

Environmental statistics

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Introduction

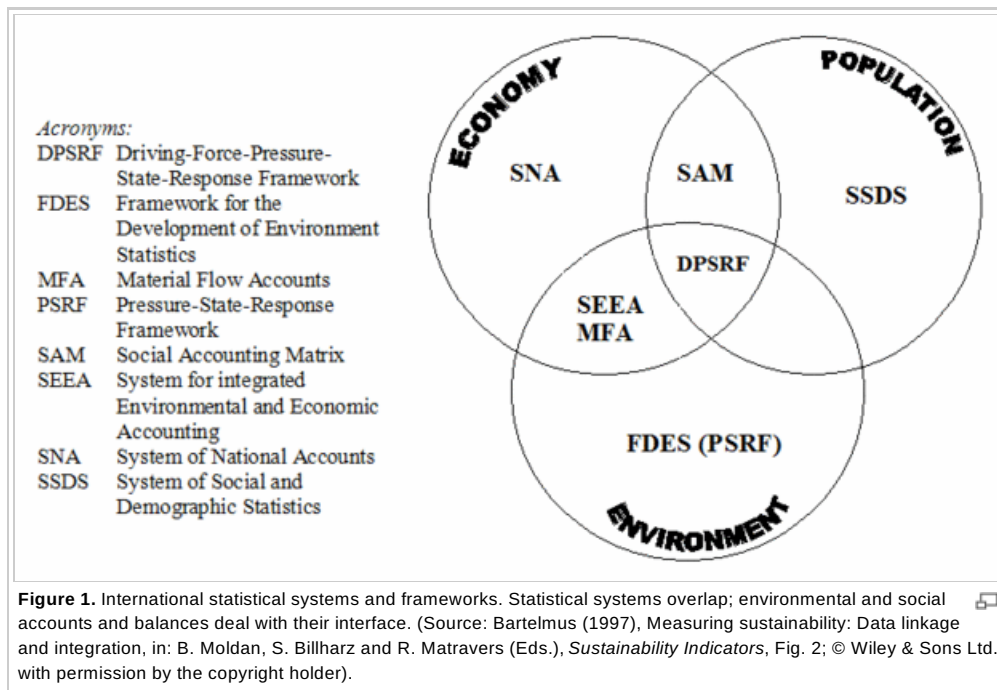
Environment statistics produce the basic data on the state of the environment and on human activities responsible for environmental deterioration and improvement. Broader definitions include environmental indicators and accounts. Environmental and sustainable development indicators overshadow the work of environmental statisticians: policy makers and the general public prefer 'nutshell' information to detailed tabulations of particular pollutants or natural resources. However, any indicator or composite index is just as good as the underlying statistics. More attention should be paid, therefore, to the concepts, methods and quality of environment statistics and their connection to economic and social statistics.

Historical perspective

The 1972 United Nations Conference on the Human Environment, Stockholm Conference^[1] provided the impulse for developing, standardizing and monitoring environmental data by countries and international organizations. Shortly after, statisticians of the United Nations Economic Commission for Europe found that international statistical systems dealt with the economy and people but ignored their biophysical (environmental) base. In order to cover the 'whole world' they suggested to devise a system of environment statistics in addition to the existing System of National Accounts (SNA) and the largely untested System of Social and Demographic Statistics (SSDS). Charged with the design of the new system, the author and his team at the United Nations Statistical Office soon realized that the myriad of different environmental impacts lacked a common measuring rod (such as the market price of the SNA). They opted, therefore, for a Framework for the Development of Environment Statistics (FDES), rather than a system of such statistics.

Frameworks and systems of environmental and related socioeconomic statistics

The popular sustainable development paradigm focuses on the interaction of three development 'dimensions' – environment, economy and society. Integrative policies, which account for this interaction, require statistics that can be compared, or at least linked, across these dimensions. Figure 1 presents the international statistical systems, which cover these dimension and those that seek to cross them. Social Accounting Matrices (SAM) connect the economic data of the SNA to social ones of the SSDS; the objective is to obtain clearly defined statistics on the distribution of income and the labour market. Environment statistics organized in the FDES are discussed below. In combination with economic statistics they generate the databases for 'green' accounting, in particular for Material Flow Accounts (MFA) and the System for integrated Environmental and Economic Accounting (SEEA). The link between environmental and socio-demographic statistics is less developed; one attempt is a databank on Population, Resources, Environment and Development (PRED) established by the United Nations Population Division.



Framework for the Development of Environment Statistics (FDES)

Table 1 shows the FDES as a cross-classification of environmental media, i.e. components of the human environment, with a sequence of 'information categories' of

- human activities and natural events as stressors of the environment
- environmental impacts representing environment stress and effects on human health and well-being, and
- social responses to environmental impacts and effects.

The Organisation for Economic Co-operation and Development (OECD) later picked up this presentation under the label of 'Pressure-State-Response Framework' (PSRF) for the compilation of environmental indicators. The FDES includes a further category of stocks and inventories in order to provide a link to environmental stock and flow accounts and their indicators.

<i>Environmental media</i>	Stress-response categories			Environmental stocks and inventories
	Fauna Flora Atmosphere Water Land/soil Human settlements	<i>Social and economic activities/events</i> <ul style="list-style-type: none"> ■ Use of natural resources ■ Emissions ■ Growth and change of human settlements ■ Natural disasters 	Environmental impacts <ul style="list-style-type: none"> ■ Depletion of natural resources ■ Environmental degradation ■ Human health and welfare effects 	<i>Responses to environmental impacts</i> <ul style="list-style-type: none"> ■ Natural resource management ■ Pollution monitoring and control ■ Settlements planning and policies

Source: United Nations (1984). *A Framework for the Development of Environmental Statistics*. New York: United Nations (simplified)

The contents of the FDES are 'statistical topics' of natural resources, pollution, natural disasters, human settlements, environmental protection, and their effects on environmental quality and human welfare. Follow-up publications on concepts and methods of environment statistics elaborate on over 500 statistical variables in these areas. Many countries used the FDES and its 'concepts-and-methods' reports for the initial set-up of environment statistics. The FDES thus helped identify national data requirements, launch data collection, and present the data in statistical compendia. For the latter, statistical tables are frequently organized around environmental media and other environmental themes without recourse to other FDES categories. Such presentation may conceal

data gaps and inconsistencies, which national statistical offices might prefer to address 'internally'.

The United Nations Statistics Division^[2] has taken a similar approach. It publishes selected environment statistics on its website. Its biennial questionnaire requests data on water and waste from national statistical services and other governmental organizations. Together with statistics from international organizations, the UNSD also presents selected statistics in world-wide Country Snapshots of Environment Statistics^[3]. A revision of the FDES and a core set of environment statistics for countries at an early stage of developing environment statistics is in the offing.

Integrative statistics for integrative policies

The sustainable development paradigm draws attention to the interaction of environment, economy and society; it also calls for the integration of economic, environmental and social policies. Integrated policies require, therefore, comparable data – whether for long lists of indicators, integrated environmental-economic accounts or nutshell indices of sustainable economic growth or development. Figure 2 sketches a Framework for Statistical Integration (FSI) for the main international data systems/frameworks, shown as the core of Figure 1. The framework displays some key relationships of the three dimensions of sustainable development in terms of the stocks and flows of the corresponding international statistical systems or frameworks. The FSI applies the information categories of the FDES to the stocks (of produced, natural and human/social capital) and flows (activities, impacts, responses) of economic, environmental and socio-demographic statistics (Bartelmus 2008).

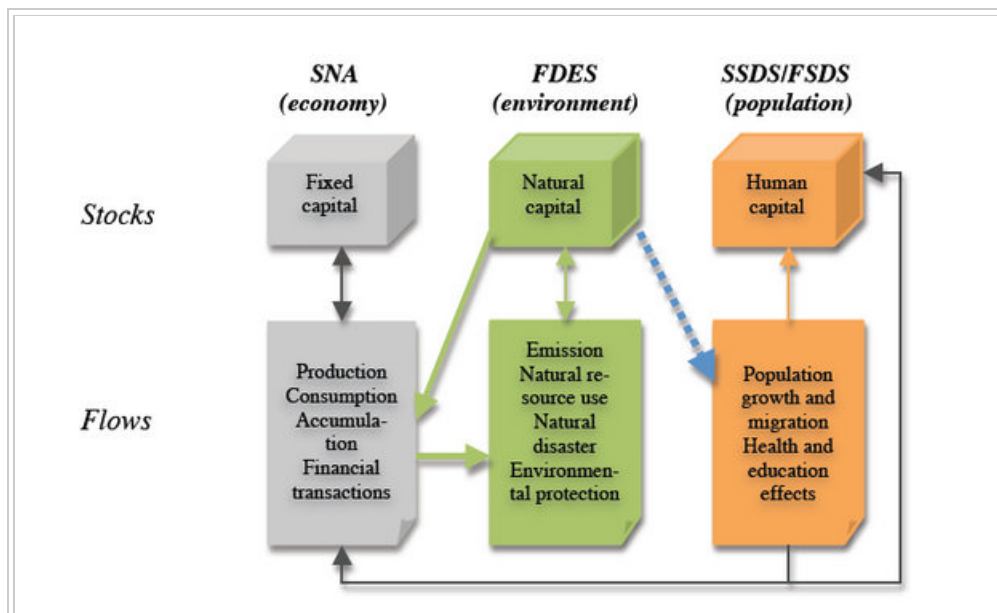


Figure 2. Framework for statistical integration. Economic stocks and flows interact with environmental and socio-demographic ones: green flows indicate the use of natural resources and the emission of pollutants by economic activities. Within the environment, natural resources are depleted and pollutants accumulate as ambient concentrations; both generate health and welfare effects (dashed blue line) for the human population (Bartelmus, P. (2008). *Quantitative Eco-nomics, How sustainable are our economies?* Springer, Fig. 4.3 (simplified).

Like the FDES, the FSI does not introduce any direct functional or cause-effect relationships among its statistical variables, which would be the task of modelling. The framework should help, though, to develop, harmonize and standardize the concepts and methods of all statistical fields for such modelling, as well as for indicator development and integrated environmental-economic accounting.

Further reading

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Notes

- [^]St 1972 United Nations Conference on the Human Environment Stockholm Conference
 - [^]United Nations Statistics Division (UNSD)
 - [^]Country Snapshots of Environment Statistics
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