1

Summary and Highlights

Environment data ranks alongside economic and sociodemographic data as one of the three major branches in most national statistical systems. The environment is the newest of the three subjects, but it has quickly become a sprawling field of loosely related topics and no single publication can effectively address all aspects. This Handbook therefore adopts a pragmatic approach. The discussion is primarily aimed at practitioners in countries that have recently begun to collect environment statistics or are still at an early stage of the program.

The Handbook has six chapters. The discussion in this chapter singles out some of the more important recommendations and highlights several critical features of environment statistics. Chapter 2 deals mainly with organizational matters such as the choice of a framework for planning and guiding the development of a program of environment statistics and the preparation of supporting publications. Chapter 3 considers two versions of a statistical framework and describes the rationale for each. In Chapter 4, the design and operation of networks to monitor air quality

are discussed, along with the most common parameters included in this exercise. Methods of identifying emission sources and estimating emissions are also surveyed. Chapter 5 addresses the quality and availability of water. Various types of networks and parameters to monitor water quality are discussed, along with methods of gathering data on the discharge of effluents from different sources. Statistics on human settlements are summarized in Chapter 6.

The challenges posed by environment statistics are generally greater than for most other types of statistics. Several reasons for this complexity are discussed in Chapter 2 of the Handbook. Most significant perhaps is the fact that a national statistical office (NSO) must rely heavily on other agencies to collect and supply the bulk of the primary data. Such a high degree of interdependence between different government bodies demands close cooperation and collaboration. Lacking these attributes, any program of environment statistics is likely to fail. Other salient characteristics of environment statistics are the unique methods of collecting data, the distinguishing characteristics of the primary data, limitations of the statistical classifications and systems used, and the dynamic nature of the users' information requirements.

A number of recommendations should help in planning and designing a system of environment statistics. One of the most crucial steps, which is described in Chapter 2, is the creation of a steering committee to oversee all phases of the work. This body should be established before the program of environment statistics is launched. Its main purpose is to promote cooperation, prevent interagency disputes, and encourage the smooth flow of information. Another important function is to monitor the changing data requirements of policy makers and ensure that these needs are consistently met. The committee could be cochaired by the environment ministry and the NSO, and should also include several high-ranking officials representing the users of environment statistics.

A second critical decision is the choice of a framework that will help to determine the division of labor and organization of the work. Several versions are discussed in Chapter 3 of the Handbook, with particular attention to those developed by the Organisation for Economic

Co-operation and Development (OECD) and the United Nations. In practice, countries do not adopt one particular framework and discard all others. Different versions can be used in the same country, sometimes simultaneously.

An appropriate framework is a powerful tool that should guide decisions on the processes of collecting, estimating, and interpreting data; determining efficient ways to organize the data around key issues and topics; and identifying topics to be addressed. No single framework can adequately depict the intricate and constantly changing network of relationships that are found in the environment. Any version necessarily introduces some simplifications, indicating that certain aspects of reality are not accurately represented.

When a program of environment statistics is at an early stage, a relatively simple but flexible framework is necessary. As the program matures and becomes more comprehensive, a more sophisticated framework can be adopted. The United Nations Framework for Development of Environment Statistics (UN-FDES) is the framework recommended for newcomers to this field. It draws on some concepts developed by OECD, but depends on no particular scheme of statistical classification or particular methods of data collection. A step-by-step account of the construction of an FDES is found in Chapter 3. Statisticians can use this material as a starting point, but will have to introduce additional variables or otherwise modify the sample tables to ensure that the environmental concerns of their country are accurately depicted.

All too often, countries that are new to the field of environment statistics treat the issue of data dissemination as an afterthought or assign it a low priority. Such an approach can have serious consequences. Public officials must be able to track environmental changes before they can develop an effective set of policies. They will require additional information to monitor compliance and enforcement. Even in industrialized countries, there is a tendency for each agency to focus on its own information requirements and give little thought to the needs of the larger data-using community. A computerized inventory of environmental data, sources, and publications can encourage cooperation, provided that such inventory is accessible to all potential users.

An aggressive program of data dissemination may seem to be a particularly radical step in transition economies where, historically, the State controls much of the economy. In the past, officials in many centrally planned economies were reluctant to allow the circulation of many types of statistics. Today, however, information systems must satisfy new functions in which the State monitors and regulates market-based economic activities. The widespread dissemination of data is essential if information systems are to contribute to environmental improvements and sustainable development.

Nor can the public be excluded from these information flows. Access to environmental information should extend beyond government ministries and agencies to include non-government organizations (NGOs) and the general public. Two publications are discussed in Chapter 2 and recommended for recurrent distribution. These are the state-of-the-environment report (SOER) and the compendium of environment statistics (CES). The SOER is designed for a wide audience, including the general public, while the CES is aimed primarily at users of the data.

Once the collection of environmental data has begun, a huge amount of data can be generated in a surprisingly brief period of time. This problem, too, must be anticipated. Statisticians need some ready means of accurately summarizing the underlying trends in the raw data. A number of environmental indicators, many of them developed by OECD, are used for this purpose. These indicators, which are described at some length in Chapter 3, are intended to reduce the volume of data required to obtain an accurate picture of a situation and to facilitate communication between statisticians and data users.

Most likely, only a few of the indicators discussed can be easily and readily incorporated into a new program of environment statistics. The distinction between different indicators can quickly become blurred, owing to conceptual difficulties and ambiguities in interpretation. Data gaps and inaccuracies are other problems that can force statisticians to find proxies for several of their preferred indicators. Officials in the NSO will have to work closely with data suppliers in other agencies to develop an informative set of environmental indicators. At the same time, the

collection effort must be gradually expanded to produce more accurate proxies and, eventually, the preferred indicators themselves.

Once a statistical framework and an overall plan for the program are in place, attention turns to more detailed matters such as methods of collection and sampling. The tasks of gathering and interpreting data on the quality of air and water are two of the most important topics in any environmental program and are discussed at some detail in Chapters 4 and 5. Marked differences between the two media influence the strategies and procedures for collecting raw data. Air is a continuous medium, but water consists of various submedia–for example, watercourses (ranging from brooks and streams to large rivers), lakes, groundwater resources such as aquifers, and saltwater bodies. Each of these submedia has its own particular set of attributes and the appropriate methods of gathering data vary from one to the next.

The design of networks to monitor the quality of air and water is a critical feature of the overall program, and considerable attention is devoted to this subject. The available financial resources and human skills are the major constraints, but a host of other factors must also be taken into account. When monitoring air quality, officials must choose from a wide range of options involving anything from a "minimum network" to a flexible approach, or a rather dense network of monitoring stations. The number of possibilities is even greater in planning a network to monitor the quality of water, since the design must be tailor-made to accommodate the characteristics of specific submedia (for example, groundwater, river systems, lakes, and so on). Moreover, any network, however well designed, is unlikely to yield sufficient data to produce the types of representative indicators that public officials require. The information will have to be supplemented with the use of estimation procedures and, perhaps, special surveys to fill in the data gaps.

Among the many factors that must be taken into account in the design of a network, the most important are the parameters to be monitored and the sampling frequencies. The most common parameters for both air and water are described in detail. Statisticians may have to augment this list, but most parameters that would be included in a regular

monitoring program are considered in the Handbook. Methods for collecting and estimating data are recommended and descriptions of the types of equipment required and the laboratory procedures are provided.

Finally, the networks to monitor the quality of air and water will have to be supplemented by a variety of other tools and procedures. Public officials, for example, cannot assemble an effective set of policies to improve the quality of air or water without a clear idea of the types of emissions being released into the atmosphere and the major sources of these emissions. Emission inventories will have to be constructed, and several options are outlined in the Handbook.

In conclusion, the primary objective of this Handbook is to improve and expand the exchange of information between statisticians and the many other specialists who contribute to a program of environment statistics. Recent experience suggests that misunderstandings and breakdowns in communication between these groups are a major source of difficulty, restricting the flow of information and undermining the quality of data. The problem seems to be especially serious for countries at an early stage in the development of environment statistics. Accordingly, the material in this Handbook is designed to help bridge the gap between different groups of contributors. Statisticians, for example, need a basic understanding of the procedures and methods for collecting data, and of problems encountered by the engineers and technicians who supply much of the raw data. The latter groups must also have an appreciation of statistical procedures and classifications.