biological Resources
Topic 2.5.5: Wild, uncultivated biological resources

- Include wild berries, fungi, bacteria, fruits, sap and other plant resources that are harvested as well as wild animals that are trapped or killed for production, consumption and trade.
- Environmentally relevant statistics on this topic focus on the use and management of these resources as this can affect biological diversity.
- Excludes timber and aquatic resources.
- Sources and institutional partners include environmental, natural resources and wildlife authorities as well as the government agency responsible for hunting.
- Today, wild animals are disappearing at alarming rates due to poaching, habitat loss and overuse of natural resources. The conservation of key habitats and landscapes and the species within them is key.
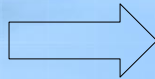
Example statistics:
- Permits for regulated hunting of wild animals
- Imports/ exports of endangered species

Sub-Component 2.6: Water Resources

Sub-Component 2.6

Water Resources

→

Topic 2.6.1
Water resources

Topic 2.6.2
Abstraction, use and returns of water
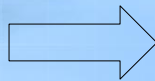

Sub-Component 2.6: Water Resources

- Statistics on water resources, their abstraction, use and returns are needed by policy makers for use in:
  - Estimating the amount of available freshwater resources;
  - Monitoring abstraction from key water bodies to prevent overutilization;
  - Ensuring equitable usage of abstracted water; and
  - Tracking the volume of water returned to the environment.
- International Recommendations for Water Statistics (IRWS) provides definitions and groupings for the purposes of statistics on water resources and their use.

Sub-Component 2.6: Water Resources
Topics 2.6.1 – 2.6.2

Sub-Component 2.6

Water Resources

Topic 2.6.1
Water resources

Topic 2.6.2
Abstraction, use and returns of water

Topic 2.6.1: Water Resources

- Include volume of water generated within country or territory as result of precipitation, volume of water lost to evapotranspiration, inflow of water from other territories, and outflow of water to other territories or the sea.
- Water resources consist of fresh and brackish water, regardless of their quality, in inland water bodies including surface water, groundwater and soil water.
- Inland water stocks are the volume of water contained in surface and groundwater bodies and in the soil at a point in time.
- Surface water includes water in artificial reservoirs, lakes, rivers and streams, snow, ice and glaciers.
- Groundwater comprises water that collects in porous layers of underground formations known as aquifers.
- Renewable water resources of a country are generated by precipitation and inflows of water from other countries and reduced by evapotranspiration.
- Sources include hydrometeorological and hydrological authorities, monitoring
- *Exclusions are freshwater and marine water quality as they are covered by topics 1.3.2 and 1.3.3*

Topic 2.6.2: Abstraction, use and returns of water

- Abstraction, use and returns of water are the flows of water between the environment and the human sub-system and within the human sub-system.
- Water abstraction is the amount of water that is removed from any source, either permanently or temporarily, in a given period of time.
- Exclusions are in-stream uses of water and the generation, treatment and pollutant content of wastewater.
- Sources are administrative records of the water supply industry; statistical surveys of primary users or household surveys.
- The most important activities, in terms of the volume of water abstracted, are agriculture (irrigation and livestock), the generation of electricity (hydropower and cooling) and the water collection, treatment and supply industry.
- Off-stream and all human in-stream uses have significant effects with regard to the ecological use of the same water resources.
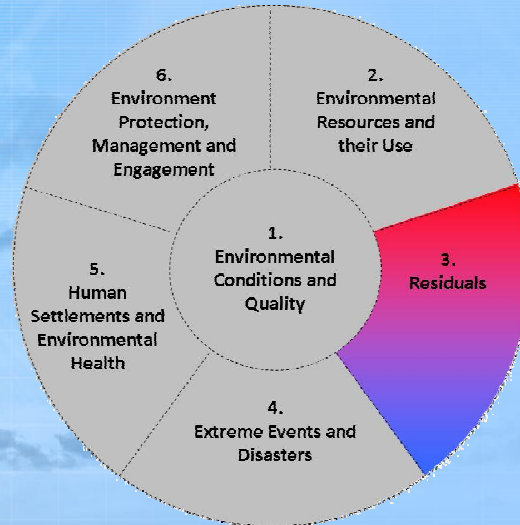
Example statistic:
- Total water abstraction
- Water abstraction from surface water

Questions, comments for Component 2?

Component 3

Contents of Component 3: Residuals

- Contains statistics on the generation and release of emissions as a result of production, consumption and accumulation processes.

- Analyses emissions by type of receiving environment (air, water bodies, or soil) and by type of substance, and type of emission source (economic activity)
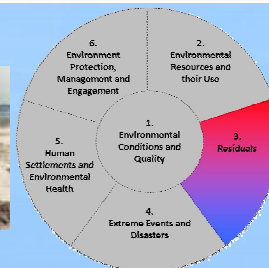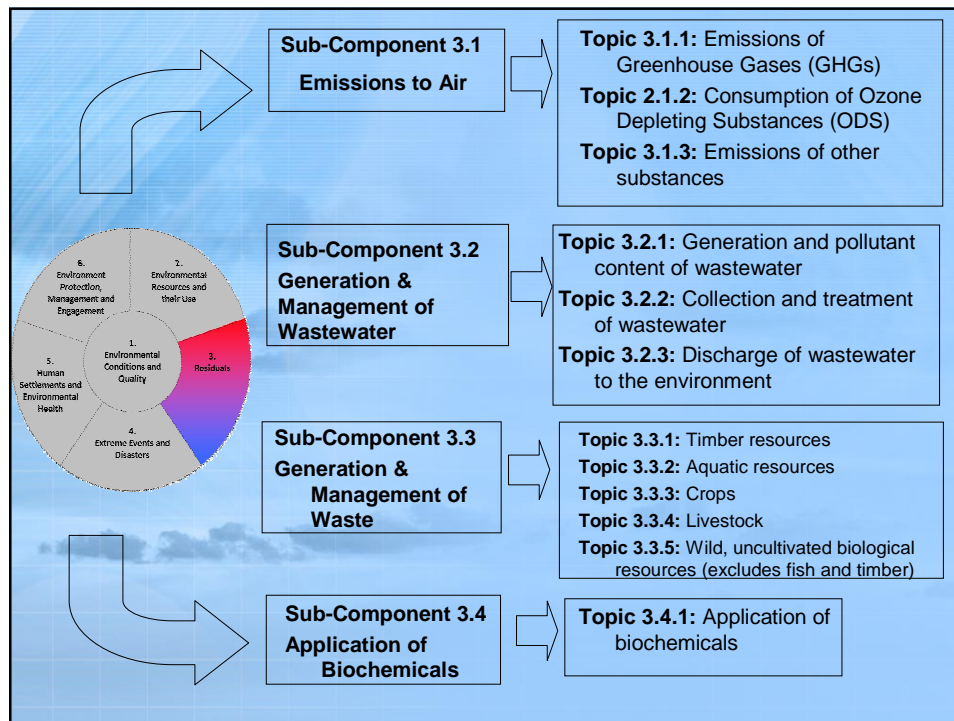
Component 3: Residuals

- Contains statistics on the amount and characteristics of residuals generated by human production and consumption processes, their management, and their final release to the environment.
- Residuals:
    - Include: Solid, liquid and gaseous materials that are discarded, discharged or emitted through processes of production, consumption and accumulation.
    - May be discarded, discharged or emitted directly to the environment or be captured, collected, treated, recycled or reused.
- The main groups of residuals are emissions, wastewater and waste.

Exclusions

Residuals deliberately released to the environment as part of production processes (i.e. pesticides and fertilizers, covered in 3.4.1 application of biochemicals). [In SEEA Central Framework, denomination is dissipative uses of product]. Portions may be absorbed in the production process, while the remaining proportion will stay in the environment and may cause pollution (covered in 1.3 Environmental Quality)
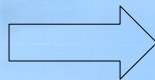

Sub-Component 3.1 Emissions to Air	**Topic 3.1.1:** Emissions of Greenhouse Gases (GHGs)
	Topic 2.1.2: Consumption of Ozone Depleting Substances (ODS)
	Topic 3.1.3: Emissions of other substances

Sub-Component 3.2 Generation & Management of Wastewater	**Topic 3.2.1:** Generation and pollutant content of wastewater
	Topic 3.2.2: Collection and treatment of wastewater
	Topic 3.2.3: Discharge of wastewater to the environment

Sub-Component 3.3 Generation & Management of Waste	**Topic 3.3.1:** Timber resources
	Topic 3.3.2: Aquatic resources
	Topic 3.3.3: Crops
	Topic 3.3.4: Livestock
	Topic 3.3.5: Wild, uncultivated biological resources (excludes fish and timber)

| Sub-Component 3.4 Application of Biochemicals | **Topic 3.4.1:** Application of biochemicals |

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

Component 3: Overview

Component 3 Residuals	Sub-Component 3.1 Emissions to Air (three topics, 20 statistics)	Topic 3.1.1: Emissions of Greenhouse Gases (GHGs) Topic 2.1.2: Consumption of Ozone Depleting Substances (ODS) Topic 3.1.3: Emissions of other substances
	Sub-Component 3.2 Generation and Management of Wastewater (three topics, 11 statistics)	Topic 3.2.1: Generation and pollutant content of wastewater Topic 3.2.2: Collection and treatment of wastewater Topic 3.2.3: Discharge of wastewater to the environment
	Sub-Component 3.3 Generation and Management of Waste (two topics, 20 statistics)	Topic 3.3.1: Generation of waste Topic 3.3.2: Management of waste
	Sub-Component 3.4 Application of Biochemicals (one topic, 5 statistics)	Topic 3.4.1: Application of biochemicals

Sub-Component 3.1: Emissions to Air

Sub-Component 3.1

Emissions to Air

→

Topic 3.1.1: Emissions of Greenhouse Gases (GHGs)

Topic 2.1.2: Consumption of Ozone Depleting Substances (ODS)

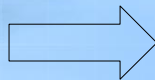**Topic 3.1.3:** Emissions of other substances

Sub-Component 3.1: Emissions to Air

- Emission of pollutants from socio-economic processes. The statistical description of such emissions covers their sources and the quantities emitted by substances.
- Important to produce statistics in accordance to ISIC economic activities.
- The groups of different chemicals relevant to statistics on emissions to air include:
  - Sulphur compounds; oxidized nitrogen compounds and oxidants; reduced nitrogen compounds; inorganic carbon compounds; halogen and inorganic halogen compounds; volatile organic compounds; heavy metals; and different fractions of particulate matter (PM).

Sub-Component 3.1: Emissions to Air
Topics 3.1.1 - 3.1.4

Sub-Component 3.1

Emissions to Air

Topic 3.1.1: Emissions of Greenhouse Gases (GHGs)

Topic 2.1.2: Consumption of Ozone Depleting Substances (ODS)

Topic 3.1.3: Emissions of other substances

## Topic 3.1.1: Emissions of Greenhouse Gases (GHGs)

- Emission inventories of GHGs are compiled according to guidelines developed by IPCC, under auspices of the United Nations Framework Convention on Climate Change (UNFCCC).
- The source categories of GHG emissions are based on processes and the categories of sinks for GHG emissions are also included.
- GHGs include both <u>direct</u> **and** <u>indirect</u> GHGs.
- The <u>most important direct</u> GHGs are carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O).
- The <u>most important indirect</u> GHGs are sulphur dioxide (SO_2) and nitrogen oxides (NOx).

Topic 3.1.2: Consumption of Ozone Depleting Substances (ODS)

- ODS is a category of emissions actively monitored by the Montreal Protocol.
- Reported statistics worldwide have shown this protocol to be very effective in phasing out the use of these substances.
- Examples of ODS:
  - Chlorofluorocarbons (CFCs), Hydrochlorofluorocarbons (HCFCs), Bromofluorocarbons, Methyl chloroform, Carbon tetrachloride, Methyl bromide
- However, as emissions of these substances are difficult to measure directly, countries report on the apparent consumption of ODS.

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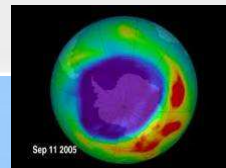
Topic 3.1.3: Emissions of other substances

- Various other environmentally important substances emitted to air beyond GHGs and ODS. Most important:
  - different fractions of PM ($PM_{2.5}$, PM_{10})
  - heavy metals and others linked to environmental/health problems.
- There are a variety of other emissions that countries may wish to measure or estimate based on national circumstances and priorities.

Sub-Component 3.2: Generation and Management of Wastewater

Sub-Component 3.2
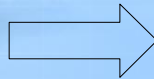
Generation and Management of Wastewater

Topic 3.2.1

Generation and pollutant content of wastewater

Topic 3.2.2

Collection and treatment of wastewater

Topic 3.2.3

Discharge of wastewater to the environment

Sub-Component 3.2: Generation and Management of Wastewater

Includes:

- Wastewater statistics include generation, management and discharge of wastewater, as well as the pollutant content of this wastewater.
- Disaggregation by economic activity of responsibility for its generation, whether the wastewater is being treated, and what is being emitted to water bodies in the country.

Relevance:

- Statistics on wastewater are needed by policy makers, analysts and civil society in order to properly manage this potentially harmful by-product of the human sub-system.
- Without statistics on the generation, management and discharge of wastewater it is difficult to assess and possibly intervene in regards to the volume and pollution levels of wastewater.

Sub-Component 3.2: Generation and Management of Wastewater

Sources:

- Administrative records and estimation outputs.
- Countries usually report their wastewater and discharges to water based on statistics from the final treatment or collecting institution(s), or when no treatment of wastewater is in place, by estimating from the water used by different activities (e.g. households, industries) using technological coefficients.

Institutional partners:

- The water and wastewater authorities or institutions in charge of water supply, collection, treatment and/or final discharge of wastewater to the environment (e.g., water regulating bodies, water authorities, municipalities, water utilities, wastewater treatment plants).

Sub-Component 3.2: Generation and Management of Wastewater
Topics 3.2.1 - 3.2.3

Sub-Component 3.2

Generation and Management of Wastewater
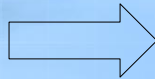
Topic 3.2.1

Generation and pollutant content of wastewater

Topic 3.2.2

Collection and treatment of wastewater

Topic 3.2.3

Discharge of wastewater to the environment

Sub-Component 3.2: Generation and Management of Wastewater

Topic 3.2.1: *Generation and pollutant content of wastewater*

- Includes statistics on the volume of wastewater generated and the pollutant content of wastewater after the use of water by economic activities and households, before any collection or treatment is applied.
- Generation of wastewater is usually estimated based on the volume of water used. The wastewater generated can be discharged directly to the environment by the generator or it can be collected in sewerage systems and treated in wastewater treatment plants.
- Wastewater generation can be disaggregated by economic activity and households where statistics permit.
- The pollutant content of wastewater (emissions to water) can usually be obtained from monitoring at the place of generation or from estimates based on technological parameters.

Sub-Component 3.2: Generation and Management of Wastewater

Topic 3.2.2: *Collection and treatment of wastewater*

Include statistics describing:

(i) Volumes of collected and transported wastewater to their final place of discharge or to treatment facilities

(ii) Volume of wastewater treated by type of treatment (primary, secondary and tertiary)

(iii) Physical infrastructure related to wastewater collection and treatment (e.g., number of treatment plants, capacities of plants, etc.)

(iv) Pollutant content extracted in the treatment facilities

Establishments engaged in the collection and treatment of wastewater are grouped under ISIC Rev.4, Section E, Division 37 Sewerage.

Sub-Component 3.2: Generation and Management of Wastewater

Topic 3.2.3: Discharge of wastewater to the environment

Scope:
- This topic captures information at the stage of final discharge of wastewater to the environment. It includes:
(i) volume of wastewater discharged to the environment without treatment
(ii) volume of wastewater discharged to the environment after treatment, by type of treatment (primary, secondary and tertiary) and type of treatment facility (public, private, municipal, industrial)
(iii) effluent quality

Source:
- Statistics on the volume of wastewater discharged after treatment can be obtained from administrative records of the treatment plants.
- Statistics on the volume of wastewater released without treatment can be obtained from economic units and records of sewerage companies, or estimated on the basis of water use. The volume of discharged wastewater should also be disaggregated according to the recipient water body.

Sub-Component 3.2: Generation and Management of Wastewater

## Topic 3.2.3: *Discharge of wastewater to the environment*

Emissions:
- In addition to the volume of wastewater returned to the environment, it is also important to measure or estimate the volumes of different pollutants that are emitted with the wastewater or otherwise released to water bodies.
- Emissions to water are the substances released to water resources by establishments and households as a result of production, consumption and accumulation processes.
- Emissions to water should be disaggregated according to the releasing economic activities and should cover the most important substances.

Sub-Component 3.3: Generation and Management of Waste

Sub-Component 3.3

Generation and Management of Waste
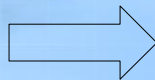
Topic 3.3.1: Generation of waste

Topic 3.3.2: Management of waste

Sub-Component 3.3: Generation and Management of Waste

- Contains statistics about the generation and management of waste, including liquid and solid residual waste. Statistics include the amount of waste generated by waste type and by source, as well as the amount of waste collected, treated or disposed of.

Relevance:

- Policy makers, particularly local governments, require statistics on waste in order to assess how its generation, treatment and disposal are changing over time. This in turn assists in planning for present and future waste management, in terms of transportation and facilities required.
- Waste can also be a resource when recycled or used as a fuel source
- Statistics on waste can also be useful in developing strategies to encourage waste reduction, reuse and recycling.

Sub-Component 3.3: Generation and Management of Waste

Topics 3.3.1 - 3.3.2

Sub-Component 3.3

Generation and Management of Waste
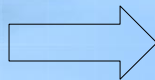
Topic 3.3.1: Generation of waste

Topic 3.3.2: Management of waste

Sub-Component 3.3: Generation and Management of Waste
Topic 3.3.1: *Generation of waste*

Content:

- This topic includes statistics describing the amount of waste generated before any collection or treatment is applied, by waste type, economic activity and households.

Scope:

- The waste lists used by countries and international organizations are usually based either on the generating process or the material content of the waste, or on the combination of these two aspects.
- Hazardous waste is a special group of waste that due to its toxic or other hazardous character needs special management; statistics on the generation of hazardous waste should also be included in this topic.
- Statistics on waste generation (can be estimated) are usually less available than the ones describing their collection and disposal.

The Basel Convention focuses on the control of transboundary movements of hazardous waste across international borders and sets up criteria for the environmentally sound management of such waste.

- Reporting needs originating in this convention include generation, exports and imports of hazardous waste.

Sub-Component 3.3: Generation and Management of Waste

Topic 3.3.2: *Management of waste*

Includes statistics on:

(i) The amount of waste collected and transported to treatment facilities or to their final disposal

(ii) The amount treated by type of treatment or disposal (e.g., recycling, composting, incineration, landfilling)

(iii) The physical infrastructure for waste treatment, including the number and capacity of treatment plants

Sub-Component 3.4: Application of Biochemicals

Content:
- Biochemical use statistics deal with chemical fertilizers to enrich soils and pesticide use to protect plants and animals from disease. Other chemicals accelerate the growth of biota and preserve and enhance the quality, size and appearance of biological products.
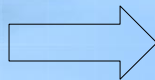
MEA:
- The Stockholm Convention on Persistent Organic Pollutants (POPs) aims to eliminate or restrict the production and use of POPs. POPs are defined by the convention as "chemical substances that persist in the environment, bio-accumulate through the food web, and pose a risk of causing adverse effects to human health and the environment".
- The Stockholm Convention identified an initial twelve chemicals or chemical groups for priority action, including: Aldrin, Chlordane, DDT, Dieldrin, Endrin, Heptachlor, Hexachlorobenzene, Mirex.

Sub-Component 3.4: Generation and Management of Waste

Topic 3.4.1

Sub-Component 3.4

Application of Biochemicals

Topic 3.4.1:

Application of Biochemicals

Topic 3.4.1: *Application of biochemicals*

Statistics include the amount of natural and chemical fertilizers, pesticides and other biochemicals (hormones, pellets etc.) used by type of active ingredients, the area under application, and the method employed.

- These statistics are proxy for estimating the part of the biochemicals that remain in the environment and affect environmental quality.
- Environmental effects are generated by the diffusion of biochemicals through cycling systems and build-up of contaminants in water, land and species (through the food chain).

Questions, comments for Component 3?

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/