Session 2: Basic Concepts of Environment Statistics

Workshop on Environment Statistics
Yaoundé, 5-9 December 2011

United Nations Statistics Division

Fundamentals of environment statistics

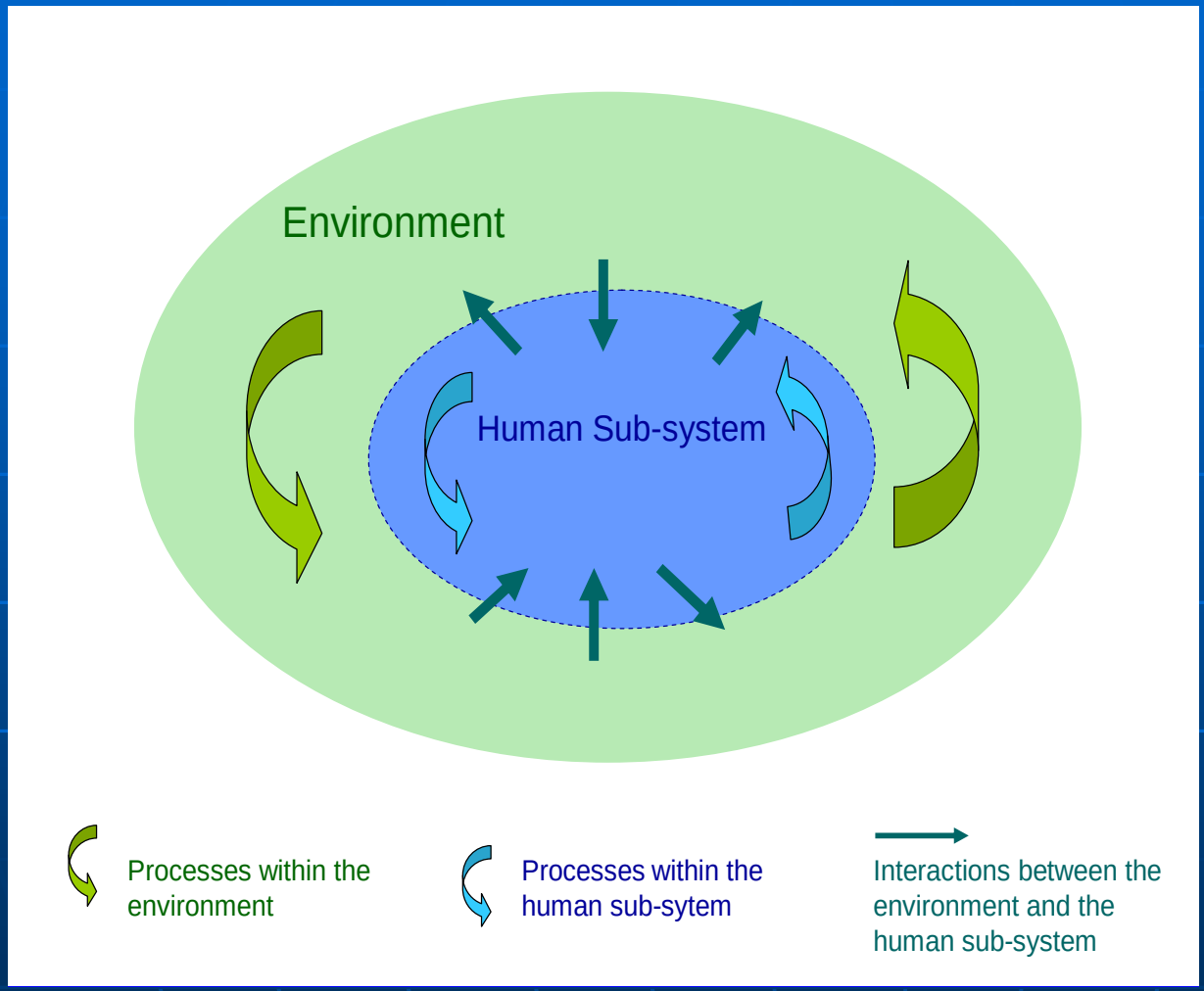
1. Definition, scope and objective
2. The domain of environment statistics
3. Types of environment statistics
4. Need, users and products of environment statistics
5. Sources of environment statistics
6. Relation to economic and social statistics
7. Institutional dimension of environment statistics
8. A brief history of environment statistics

1. Definition, scope and objective of ES

Environment Statistics

- Environment statistics describe the qualitative and quantitative aspects of the state and changes of the environment and its interaction with human activities and natural events.
- Environment statistics are integrative, measure human activities and natural events that affect the environment, monitor the impacts on the environment and the social responses to environmental impacts.
- Environment statistics is a domain of statistics, and it is indispensable for evidence based policies and decision making to support sustainable development.

The Environment and the Human Subsystem



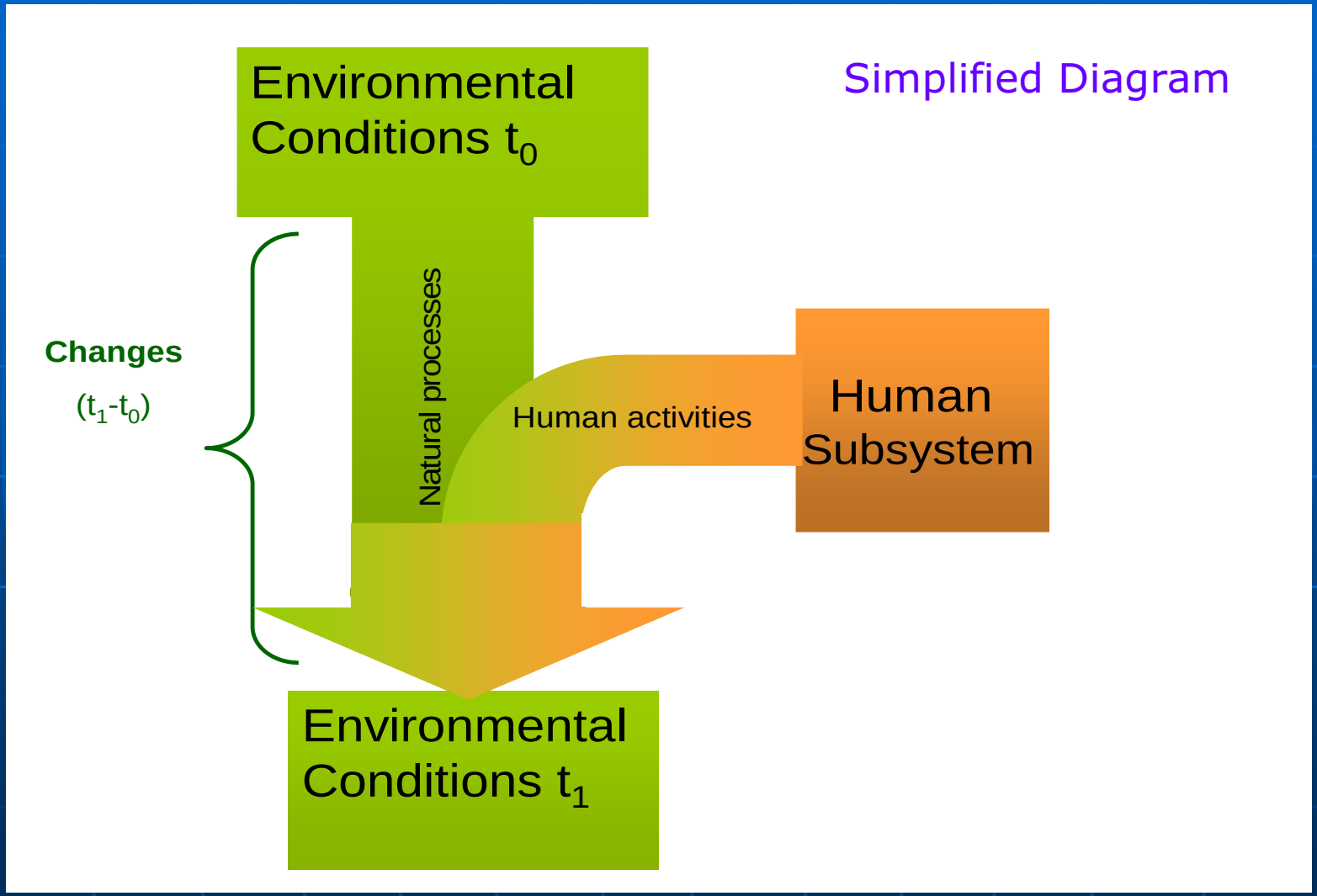
Humans use environmental resources for production and consumption and they return residuals and waste to the environment.

As a result of human activities, environmental conditions, natural processes and the capacity of ecosystems to provide their goods and services all experience change.

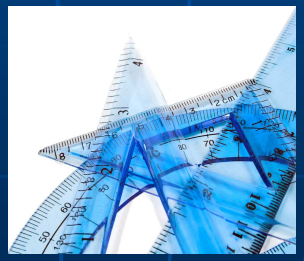
These changes, in turn, initiate changes in the human subsystem's economic and social processes.

FDES Conceptual foundation- preliminary

Environmental Conditions and their Changes



- About the environment as a whole, what do we know, what can we monitor and measure, and what do we want to incorporate in the production of environment statistics?

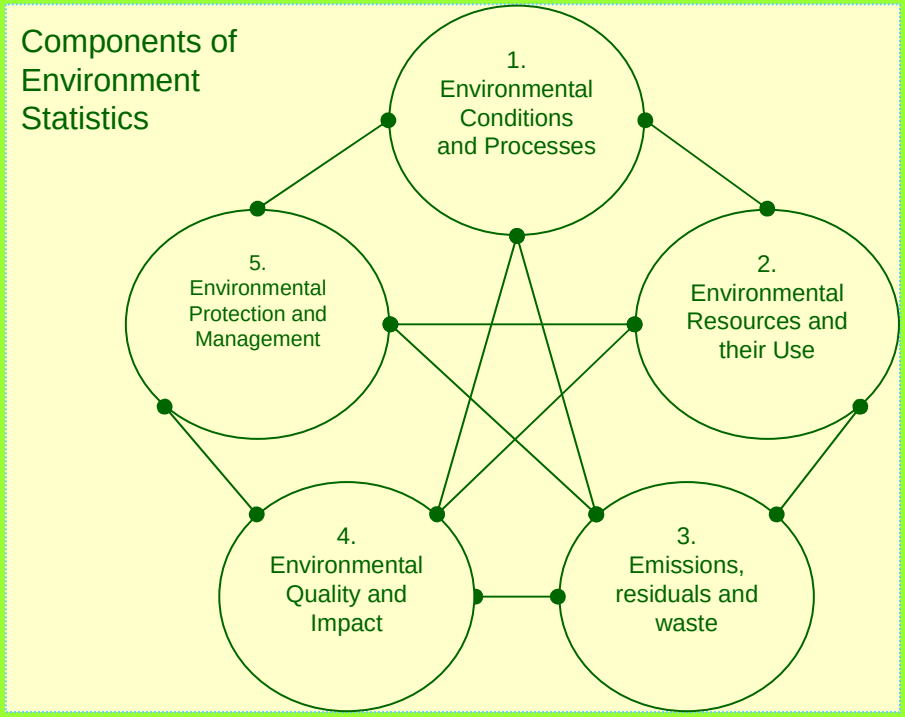




U_1

The U_1 Universe = The Ecosphere

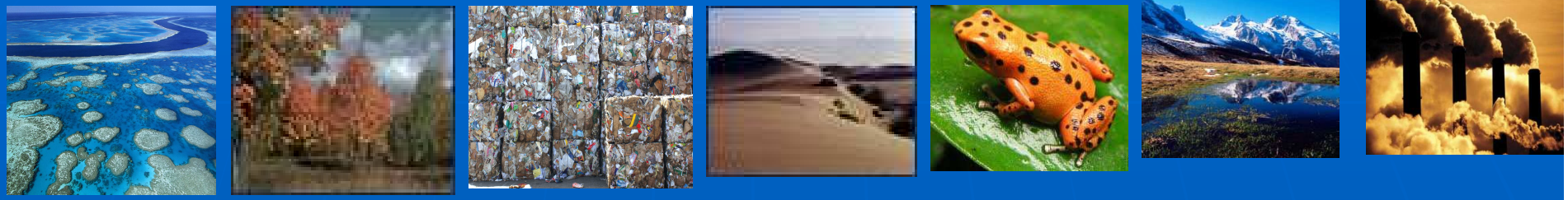
U_2 Known universe= adjacent and interacting with humans

U_3 Measurable universe = realm of environment



Statistics

U_4 What the country includes in its environment statistics system



- As illustration, environment statistics' usual themes/topics can include (but are not restricted to):

  Atmosphere, Climate, Ambient Air, Biodiversity and Biota, Land, Forest, Water, Ocean/Marine, Natural Resources, Pollution, Environmental Quality, Residuals and Waste, Environmental Protection Expenditure, Environmental Management, etc.

- There are different ways to structure and organize the contents of Environment Statistics (frameworks will be discussed later)

- The actual individual statistics and indicators to be produced by a country will depend on the selection criteria (i.e. relevance, statistical feasibility)

The Objectives of Environment Statistics

- Immediate objective of environment statistics is to provide quantitative information about the environment's state and its most important changes over time and across territories.
- Aim to provide quality statistical information to improve policy and decision making by different players.

Operationally, the objective and ultimate purpose of environment statistics can be achieved by setting up, strengthening and sustaining environment statistics programmes and units that function on a regular basis in each country, similar to those already operating in economic and social statistics.

Source: Revised FDES. Provisional Draft.

2. The domain of environment statistics

Characteristics of ES

- Environment statistics is a cross-cutting statistical domain with specific complexities.
- The development of programmes of environment statistics is heterogeneous among countries, but clear progress have been made during the last 15 years, particularly in developing countries.
- The demand for environment statistics is increasing rapidly everywhere.
- Environment statistics production requires combined technical expertise on environmental themes, statistical technical capacities and institutional coordination capacities.
- By definition, environment statistics are multidisciplinary and cross-cutting, involving numerous stakeholders

Characteristics of ES (cont)

- Environment statistics' sources are dispersed and a variety of methods are applied in their compilation.
- Environment statistics are compiled, stored and disseminated by central statistical services, government departments, research institutes, local authorities and international organizations.
- They are collected through censuses, surveys, the use of administrative records, but also from specific types of sources such as: monitoring stations, remote sensing and scientific research.

- The way of collecting data from the specific types of sources differs considerably from the survey techniques employed in social and economic statistics.

- From the environment to the production of biophysical data describing natural resources and environmental quality

Characteristics of ES (cont)

- Usually, the same institutions producing environmental data are also users of environment statistics. Further demand for environmental data arises from business and industry, scientists, the mass communication media and the general public.
- The interdisciplinary and inter-institutional characteristics of environment statistics and the variety of data producers and users require collaboration among institutions, practitioners and experts in different fields
- To effectively transform environmental information into official environment statistics, the collaboration and coordination of a significant number of actors and institutions is required.
- Institutions with strong leadership and the skills and resources to facilitate multi-stakeholder processes are required
- Thus, institutional strengthening and inter-institutional collaboration and co-ordination are inherent to environment statistics data production, processing and dissemination.

Dispersion, atomization and costs of monitoring and measurement

- Environmental phenomena takes place in dispersed manner, constantly over time and across territories, as a fluid set of processes, each with different velocities.
- At the primary sources, measuring and monitoring requires careful selection. Transforming raw data from primary sources to statistics, takes expertise and institutional capacities.
- Developing countries face budgetary constraints and the funds allocated to statistics are subject to restrictions. In general, environmental issues are given a lower priority than social and economic statistics.
- The cost of monitoring systems and remote sensing is falling over time, some of the primary production of raw data (in monitoring and remote sensing agencies) require the investment, calibration and use of somewhat costly instruments, not to mention the work of interpreting data (such as satellite images). This means that the country has to invest in developing these monitoring capabilities, and also that scientists and highly specialized experts must be hired on a stable basis. Remote sensing in particular also requires the validation of the imagery data with direct observation in the field, thereby increasing the cost of producing environment statistics by this method, relative to the cost of statistics derived from questionnaires, for example.
- Prioritizing environment statistics that are most relevant, critical or strategic, and work progressively on further expansion.

Temporal considerations

- Time consideration is key to environment statistics. In fluid environment phenomena, the time is set arbitrarily as its dynamics are not discrete, but are rather continuums.
- Uniform calendar or fiscal year does not fit the diversity of natural phenomena as their behaviour is significant within either much shorter or much longer periods of time than traditional variables of the statistical system.
- Still, some environment statistics are often produced/updated annually within NSOs.

Periodicity.

- Periodicity needs to be adjusted according to relevance of each variable
- I.e., in a slow growing forest that is not subject to logging – do not require assiduous monitoring and informing about its status, since relevant changes occur over years.
- Other processes change so quickly that in some urban centres they are monitored as frequently as every hour of the day. One example is air quality, which depends on emissions and concentrations of fine and coarse particulate matter (PM_{10}, $PM_{2.5}$)

From raw data to statistics - examples

Monitoring: observations are voluminous over time and space

Selection, validation, structure, description

Relevant statistical data series

Primary Source

I.e. Monitoring Station, Remote Sensing

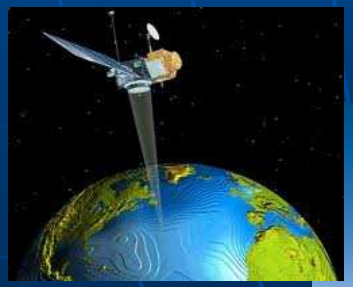
→

Statistical Office

Transforms raw data into statistics

→

Dissemination to public



Time: Different periodicities

Temporal considerations, cont.

Distinguish among periodicities:

- The first time period to be defined is when the occurrence of the phenomena are relevant to the microdata or data being produced,
- Second periodicity is the time period for which data will be made available for processing,
- Third period can be defined for when a statistical operation will take place in order to produce and disseminate official data series.
- Illustration a) Statistic UV radiation, most likely there will be an hourly periodicity of measurements within a network of monitoring sites in any given country, there will be a periodicity for transmitting these microdata to a meteorological institution, and from here to the statistical office or environment ministry which will produce a data series of monthly maximums, minimums and average radiation for a set of territories.
- Illustration b) Soil degradation for a defined territory, will probably yield one or two points of observation within decades and therefore there will probably be only one time in which the observation, measurement, transmission and operation to produce the statistical series takes place.

Seasonality

- Some environmental variables behave in a markedly seasonal manner
- Fluctuations in certain types of fish biomass, surface water levels, ice cap surface or the incidence of fires.
- In such cases, monitoring needs to be focused more during some months than others, and therefore statistics should be carefully produced in the most relevant time periods.

Spatial considerations

- Environmental phenomena occur in a given territorial space and their sequence of occurrence and impacts are distributed within territories.
- I.e., some rivers and ecosystems (forests), mountains and oceans, are shared by different regions and countries.
- Climate change occurs at a global level although its causes, state, impact and responses are unevenly distributed among countries, not only based on natural geographic circumstances but also by the patterns of production, consumption and disposition of residuals that are very different in developing and developed countries at different locations.
- Environmental variables fluctuate considerably depending on their geographic location, which in turn is associated with different climatic and ecosystemic conditions and anthropogenic pressures.
- Consequently, spatialized indicators, or those that are specific to each territory, are more useful than indicators that are national aggregates or averages.
  - I.e. Quality of surface water intended for human consumption, since a specific water pollution indicator – e.g., the biochemical oxygen demand (BOD)– may be less important in the flow downriver from a city than in the intake for public water use. More important to inform the maximum levels at a very specific geographic location, rather than the average pollution levels, in order to determine whether the standard for that location has been met. The average would be influenced by the number of observations and the pollution levels for the entire length of the river.
- Measuring and producing statistics about the environment pose a challenge to traditional statistical systems that mostly rely on administrative units of observation and produce data in accordance with these institutionally set boundaries and units.

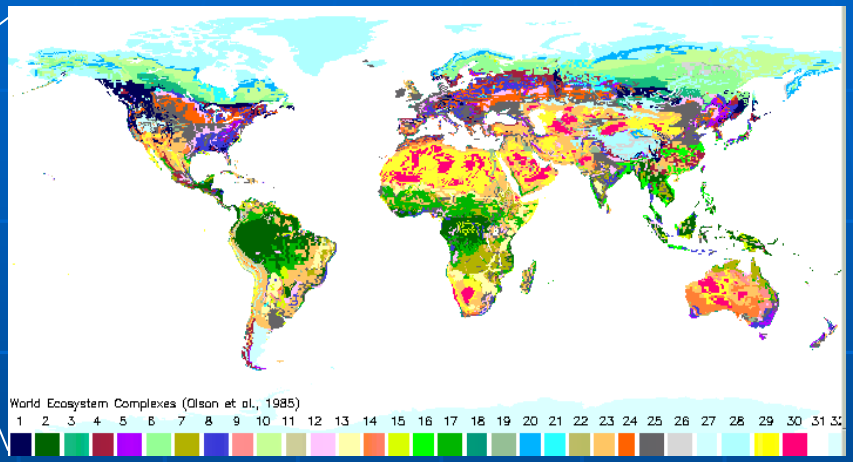
Spatial considerations, cont

- Currently, most sources and current data availability (environmental, social, demographic and economic) in the statistical systems are not spatially observed, measured or capable of being (diss)aggregated according to spatial categories.
- Most economic and social data are collected and aggregated using political-administrative boundaries.
- But most environmental phenomena and an important part of environment statistics are observed and collected with regard to some spatial unit, that being a territory, an ecosystem, a biome or a basin. Only environment statistics originating in traditional sources (Surveys and Admin Records) are observed at individual establishments or households and are aggregated according to administrative boundaries.
- Recently collection of some traditional data sets are georeferenced. I.e, some countries implemented 2010 Round of Population and Housing Censuses.
- Some countries are advancing significantly in producing data using geographical, geomatic and geodesic bases for describing human activities within their territories and can relate these spatial attributes to economic, social and environment statistics.
- Geo-statistics appear set to play a pivotal role in environment statistics, and in official statistics generally.

Space, territories and boundaries

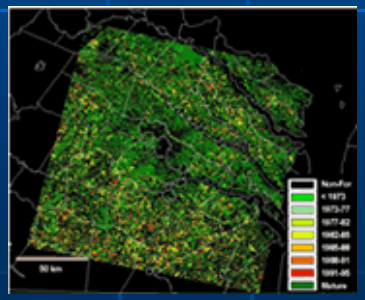
a) The Earth – no boundaries
b) Definition of biomes, ecosystems, basins and habitats – overlapping borders
c) Definition of political administrative boundaries – countries
d) Definition of economic territory
e) Definition of international areas

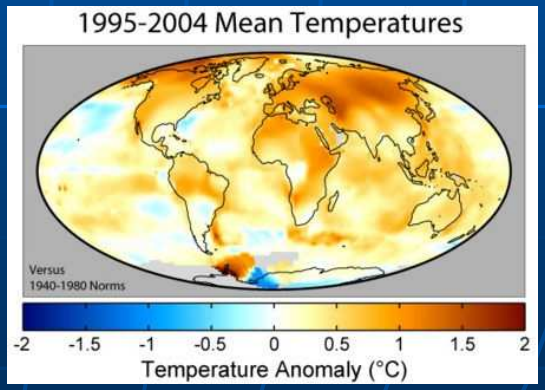
a. The Earth – no boundaries



The planet holds one unique immense and fluid environment composed of interacting ecosystems that are not simply unconnected and distinct and which do not recognize any particular border set up by humankind.

Environment statistics aim to capture the magnitudes of these different aspects of the state and changes of ecosystems that are experienced by countries but are trans-boundary in nature.



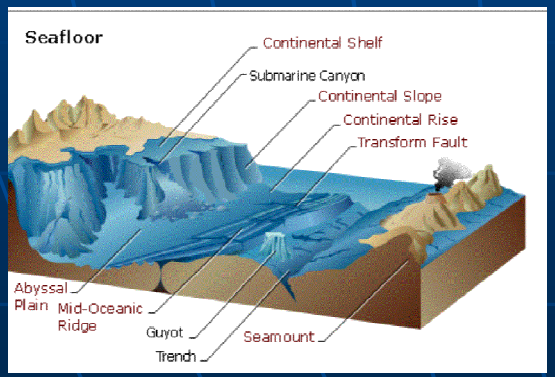


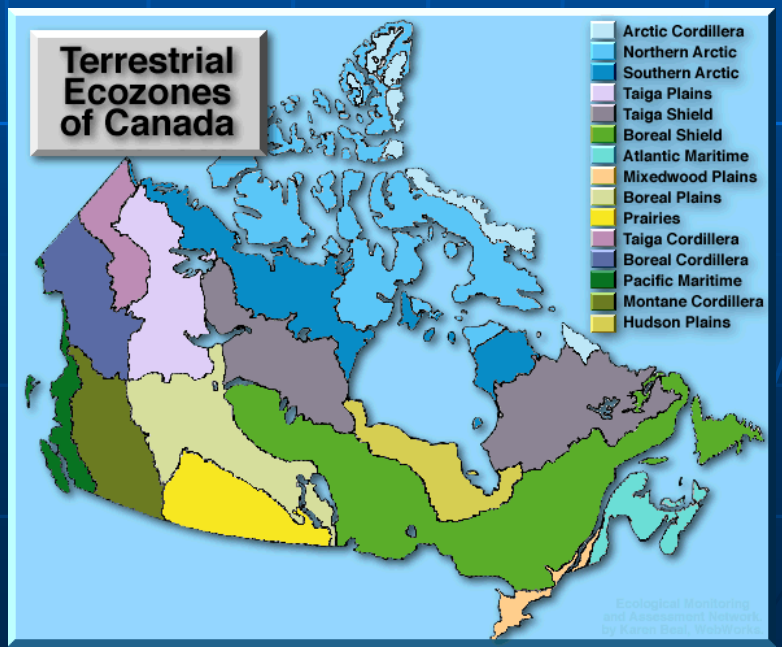
These are the complex ecosystems represented globally. Environment Statistics aim to capture its state and changes at different scales.

b. Definition of different natural areas – overlapping borders

- Biomes
- Ecosystems
- Habitats
- Ecozones
- Water Basins

Australasia ecozone





The world's biomes

- Biomes are defined as "the world's major communities, classified according to the predominant vegetation and characterized by adaptations of organisms to that particular environment" (Campbell 1996).
- Biomes have changed and moved many times during the history of life on Earth. More recently, human activities have drastically altered these communities.
- Usual biomes of the world include **Mountains (High Elevation), Tundra, Temperate Forest, Marine/Island, Desert, Tropical Dry Forest, Cold Climate Forest, Grassland, Savannah, and Tropical Rainforest**

Biomes, major types :

- Freshwater

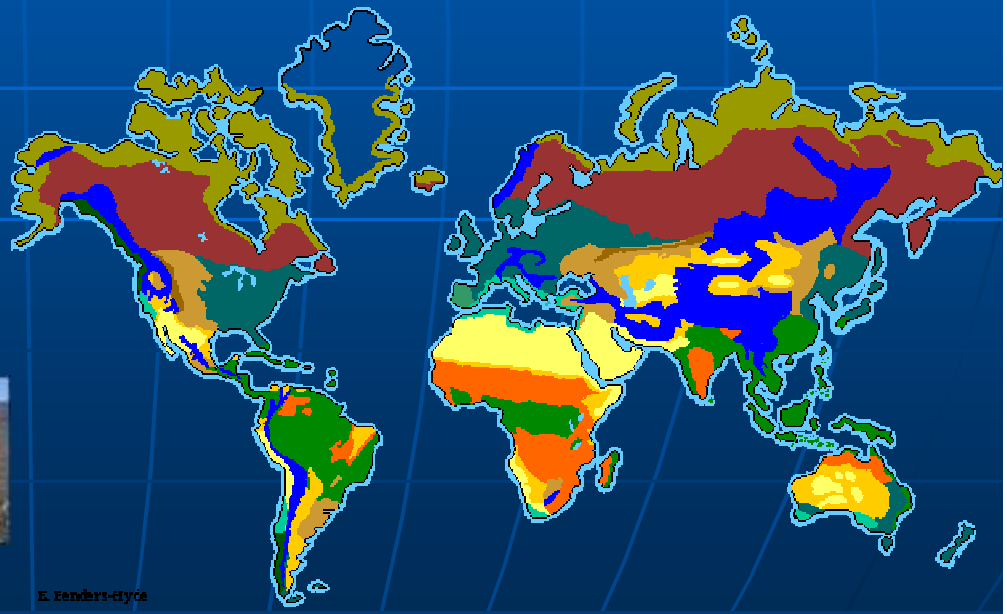
- Marine

- Desert

- Forest

- Grassland

- Tundra

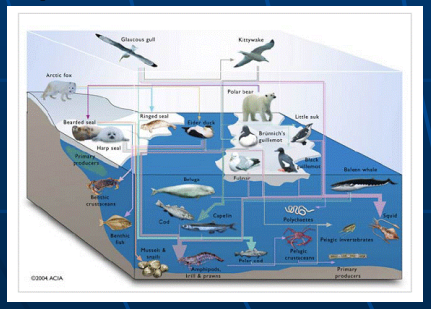


Ecosystems

- "An ecosystem includes all the biotic interactions of a community as well as the interactions between organisms and their abiotic environment. Like other systems, an ecosystem consists of multiple interacting parts that form a unified whole. An ecosystem is a system in which all of the biological, physical, and chemical components of an area form a complex, interacting network of energy flow and materials cycling". Raven, Berg, Hassenzahl (2008): Environment. Wiley, 6th Edition. P. 47.

- An ecosystem is a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit". Convention on Biological Diversity

- Ecosystems can be described at different scales, i.e., they can be as large as the Sahara Desert, or as small as a puddle or vernal pool.





Habitats

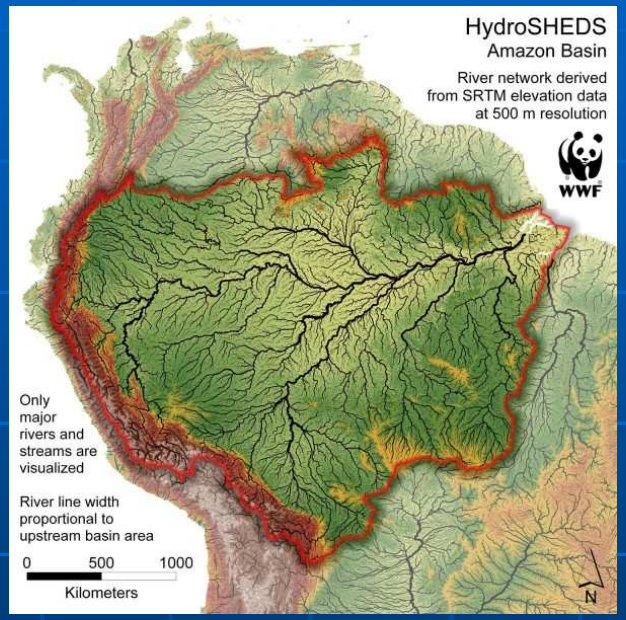
- Coastal

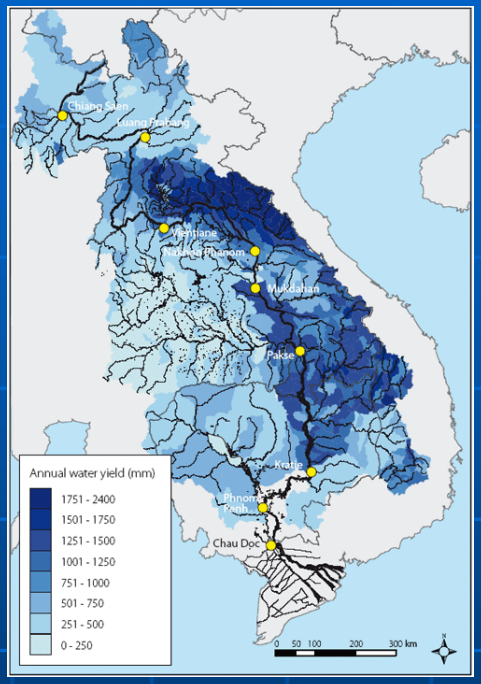
A **habitat** is the natural environment in which an organism lives, or the physical environment that surrounds (influences and is utilized by) a species population

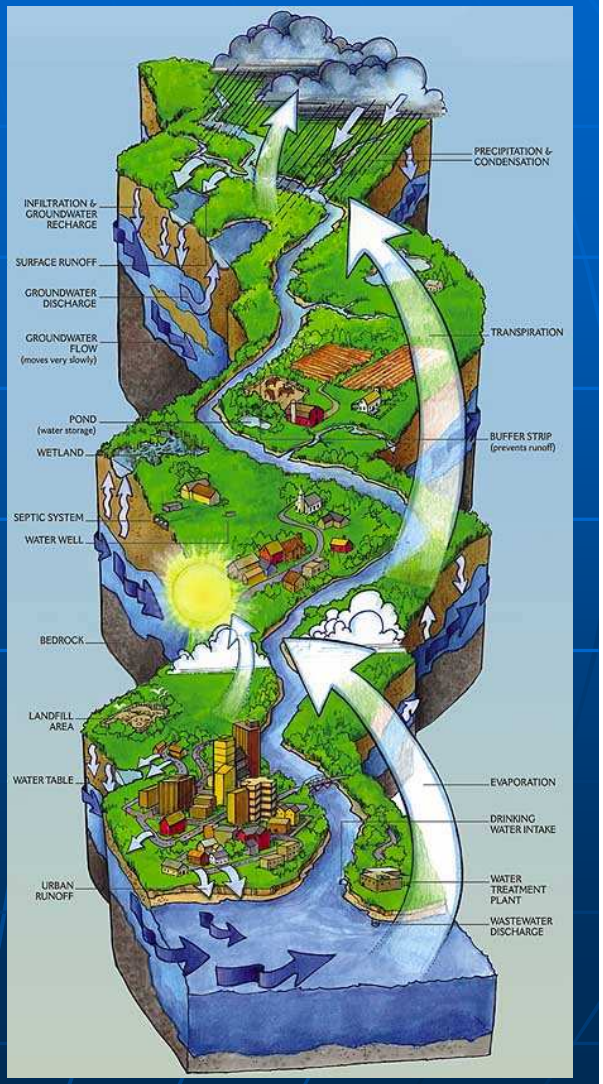
- Rainforest

- Coral reef

River basins and watersheds

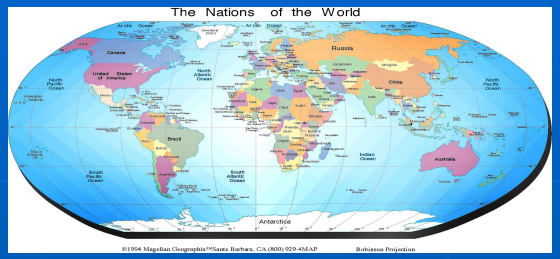






A watershed is an area of land that drains to a common location. A watershed can vary in size, they can represent the area draining to a small stream to the entire are draining to an ocean.

c. Political-administrative national boundaries



Country

Sub-national regions

Territorial land, seas and islands

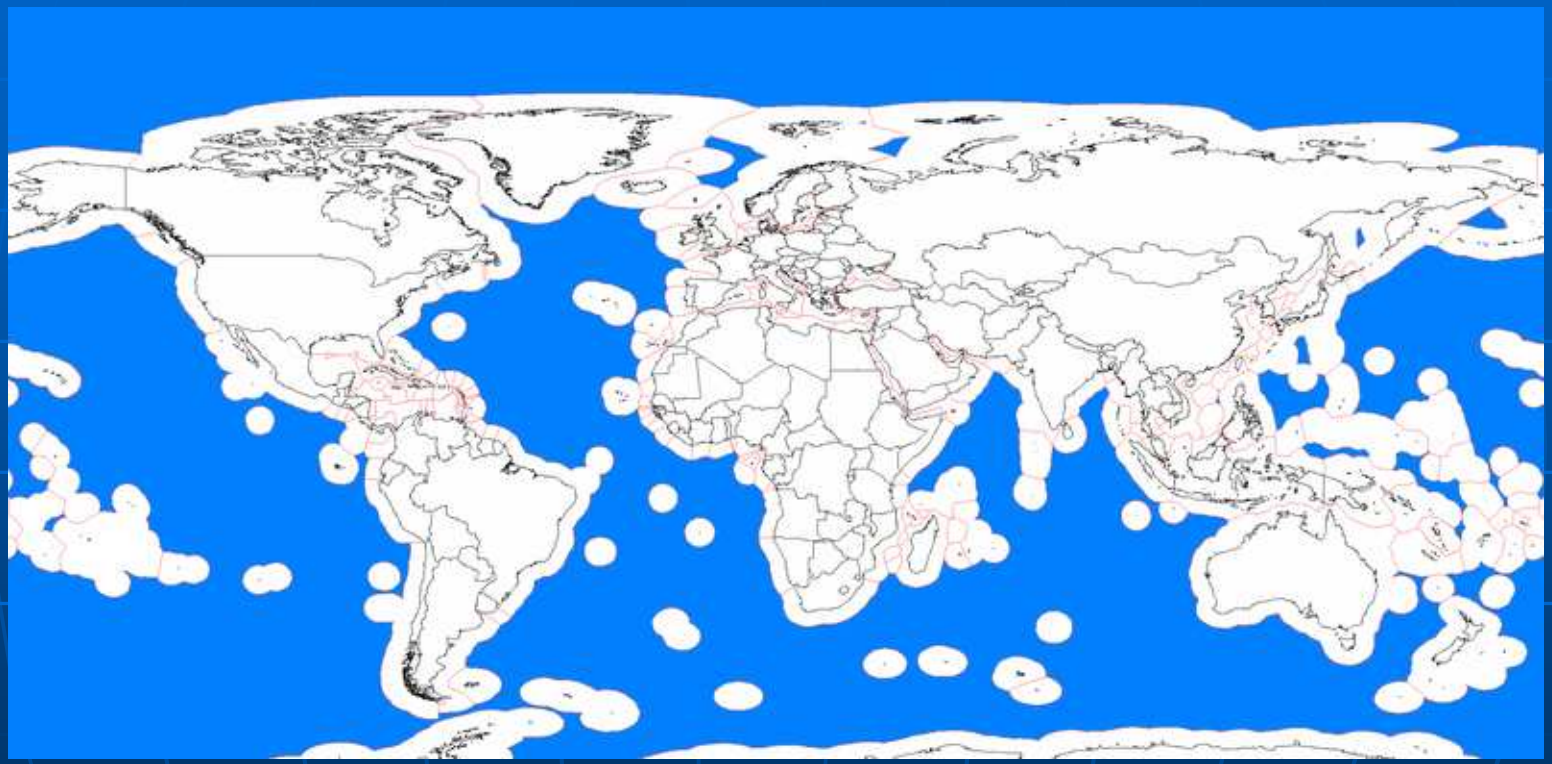
- Territory under one political authority
- Sub-national regions defined administratively
- Usually includes territorial seas and islands

d. Economic Territory

Economic territory includes the land area of a country including islands, airspace, territorial waters and territorial enclaves in the rest of the world. Economic territory excludes territorial enclaves located in the reference country.

A national economy comprises the set of all institutional units that are resident in an economic territory, i.e., the unit has its centre of predominant economic interest in a particular economic territory.

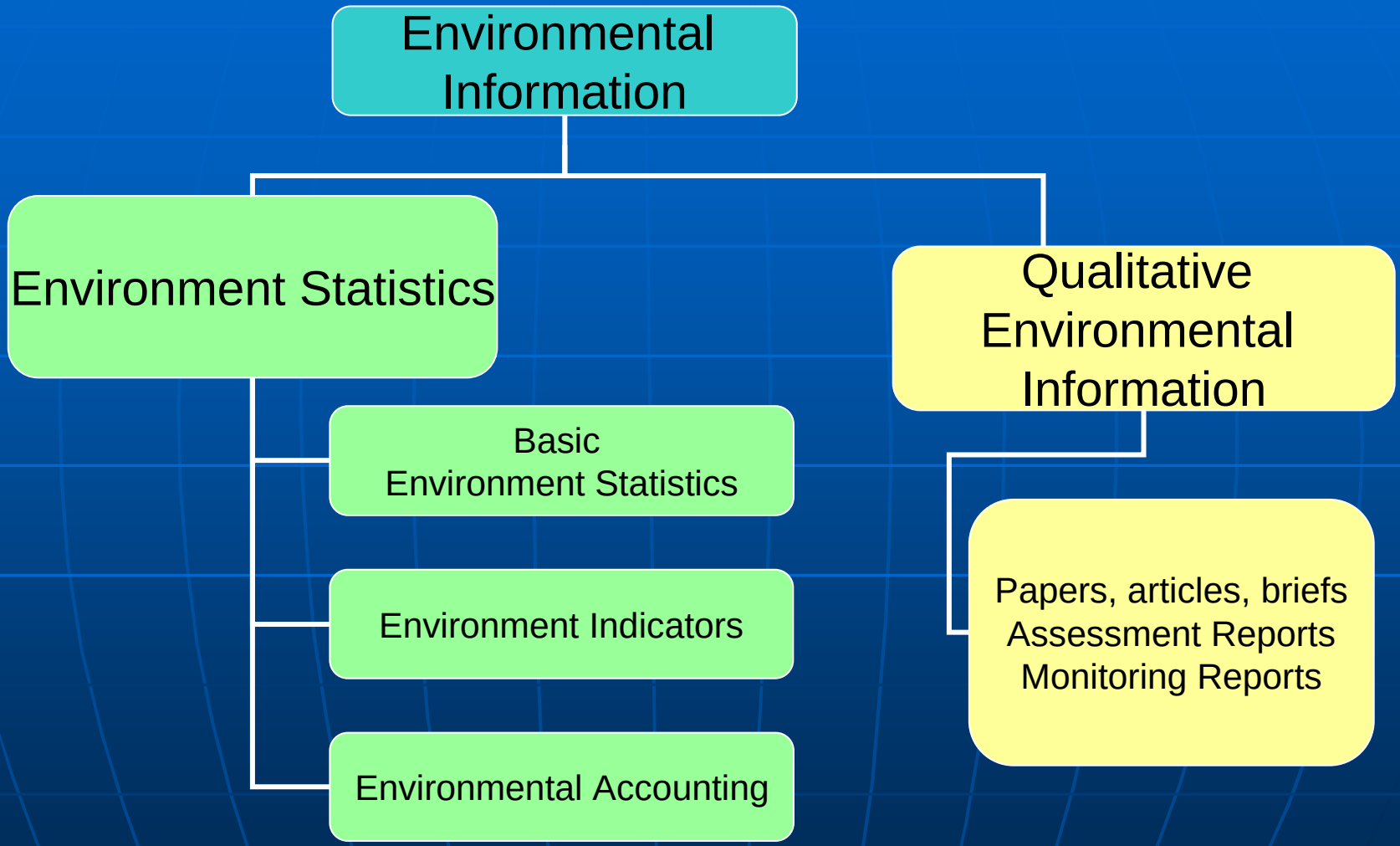
e. Areas outside of exclusive economic zones



Areas outside of exclusive economic zones (in bright blue)

3. Types of environment statistics

Types of Environmental Information



Types of quantitative environmental information, characteristics, users and products

Type of environment quantitative information	Characteristics	Major Users	Illustrative Products
Environment Statistics	Voluminous Detailed Include as many variables as possible Highly disaggregated	Researchers Analyst Report authors Indicator producers Accounts producers	Databases Compendia
Indicators	Aggregated Composite Highly aggregated Selected variables into a limited in number Presented in a context	Analysts Advisors Decision makers General public	Indicators sets Indicators databases (for monitoring policy goals, and targets)
Accounts (SEEA)	Aggregated at the national level Integrates economic and environmental data It contains different accounts such as natural assets accounts, physical flows, emissions, etc.	Analysts Indicator producers Decision makers General public	Result Tables

Environment statistics

- Environment statistics is also referred to as basic environment statistics.
- Usually voluminous sets of statistics describing the state and trends of the environment and their main components. Include the human subsystem in its interrelation to ecosystems as a whole.
- To transform raw data into official statistics requires a carefully tailored process of definition of the types of magnitudes (i.e. aggregates, averages, minimums, maximums, etc) and its attributes (time, location, coverage, etc.) to be captured by carefully selected variables, that are then collected, validated, structured and described using statistical standards and procedures (more later).
- Usually the environment statistics series are produced for countries, regions and the world, and disseminated through compendia and databases. Because of their volume, the general public and the decision makers often require further processing of environment statistics to satisfy their analytical and decision-making needs.

Environmental indicators

- Environmental indicators are a particular type of statistics, requiring a careful selection of individual statistics in order to calculate a composite or more complex measure to depict key elements of processes about the environment.
- Indicator sets are typically produced to monitor national (and international) policy goals and targets and to enable continued oversee of progress towards sought objectives.
- Environmental indicators are widely produced as a stand alone product, but sometimes environmental indicators are part of sets of sustainable development indicators, along with accompanying economic and social indicators.
- Indicators are powerful measures that are usually disseminated with an accompanying context and explanation. Frequently, environmental indicators are disseminated through reports, brochures and websites, and are widely used in assessment and reports about the state and trends of the environment.

Environmental accounting

The System of integrated Environmental Economic Accounting (SEEA) is an accounting framework that follows the methodology of the System of National Accounts[1].

It consists of a series of tables that account for the interactions between the economy and the environment, using standard classifications, as well as environmental and economic statistical data sets.

Environmental-economic accounts is aimed at measuring the impacts of the economy on the environment, the contribution of the environment to the economy and the state of the environment. The SEEA is the statistical framework that provides internationally agreed concepts, definitions, classifications, accounting rules and standard tables for producing internationally comparable statistics on the environment and its relationship with the economy.

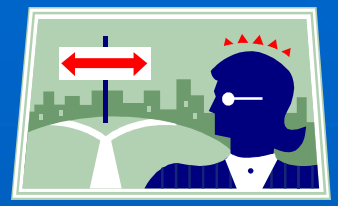
For example, in the field of natural resources, there is SEEA-Water that focuses on accounting for stocks and flows, and inflows and outflows of water in a country, so that physical balances can be calculated by the end of the fiscal year, thus making possible the temporal analysis.

The SEEA is currently undergoing revision for the new SEEA (Volume 1) and is expected to be adopted by 2012.

- [1] The SEEA is a satellite account of the central SNA, the accounting framework used worldwide to provide economic accounts that are comprehensive (in that all designated activities and the consequences for all agents in an economy are covered), consistent (identical values are used to establish the consequences of a single action on all parties concerned using the same accounting rules); and integrated, in that all the consequences of a single action by one agent are necessarily reflected in resulting accounts, including the impact on measurement of wealth captured in balance sheets [SNA 2008].

4. Need, users and products of environment statistics

Need for Environment Statistics



- Offer environmental data series (through compendia and databases) and feed into the production of environmental and sustainable development reports, indicators and accounts, at the national and international level;
- Support evidence based policy making, by enabling the objective quantification of components and impacts of policy initiatives (whose goals and aims may or may not have quantitative targets and/or indicators);
- Strengthen assessment through quantitative metrics, making analysis and assessment more robust through official, comparable and timely data provision;
- Enable statistical reporting to major national and international data collectors (i.e. international environmental agreements, global and regional data collection through Questionnaires and other instruments). Reporting can be voluntary or it might entail obligations, data is needed regardless. For supranational reporting comparability is more important;
- Inform the general public, civil organizations and major stakeholder groups through official and relevant environmental data sets.

Users of Environment Statistics

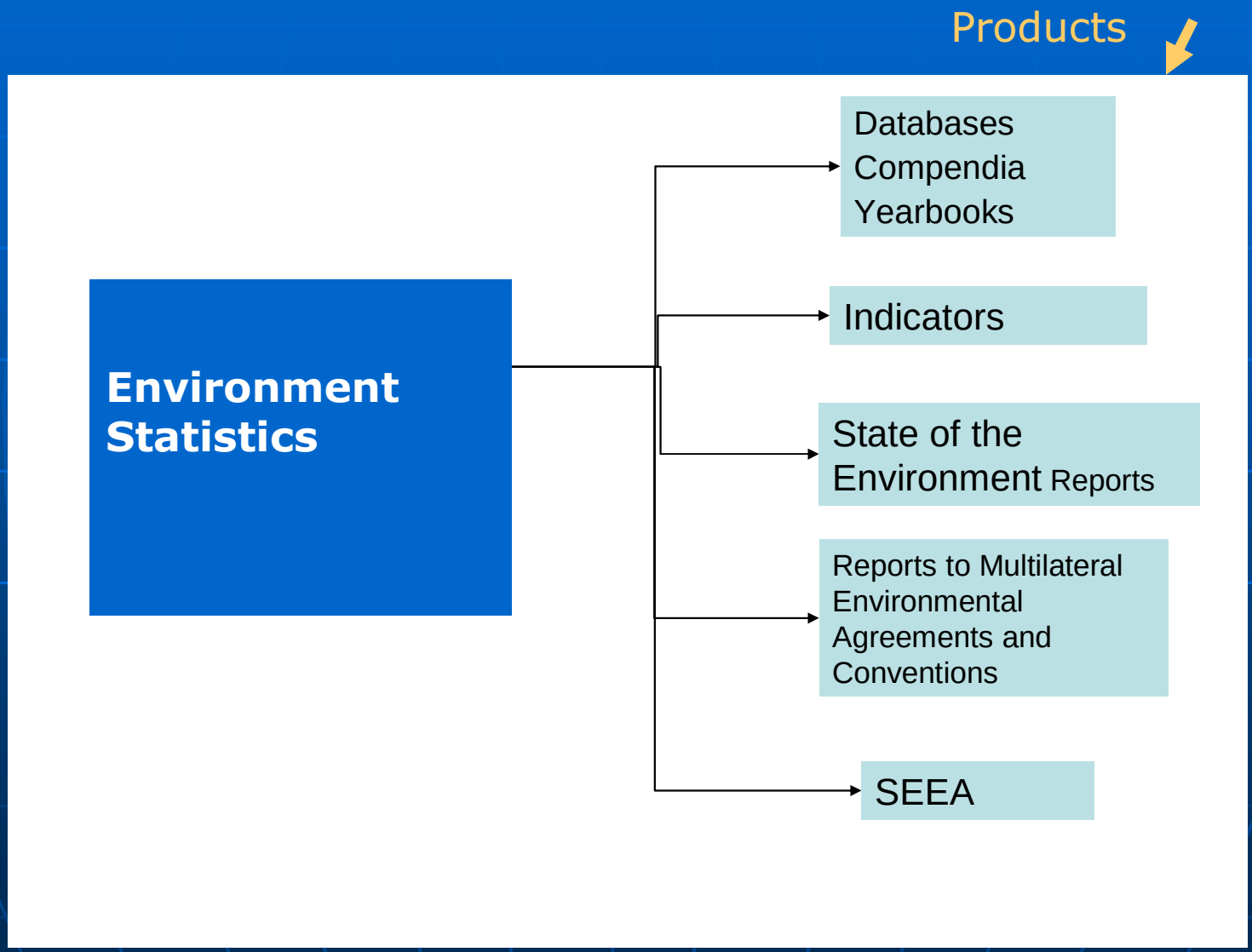
Environment Statistics serve a variety of users, including:

- The general public
- Decision and policy makers
- Researchers
- Analysts, experts and advisors
- Government officials and practitioners
- International agencies

- The different users need the environment statistics presented at different levels of aggregation and dissagregation, and with specific depths of information and metadata.
- The users may be sometimes in need of cross-cutting environment statistics datasets and in other cases only interested in particular topics and themes pertaining to environment statistics.

- These players regularly **use** environment statistics to produce different products and results that are generally published and disseminated

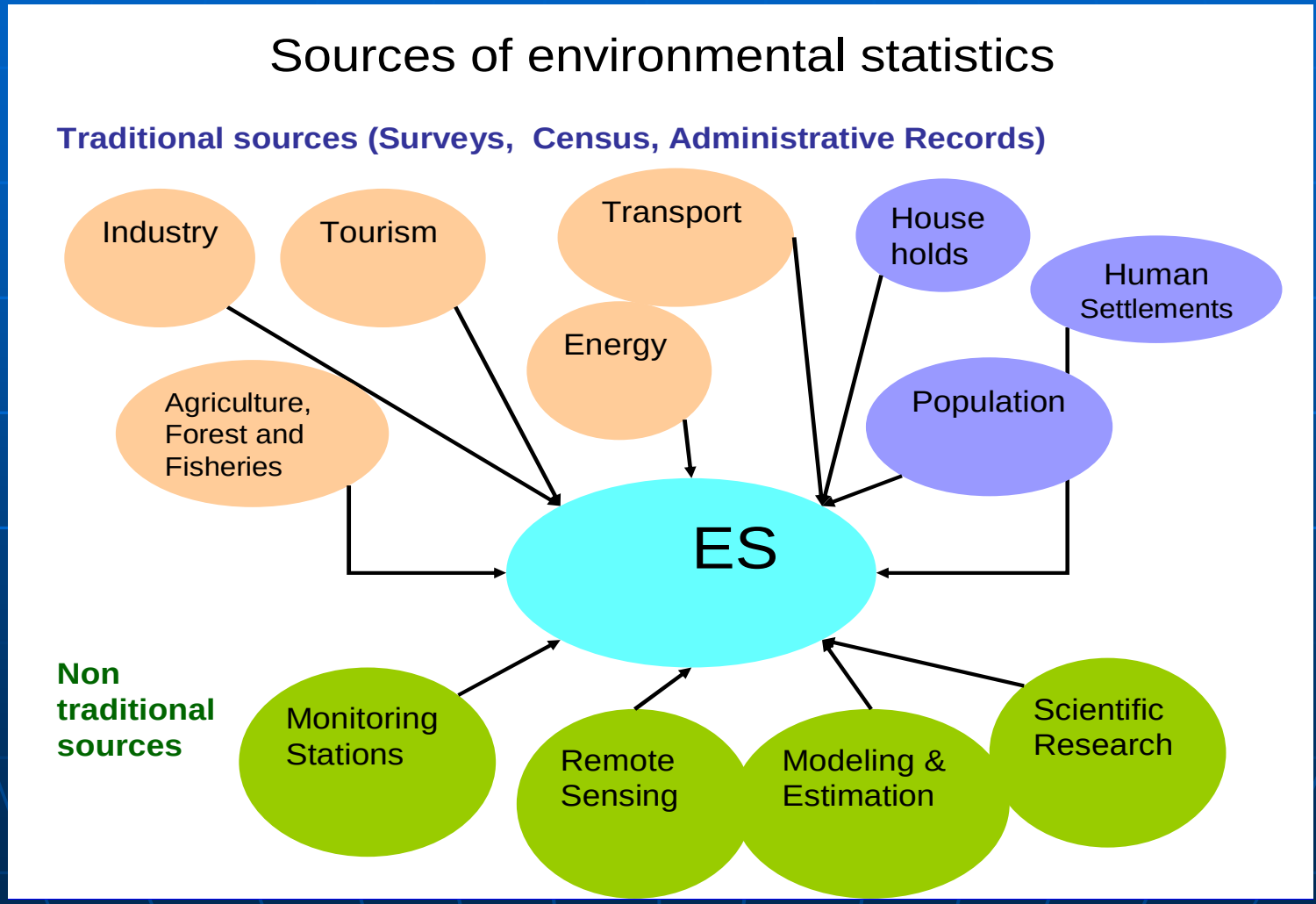
Products using Environment Statistics



Source: Revised FDES. Provisional Draft.

5. Sources of environment statistics

Traditional and non-traditional sources of environment statistics



Source: Revised FDES. Provisional Draft.

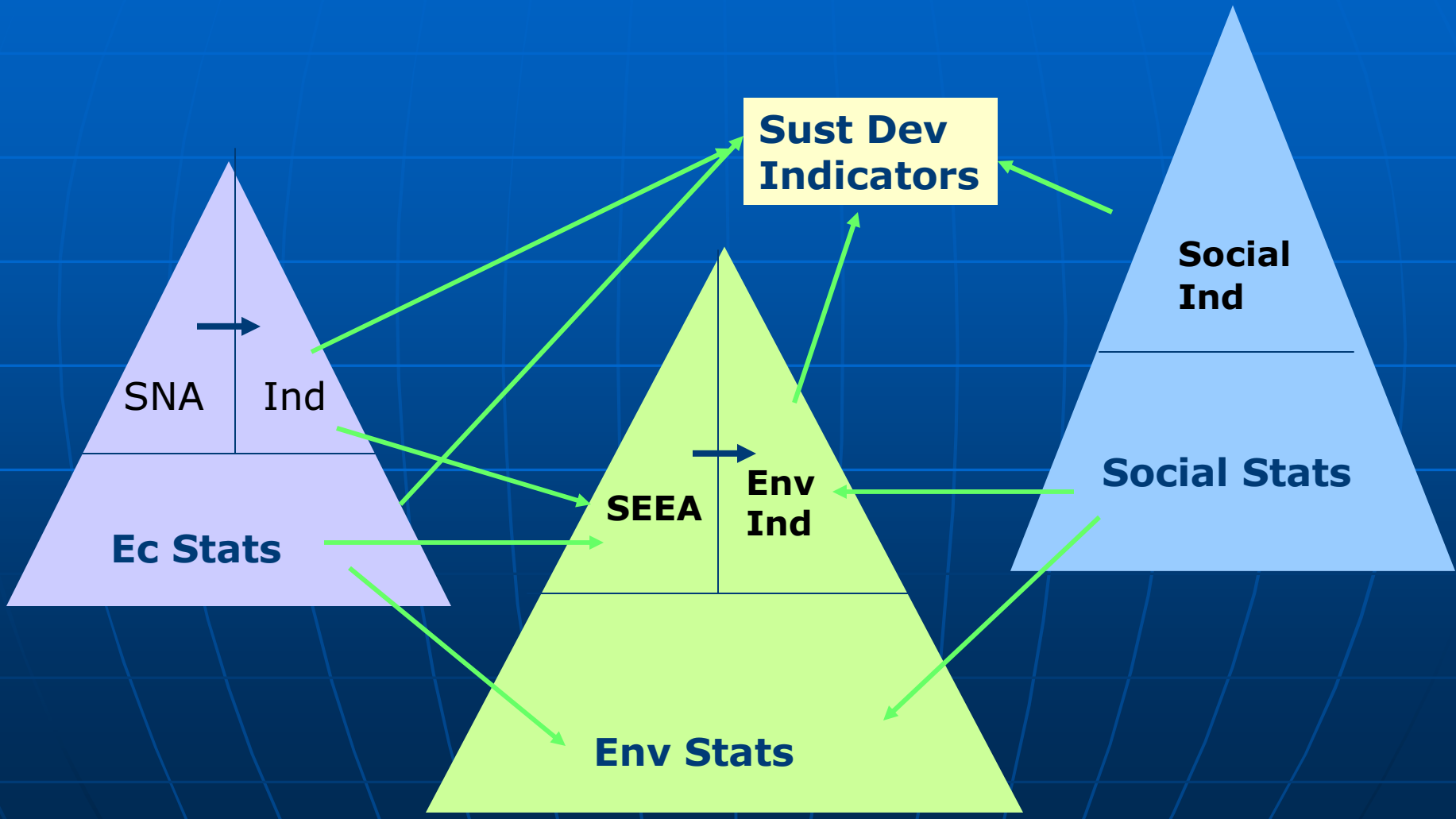
Main sources of Environment Statistics

1. Administrative records (of government agencies in charge of natural resources and other ministries)
2. Statistical censuses (of population, housing, livestock, businesses) and surveys (of households, employment, and different aspects of environment management)
3. Monitoring systems (of water quality, air pollution, climate, soils, and so on)
4. Remote sensing (i.e. satellite imaging of land use, water bodies and forest cover)
5. Estimates and modeling (creating different models for estimation, and using methods such as regression, extrapolation and interpolation)
6. Scientific Research

Type of source	Example of source type	Example of statistical data sets	Principal potential strengths	Principal potential weaknesses	Challenges for developing countries
1. Administrative records	Statistical exploitation of records maintained in different government agencies for administrative purposes, at various levels (national, regional, provincial, municipal, and so on) such as: Customs records (imports), sectoral ministry records, public finance and budget records, tax returns records, environmental authority records.	Apparent consumption of agrochemicals Chlorofluorocarbon consumption Number of motor vehicles Environmental impact Licensing Enforcement of protected area regulations Environmental education actions Reforested surface area Public spending on environmental matters	High periodicity of production (annual, quarterly and even monthly) and thus high frequency of updating	Questionable quality of records in terms of lack of continuity, and insufficiency of metadata to ensure compatibility of series	Building statistical capacities in sectoral ministries and public services Requires stable national inter-institutional coordination
2.1 Censuses	Although these are general purpose instruments, censuses may often include environmental aspects of areas inhabited by the population.	Potable water Basic sanitation Housing quality Electricity connections to households	More representative of the universe of informants, more accurate data outcomes	Periodicity every decade, some developing countries even less frequent	Refining sectors of the instrument to capture more and better environmental information
2.2. Surveys	Includes general purpose instruments (which may undoubtedly cover environmental issues) such as Household Surveys and business surveys; also includes emerging surveys specifically designed to gather environmental information, such as environmental management surveys for business establishments (industry, tourism, agriculture, and so on), municipal environmental management surveys and public opinion polls on the environment, among others.	Potable water Basic sanitation Housing quality Establishments with environmental management systems Production and handling of solid waste Opinion barometers on environmental policies and management	Greater periodicity and therefore more frequent updating of series	Sampling and representativeness of sample in the universe of informants can be a concern	Refining sectors of recurrent instruments to capture more and better environmental information Developing and maintaining specialized environmental surveys of different sectors and on different scales
3. Monitoring systems	Includes various natural resource quality and pollution monitoring stations and systems, such as: Urban air pollution monitoring stations, surface water quality monitoring systems (principal rivers), glacier monitoring systems, seawater or coastal water quality monitoring systems, and so on.	Various parameters sampled to establish: Quality of potable water Urban clean air quality Coastal - beaches pollution Level, height or retract of principal glaciers	In general, good to excellent quality and more accurate data and microdata	Costs of installing and maintaining monitoring systems and thus of producing microdata	Need to coordinate the flow of data from primary source in terms of periodicity, aggregation and format required for feeding into statistical production (series, indicators)
4. Remote sensing	All kinds of remote sensing and atmospheric measuring tools that produce images and their interpretation: satellite imaging, aerial photography, geodata, geodesy, geomatics	Satellite imaging to inventory forests Remote imaging of urban sprawl (city surface) Land cover and land use (types)	Very accurate, but still under-utilized Costs of imaging have declined considerably	Cost of interpreting images remains high Many national statistical offices and Ministries of the Environment do not have specialists in geomatics	Requires geo-spatial literacy among officials responsible for environmental statistics Requires sufficient resources to interpret images and build geospatial representations of data
5. Modeling and Estimation	Estimates made using different methods such as regression, modelling, simulation, scenarios, extrapolation and interpolation.	CO_2 emissions Degradation of natural resources	Can be used when it is not possible to monitor or gather information directly	Results may be questionable, depending on methodologies used	

6. Relation to economic and social statistics

Relations between social, economic and environment statistics



7.Institutional dimension of Environment Statistics

Why the institutional dimension is important?

- The production of environment statistics requires institutional capacities to enable the systematic production and dissemination of good quality and timely statistical products.
- To effectively transform environmental information into official environment statistics, the collaboration and coordination of a significant number of actors and institutions is required.
- To successfully produce official environment statistics on a permanent basis requires institutions with strong leadership and the skills and resources to facilitate multi-stakeholder processes.
- Building the capacities of institutions to lead, plan, organize and coordinate the production of environment statistics is essential, especially in developing countries where resources are scarce.
- In general, in many developing countries institutional weakness, lack of an institutional framework, unclear mandates, duplication of efforts and/or poor coordination are key barriers for the systematic production of environment statistics.

Key players

Potential data providers can roughly be grouped as follows:

- National Statistical Institutes and their related bodies (e.g., regional offices)
- Public Administration (e.g., Ministries) and related bodies (e.g., Environment Agencies, National Geographical Institutes, local authorities)
- Research Institutes (public and private)
- Private or semi-private interest groups (e.g., Water Association, Chamber of Commerce, Agriculture Lobby Groups)
- Non-Governmental Organizations (NGOs)

In addition, in the field of environment statistics, most of these players are also users of official environment statistics' series and data sets.

Source: Michael Nagy, cited in the Revised FDES, preliminary draft.

Main institutional challenges countries face in ES

1. In many countries a coherent and explicit institutional framework to govern the production of environment statistics is not clear or missing. Often it is not clear which agency or agencies are responsible for the country's official environment statistics.
2. The various institutions involved in the production of environment statistics, i.e., National Statistical Offices (NSOs), Environmental Ministries and other line and sectoral agencies (Water, Air, Forest, Agriculture, Ocean authorities) frequently do not coordinate or share data, often resulting in duplication of efforts.
3. It is common that human and financial resources dedicated to environment statistics are limited. Consequently activities such as coordination and collaboration with other agencies do not take priority.
4. Often the production of environment statistics is begun in an ad hoc manner, with teams set up to carry out specific projects aiming to publish a first set of environment statistics, indicators and/or accounts. In many cases the production of environment statistics fails to be "institutionalized". In other words, the generation of the statistical product does not become a regular activity and is not accorded the human and financial resources needed to carry it out on an ongoing basis.
5. In the emerging domain of environment statistics, the turnover of staff is high in both NSOs and Ministries, particularly in developing countries. These losses of human capital are an important concern as there is a general lack of environment statistics expertise among both environmental experts and statisticians.
6. There is insufficient communication and coordination among the producer and user communities of environment statistics at all levels.
7. There are insufficient information and operational guidelines (available in the languages of the practitioners) regarding the institutional dimension of environment statistics production, thus often NSOs and Environmental Ministries do not have a clear idea of the minimum requirements necessary for implementing an official environment statistics programme.

Key elements to the institutional dimension

a) Legal Framework

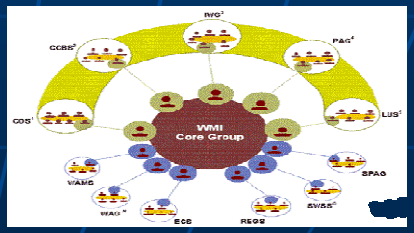
b) Institutional development

c) Organization of inter-institutional collaboration

d) Collaboration among national, regional and global scales

a) Legal Framework

- Legal framework relevant for production of Env Stats.
- Commonly consists of a statistical, environmental and other relevant sectoral legislation (water, energy, agriculture). Each defines mandate and competencies of institutions in charge of each sector.
- Under the national statistical legislation, usually the NSO is the responsible authority for creating and coordinating the national statistical system.
- But frequently, the statistics law does not explicitly make reference to environmental information (newer domain). Does not explicitly provide guidelines for statistical coordination among the relevant statistical parties.
- Nevertheless, because of increasing demand in development agenda, NSOs have included the production of environment statistics in their programmes, usually collaborating with Environment and other line Ministries.
- Usually, Environment Ministries are by law in charge of creating national environmental information system (including national environmental indicators to monitor the environment and the implementation of environmental policies).
- There may be unclear and overlapping mandates, duplication of efforts, and coordination difficulties.
- Important to review their statistical and environmental legislation to provide clarity on the authorities responsible for producing official environment statistics along with guidelines for statistical governance and coordination.



b) Institutional development

- Successful organization of a national environment statistics unit, with a well defined programme is critical within the official institutions responsible for statistics production
- Even in developing countries, Environment Statistics Departments/Units have been created and are supported at the same level with Economic and Social Statistics Departments.
- Environment Statistics, as any other static program, require a regular budget for operations and a minimum amount of personnel who would ideally be trained for the tasks entailed. Hence, it is important for the environment statistics units to have a capacity building programme for their staff along with the financial resources to carry it out.
- Institutions deciding to start/strengthen environment statistics programmes require human resources, technical capacities, minimum infrastructure and networking with regional and global networks.

Environment Statistics Department

c. Organization of inter-institutional collaboration

- Inter-institutional platform (Round Table, Committee, Working Group) are established to work on the production of national environment statistics in general, or on specific topics (i.e., water, forest, protected areas, solid waste, etc).

- Several developing countries producing environment statistics have established an inter-institutional platform to coordinate the generation of environment statistics and the development of their countries' national environment statistics systems.

- From establishment to operational…
  - Platform to developed a strategy, work plan, protocols, coordination and governance mechanism, and meet on a regular basis to advance the work.
  - NSO as the official authority tasked with overseeing the national statistical system or the system of environment information nationally needs to be engaged to coordinate these platforms, with adequate authority, resources and capacities to lead.
-

Inter-institutional platform, cont.

- Tasks of the platform is to ensure that a common statistical standard and methodology is being used to generate the information to ensure that it is statistically sound
- Data sharing agreements between key institutions is necessary
  - In some countries the data sharing agreements are formalized to explicitly stipulate that government agencies share their data. In other countries this is done on an informal basis.
- Also important to have an executive board or committee to oversee the strategic aspects of the process and to whom the technical platform can report. This will ensure that the technical platform has the authority and institutional backing needed and that decisions can be taken on important strategic and management issues. The high level mechanism can also be called upon to support the work of the technical platform, particularly in terms of allocating resources and including the work of the platform as part of staff's regular workplan.

d. Collaboration among national, regional and global levels

Similar challenges within the international statistical community

3 levels of statistical production of environment statistics:
national, regional and global

from which 3 interfaces for collaboration emerge:
a) national-global, b) national-regional, and c) regional-global

- Arrangements and mechanisms for better coordination and cost effectiveness among the national, regional and global levels is key, (understanding that all potential partners have different mandates, work programs and deadlines)
- Example of national to global coordination: Data sharing among agencies at national and global levels is necessary. Often specialized United Nations agencies obtain statistics directly from national sector agencies (i.e. health, education, water, etc.) without coordinating with the NSO or UNSD …. duplication of efforts and respondent fatigue. The process is suboptimal with precious time, statistical inputs and results lost or discontinued, especially in the less statistically developed countries. This is exacerbated by the high turnover of staff experienced in developing countries.

Coordination interfaces: National - Regional - Global

1: National Level

NSO- Ministries

- NSO
- Line Ministries
- Sectoral Authorities

2: Regional Level

RCs, Regional Offices of UN

Substantive Regional Bodies

3: Global Level

UNSD, Specialized agencies: UNICEF, WHO, UNFPA, UNEP, UNEP, ILO, UN Women, etc.

Interface A:

national- regional

UN RCs
Regional Statistical Conferences,

Interface B:

regional-global
RCs, Regional UN Bodies, UNSD

Interface C:

national- global
UN Agencies, NSO and National Agencies

8. A brief history of environment statistics

A history of environment statistics

- The United Nations Conference on the Human Environment (Stockholm, June 1972) was the first global conference to signal that environmental concerns had increasingly become the subject of mainstream socioeconomic policies.
- The first initiatives to develop environment statistics at the international level stemmed from two meetings of the Economic Commission for Europe (ECE) in 1973. Given the global environmental concerns, a draft programme of international work in environment statistics was first submitted to the Statistical Commission at its eighteenth session in 1974.
- The second major global conference in the environmental field was the United Nations Conference on Environment and Development (Rio de Janeiro, June 1992) where a groundbreaking consensus was achieved that strategies of sustainable development should integrate environmental issues into development plans and policies. Specific recommendations by Agenda 21 to UNSD referred to the development and implementation of integrated environmental and economic accounting and indicators of sustainable development.
- While work at UNSD concentrated on conceptual frameworks, indicators and environmental-economic accounting, the UN-ECE Statistics Division pioneered work on standard environment statistics classifications.

A history …. cont

- Progressively, UNSD published relevant methodological handbooks including the FDES (1984), and subsequent accompanying handbooks, and an Environment Statistics Glossary.
- During the 90's, environment statistics' programmes also started at OECD and later at Eurostat, focusing on data collection and indicator development.
- After Rio 92, and also to respond to an increase in the need for monitoring the environment, many developing countries started work to develop sustainable development and environmental indicators and inform on the state of the environment at the national level.
- In the late 1990's UNSD embarked on data collection (1999), and since then it has been established on a biennial basis.
- In 2000 most countries signed the Millennium Declaration and committed themselves to reach the declaration's goals and targets by 2015, including Goal 7 on environmental sustainability, using 10 globally agreed environmental indicators to monitor progress.
- Around year 2000, two other Regional Commissions (ECLAC and ESCAP) started to work on environment statistics, supporting capacity building and training within their regions. ESCWA and ECA also started to work on environment statistics subsequently.

A history …. cont

- UNSD has work by technically assisting member countries and contributing to capacity building in environment statistics through the organization of several technical assistance missions, training workshops, meetings and seminars about environmental statistics and indicators at the international, regional and national levels.
- The World Summit on Sustainable Development (Johannesburg, 2002) put the emphasis on reaching specific targets in specific time frames and monitoring progress, thus reaffirming the need for statistics, indicators and integrated information systems that measure and track progress.
- In 2010, UNSD and a group of experts were asked by the Statistical Commission to start the revision of the FDES and to develop a Core Set of Environment Statistics to provide guidance to countries, this work is expected to be finalized during 2012.
- Emerging environmental issues (climate change, biodiversity loss, desertification, food security) and the international conventions and agreements with accompanying special data requirements have influenced the production of environment statistics.
- Preparations for the UN Summit on SD, Rio+20 (Brazil, June 2012) with emphasis on green economy in the context of sustainable development and poverty eradication.
- Ecosystem assessments, climate negotiations and discussions of measuring progress about sustainable development and green economy are recent developments that have influenced current work in environment statistics.

Environment Statistics so far

- Environment Statistics is an emerging statistics domain
- Faces considerable challenges and resource limitations
- It is very important from the policy side
- Demand is continuously growing everywhere
- Heterogeneous level of development and production among countries
- Even in countries that have not started regular production of Env Stats, there are data to be mined from traditional and non traditional sources
- There are technical resources available, including methodological, networking and information for capacity building
- Requires further institutional strengthening and regular resources allocated, particularly in developing countries
- Increasing collaboration among national, regional and global bodies

Thank you for your attention

United Nations Statistics Division

http://unstats.un.org/unsd/environment/