United Nations Convention to Combat Desertification

Committee for the Review of the Implementation of the Convention
Eleventh session
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Item 8 of the provisional agenda
Improving the procedures for communication of information as well as the quality and format of reports to be submitted to the Conference of the Parties

Guidelines for the implementation of a data quality framework for the UNCCD process

Note by the secretariat

Summary

In response to operational objective 3 of The Strategy "to become a global authority on scientific and technical knowledge pertaining to desertification/land degradation and mitigation of the effects of drought", gathering and disseminating of high-quality data and information is a must. Moreover, decision makers and other users should be informed about data quality, in order to increase confidence in, and appropriate uses of the information. For these reasons, the design and implementation of a data quality framework is an imperative task for the Convention, and is the only means by which the quality of statistical activities can be guaranteed.

An important step towards this objective is adopting a set of basic principles and standards on which data quality is premised. Assuring data quality requires that data are objective and comparable across domains, data sets, countries and time, and thereby serves as a means to build credibility in using relevant data for the review of implementation of the Convention.

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Contents

I. Introduction

1.   The need for a data quality framework (DQF) arises from two main requirements, one of which is concerned with the needs of users of data, the other with the responsibilities of producers of the data. Users of statistics need quality reporting to understand the strengths and limits of the provided statistics and to know how to use them properly.

2.   Data producers need a quality framework as a core element in their efforts to improve the quality of their statistical output and to identify the main weak points in the data production process.

3.   The UNCCD does not have a formal DQF, but the importance of data quality is now fully recognized by the Conference of the Parties (COP).

4.   An important innovation of the current reporting cycle is the data quality assurance mechanism established by decision 14/COP.10. According to that decision, Parties and other reporting entities will have a period of time during which data and information provided could be checked and guidance sought from the reporting entities on substantive issues. The secretariat and the Global Mechanism (GM) will update the guidelines and procedures for the data quality checks, and publish these on the Convention website and on the performance review and assessment of implementation system (PRAIS) portal.

5.   The relevant part of decision 14/COP.10, which pertains to the iterative process relating to the assessment of implementation, including performance and impact indicators, methodology and the reporting procedures, sets out the following guidelines:

       (a)   Data quality checks will be undertaken during the compilation and processing of information received from Parties and other reporting entities. The secretariat is requested to establish relevant procedures in this regard, in consultation with the GM as appropriate;

       (b)   The secretariat and the GM are also requested to update the guidelines and procedures for the data quality checks as required, and to publish these on the Convention website and on the PRAIS portal;

       (c)   Starting from the 2012–2013 reporting and review process, a three-month period prior to the publication date of documents for the eleventh session of the Committee for the Review of the Implementation of the Convention (CRIC) will be dedicated to the compilation and data quality checks of information received by reporting entities, thereby enabling the Convention's institutions to seek further guidance from these reporting entities on substantive issues.

6.   While the recognition of the need for improved data quality is an important step, the referred to "quality checks" are not sufficient to assure quality, particularly in the absence of a structured framework that systematically monitors quality throughout the data life cycle. The reasons will become evident in the remainder of the document.

II. Elements of a data quality framework

A. Introduction

7.   In the challenge to develop high quality data, international organizations and national statistical offices have carried out much work in recent years to set up DQFs that include the following elements:

(a)   A definition of quality and its dimensions;

(b)   A set of standard and measurable quality indicators;

(c)   A set of broad principles and standards on which statistical analysis are to be conducted;

(d)   A set of quality guidelines covering the various phases of the production of statistics;

(e)   Procedures based on those principles for evaluating and reporting the quality of statistical analysis on a regular basis;

(f)   Procedures based on those principles for ensuring the quality of statistical analysis;

(g)   A quality improvement strategy.

8.   The design of a DQF needs to consider the different stages in the statistical process as identified in, for example, the Generic Statistical Business Process Model.[1] Data quality monitoring can be targeted at three "key points" of the statistical process: "at the source" before the data are processed by the data provider (point q1 in the figure below); at the time when the data are released by the data provider (point q2 in the figure below); and when the data are disseminated by the international organization (point q3 in the figure below).

9.   By covering all three key points, quality monitoring by the Convention would assess the value added to data quality achieved at the different stages of the statistical process and identify main bottlenecks in that process.[2] Monitoring at point q1 is not customarily included in DQFs of international organizations, but it appears to be relevant for Convention activities in capacity development; this will be alluded to later.

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[1] Available at: <http://www1.unece.org/stat/platform/display/metis/The+Generic+Statistical+Business+Process+Model>.

[2] See H. Kasnakoglu and R. Mayo, FAO Statistical DQF: A Multi-layered Approach to Monitoring and Assessment, Paper presented at the Conference on Data Quality for International Organizations, Committee for the Coordination of Statistical Activities, Wiesbaden (Germany), 27–28 May 2004.

Multi-layered approach to quality monitoring
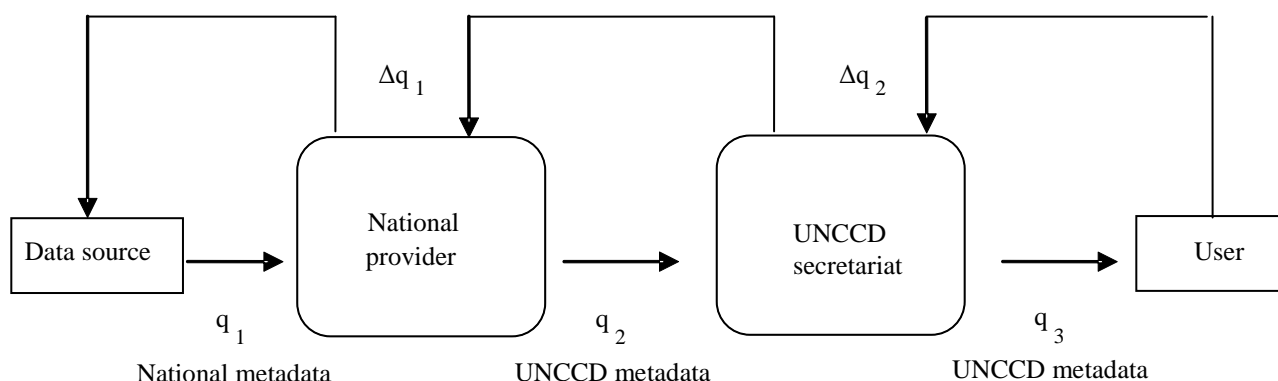
Source: based on FAOSTAT website, section "Data Quality" (<http://faostat.fao.org/site/365/default.aspx>).

B.   Defining data quality, standards, principles and measurement

10.   In the International Organization for Standardization (ISO) Standard No 8402 (1986, 3.1), quality is defined as "the totality of features and characteristics of a product or service that bears on its ability to satisfy stated or implied needs". In an updated version, ISO Standard 9000:2005, defines quality as the "degree to which a set of inherent characteristics fulfils requirements".

11.   In the Principles Governing International Statistical Activities,[3] developed by the Committee for Coordination of Statistical Activities, the first principle is that "high quality international statistics, accessible for all, are a fundamental element of global information systems". This is reinforced with "aiming continuously to introduce methodological improvements and systems to manage and improve the quality and transparency of statistics" and "sources and methods for data collection are appropriately chosen to ensure timeliness and other aspects of quality".

12.   Apart from highlighting the importance of various aspects of cost-efficiency, respect of the rights of data providers and confidentiality, the Principles Governing International Statistical Activities also make reference to specific aspects of data quality. For instance, it is asserted that international statistics should be "accessible to all", that their "relevance" and "timeliness" should be ensured, and that the production of international statistics be "impartial and strictly based on the highest professional standards".

13.   The concepts, definitions, classifications, sources, methods and procedures employed in the production process should be made transparent to users and erroneous interpretation and misuse of statistics "immediately and appropriately addressed". Finally, international statistical programmes should be coordinated to strengthen coherence.

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[3] See document E/ECE/1266 (Page, 17 page 35-36). Economic Commission for Europe, Annual Report (18 April 1991 - 15 April 1992). Available at:
 <http://www.unece.org/fileadmin/DAM/stats/documents/e/1992/32.e.pdf>.

Thereby the Principles Governing International Statistical Activities touch on several quality dimensions established by major international organizations involved with statistical activities, such as relevance, timeliness, accessibility, clarity, coherence and in some instances, credibility.

14.   Statistical organizations have produced quality frameworks to define the concept of quality, and to provide criteria against which the quality of outputs can be judged. These frameworks do not necessarily provide precise and objective measures of quality, but do encourage a standard and systematic approach to quality within the agency. Initiating a UNCCD DQF and making it operational would benefit from building on or adapting these prior efforts to the specificities of the Convention.

15.   The DQFs of international organizations slightly differ in their understanding of quality, revealed by the fact that they have some, but not all, quality dimensions in common (see table below). For instance, within the International Monetary Fund (IMF), the statistical office of the European Union (Eurostat), the European Central Bank (ECB), the Food and Agriculture Organization of the United Nations (FAO), and the Organization for Economic Co-operation and Development (OECD), data quality reporting is embedded in a broader DQF that encompasses also the definition of procedures and institutional provisions for quality monitoring, assurance and improvement. All of them are explicitly grounded on the Fundamental Principles of Official Statistics,[4] which call for impartiality, objectivity, professionalism and transparency in the compilation process, avoidance of misinterpretation of the statistical output, and consistency with regard to the applied concepts, classifications and methods.

16.   The quality concepts of Eurostat, the IMF, the ECB, and the OECD all include relevance, accuracy, timeliness and accessibility, as well as any of the terms consistency, coherence or comparability. In some cases different terms are used to define almost identical quality dimensions. For instance, consistency, coherence and comparability are commonly used to describe the absence of methodological and conceptual differences, either across geographical units, or over time, or across data sets. All the presented quality frameworks consider these aspects as relevant.

17.   Looking at the differences between the quality concepts, it is noteworthy, first, that in some quality frameworks "accuracy" is accompanied by "reliability". "Accuracy" is commonly referred to as the closeness of the statistical output to the (unknown) true value, whereas "reliability" is understood as the closeness of revisions to their initial value, as by the ECB. By contrast, the IMF's understanding of "accuracy and reliability" focuses on the data compilation process rather than on the statistical output. According to their conception, "accuracy and reliability" describe a state where the source data are prudently chosen and regularly assessed, sound statistical techniques are applied, and the source data and statistical output – as well as revisions – are regularly analysed.

18.   The stronger process-orientation of the IMF quality dimensions results from the fact that these are meant to apply to all data compiled and administered by the organization, comprising source data, intermediate data and the statistical output. Accordingly, the IMF entry list in the table contains certain quality dimensions that cannot be found among the other organizations. These comprise: "prerequisites of quality", i.e. a supportive legal and institutional environment, commensurate resources, and good quality management; "assurances of integrity", i.e. professionalism, transparency, guidance by ethical standards; and "methodological soundness".

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[4] See document E/CN.3/1994/18 (chapter V, paragraph 59). United Nations Economic and Social Council, Statistical Commission, Report on the Special Session (11 – 15 April 1994). Official Records (1994), Supplement No. 9. Available at: < http://unstats.un.org/unsd/statcom/94report.pdf>.

19.   As with the IMF quality framework, the framework of the OECD is meant to cover both the input and output side of the statistical process. Their quality dimension "credibility" is similar to "integrity" and "methodological soundness" as defined by the IMF. In addition, the OECD has set up "cost-efficiency" as an additional quality dimension.

Mapping of quality dimensions used by international organizations

FAO[a]	Eurostat[b]	IMF[c]	ECB[d]	OECD[e]
				Cost efficiency
		Assurances of integrity		Credibility
Sound statistical metadata		Methodological soundness		
		Prerequisites of quality		
Relevance	Relevance		Relevance	Relevance
Accuracy	Accuracy	Accuracy and reliability	Accuracy and reliability (including stability)	Accuracy
Timeliness and punctuality	Timeliness and punctuality	Serviceability	Timeliness (including punctuality)	Timeliness (with punctuality)
Comparability	Comparability		Consistency (or coherence) and comparability	Coherence
Coherence and completeness	Coherence			
Accessibility and clarity	Accessibility and clarity	Accessibility	Accessibility and clarity	Accessibility
				Interpretability

[a] Food and Agriculture Organization of the United Nations.
[b] Statistical office of the European Union.
[c] International Monetary Fund.
[d] European Central Bank.
[e] Organization for Economic Co-operation and Development.

Sources: Eurostat, 2007, quoted above; International Monetary Fund, 2006, Data Quality Assessment Framework, DQAF, <http://dsbb.imf.org/images/pdfs/dqrs_factsheet.pdf>; European Central Bank, 2008, ECB Statistics Quality Framework (SQF), Frankfurt am Main, <http://www.ecb.int/stats/html/sqf.en.html>; UNECE; Organization for Economic Co-operation and Development, 2003, Quality Framework and Guidelines for OECD Statistical Activities, STD/QFS(2003)1, <www.oecd.org/statistics/qualityframework>.

20.   Based on the DQF of international organizations that are involved with statistical activities, the following dimensions, together with their definitions, would serve to meet the quality requirements of the Convention:

(a)   **Relevance**: The relevance of data products is a qualitative assessment of the value contributed by these data. Value is characterized by the degree to which the data serve to address the purposes for which they are sought by users;

Implications for UNCCD: Beyond the "additional information" section of the reporting templates, there is no specific user survey at present on relevance of data. Such a survey may be instituted to assess relevance of performance and impact indicators;

(b)   **Accuracy**: The accuracy of data products is the degree to which the data correctly estimate or describe the quantities or characteristics they are designed to measure. Accuracy refers to the closeness between the values provided and the (unknown) true values. Accuracy has many attributes, and in practical terms there is no single aggregate or overall measure of it. Of necessity these attributes are typically measured or described in terms of the error, or the potential significance of error, introduced through individual major sources of error. In the case of sample survey-based estimates, the major sources of error include coverage, sampling, non-response, response, processing and problems in dissemination. For derived estimates, sources of error arise from the surveys and censuses that provide source data – from the fact that source data do not fully meet the requirements of the derived estimates in terms of coverage, timing, and valuation and that the techniques used to compensate can only partially succeed;

Implications for UNCCD: Arguably, this is the most important dimension to be considered by Parties as the CRIC depends heavily on data being made available to it via an online questionnaire and as such has little control over accuracy in reporting Parties' data;

(c)   **Credibility**: The credibility of data products refers to the confidence that users place in those products based simply on their image of the data producer. Confidence by users is built over time. One important aspect is trust in the objectivity of the data. This implies that the data are perceived to be produced professionally in accordance with appropriate statistical standards, and that policies and practices are transparent. For example, data are not manipulated, or their release timed in response to political pressure. Credibility is determined in part by the integrity of the production process. Principle 2 of the United Nations Principles of Official Statistics (1994) states: "to retain trust in official statistics, the statistical agencies need to decide according to strictly professional considerations, including scientific principles and professional ethics, on the methods and procedures for the collection, processing, storage and presentation of statistical data";

Implications for UNCCD: The publication of poor quality data received from countries and other reporting entities may affect the overall credibility of the review process conducted by the CRIC, and ultimately undermine its deliberation on enhancing the implementation of the Convention;

(d)   **Timeliness**: The timeliness of data products reflects the length of time between their availability and the event or phenomenon they describe, but is considered in the context of the time period that permits the information to be of value and still acted upon. Closely related to the dimension of timeliness, the punctuality of data products is also important, for both national and international data providers. Punctuality implies the existence of a publication schedule and reflects the degree to which data are released in accordance with it. A publication schedule may comprise a set of target release dates or may involve a commitment to release data within a prescribed time period from their receipt. Here "release date" refers to the date on which the data are first made publicly available, by whatever medium, typically, but not inevitably the website;

Implications for UNCCD: The timeliness of the data published by the UNCCD is largely stipulated by the requirements of the reporting rounds and of the data it receives from the reporting entities. The secretariat is responsible for the timely collection, processing,

derivation or dissemination of data, and as such it should be provided with sufficient and predictable resources;

(e) **Accessibility and clarity**: Accessibility refers to the physical conditions in which users can access statistics: distribution channels, ordering procedures, time required for delivery, pricing policy, marketing conditions (copyright, etc.), availability of micro- or macrodata, media (paper, CD-ROM, Internet), etc. Clarity refers to the information environment of the statistics: appropriate metadata provided with the statistics (textual information, explanations, documentation, etc); graphs, maps, and other illustrations; availability of information on the quality of the statistics (possible limitation in use);

Implications for UNCCD: Policies on the accessibility of data, and types of access is ultimately the decision of the COP. However, reporting clarity is more of an imperative for ensuring that users can assess how the data can be used;

(f) **Comparability**: The extent to which differences between statistics are attributed to differences between the true values of the statistical characteristic, or to methodological differences. Comparability includes: comparability over time – the extent to which data from different points in time can be compared; comparability through space – the extent to which data from different countries and/or regions can be compared (the provision and application of international standards is particularly important here); and comparability between domains – the extent to which data from different statistical domains can be compared;

Implications for UNCCD: Ensuring comparability across countries is one of the major sources of value added provided by the Convention. The role of metadata in explaining possible changes in concepts or methodologies over time and across countries is absolutely fundamental. Unexplained inconsistencies across datasets can seriously reduce the interpretability and credibility of Convention statistics.

C.   Stages of quality control

21.   For an international organization, the quality of statistics depends:

(a)   The quality of statistics received from national statistical offices (NSOs) or other national sources (q1 in the figure above);

(b)   The quality of internal processes for collection, processing, analysis and dissemination of data and metadata (q2 and q3 in the figure above).

22.   DQFs typically focus on the various dimensions for statistical output, i.e. the data disseminated (point q3 in the figure above). However, quality dimensions need to be defined also for the earlier phases of the statistical process, focusing especially on the points where the data are collected and released by the data provider.

23.   This information is indispensable, first, for the proper reporting on the quality of the statistical output provided; and second to allow assessing the value added on data quality achieved at the different levels. The difference in quality between the points q3 and q2 would provide valuable evidence of the need for improvements in the statistical process administered by the Convention; the difference in quality between the points q2 and q1 enables the needs for capacity development to be identified and the efficiency of capacity development projects carried out in the past to be evaluated.

24.   The appropriate standards for that earlier-phase data quality reporting are highly dependent on the particular nature of the statistical process. They should therefore be designed and implemented by the entity responsible for the individual statistical process.

25.   A typology of different statistical processes is useful in understanding better how data are collected from countries and, more importantly, where quality problems may arise:

(a)   **Sample survey**: a survey based on a, usually probabilistic, sampling procedure involving direct collection of data from respondents;

(b)   **Census**: survey where all frame units are covered;

(c)   **Statistical process using administrative source(s)**: a process making use of data collected for purposes other than the direct production of statistics;

(d)   **Statistical process involving multiple data sources**: different sampling, questionnaire designs and/or sampling procedures are used for different survey segments;

(e)   **Index process**: involving complex sample surveys, often with non-probabilistic designs, and where the target is complex and model-based;

(f)   **Statistical compilation**: such as aggregates, derived indicators and other metrics.

26.   All categories of statistical process require strong technical competencies in carrying them out. In the absence of prerequisite skills, there is a profound risk of introducing statistically significant errors into the data cycle. These typically arise from selecting non representative sampling frames, leading to sampling error, poor survey design, collating data from different sources of disparate quality with an unknown size of error, etc.

27.   The quality of indicators compiled by the international organization rests on the quality of the underlying data, but many countries, especially in the developing world, lack the capacity to produce and report even the minimum set of data necessary to monitor national trends or inform the international development debate.

28.   As an example, the Independent External Evaluation of the FAO (FAO 2006)[5] concluded that "the quantity and quality of data coming from national official sources has been on a steady decline since the early 1980s, particularly in Africa." It also found that "official data submissions from countries in Africa are at their lowest level since before 1961, with only one in four African countries reporting basic crop production data."

29.   There are several likely reasons for the decline in the quantity and the quality of sectoral statistics. One obvious reason is the lack of country-level capacity at public statistical agencies. The decline in the priority and in the resources that national systems assign to collecting and reporting reliable statistics is paralleled by a general lack in donor interest. Not unrelated to the lack of capacity is the lack of financial resources to collect data. Also, the lack of integration into the national statistical system is a major reason for the weakness of sectoral statistics in many countries. In countries with decentralized statistical systems, coordination between the national statistical office and the ministries responsible for sectoral management is often lacking. Nor do many national strategies for the development of statistics adequately cover all sectors. A number of problems are common to many developing countries:

(a)   Limited staff and capacity of the units that are responsible for collection, compilation, analysis, and dissemination of statistics;

(b)   Lack of adequate technical tools, statistical methodology, and survey framework to support data-production efforts;

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[5] See document PC 100/3a. Programme Committee, Hundredth Session, Rome 6 –10 October 2008. Independent Evaluation of FAO's Role and Work in Statistics. FAO (2008).

(c) Insufficient funding allocated for statistical activities from development partners and national budgets;

(d) Lack of institutional coordination, which results in the lack of harmonized and integrated data sources;

(e) Lack of capacity to analyse data in a policy perspective, which results in a considerable waste of resources as large amounts of raw data are not properly used;

(f) Difficulty for data users in accessing existing data with no metadata or indication of quality.

30. A systematic assessment is needed, using a standard international framework, to provide a detailed diagnosis and analysis of the current statistical capabilities country by country. The assessment should cover all principal data domains, including data gaps, data quality, and related institutional and methodological limitations with regard to priority data needs. Evidence suggests that Africa and some subregions of Asia and and Latin America have the largest number of countries with weak statistical systems. Countries situated in these regions also constitute the priority for UNCCD intervention. Consequently, they require a comprehensive capacity-development effort to enable them to meet minimum data requirements.

31. Any UNCCD DQF should therefore focus on improving the quality of data collected, compiled and disseminated ideally through a strategy.

D. Towards a quality improvement strategy

32. The purpose of the quality improvement strategy (QIS) is to identify the broad areas where quality improvement work should be concentrated. It should act as a bridge between theoretical quality framework and the more practical quality improvement programmes. The QIS is driven by requirements expressed by users, as well as those identified by statisticians, and has the four notable elements:

(a) Understanding user needs. The secretariat has knowledge of the needs of the key users of the statistical data, but this knowledge may not be exhaustive;

(b) Identifying and improving current capacities in data reporting;

(c) Improving processes and quality control in promoting better standards for documentation and metadata, and improve data validation processes;

(d) Communicating efforts to improve and standardize metadata, so that users have better information to assess the quality of indicators and other outputs themselves.

33. In order to anchor the QIS, an assessment should be conducted of the capacities existing at country level, as well as at secretariat level, to produce high quality statistics on Convention-relating matters.

34. The country assessment and the secretariat self-assessment (with external assistance) should culminate in a report that elaborates on quality problems and their sources, as well as prioritizing interventions to improve quality. The report could also be complemented by an in-depth review involving external expertise and both user and partner surveys.

35.   The self-assessment can be assisted by employing the Checklist for Quality Assessment of Statistics Compiled by International and Supranational Organizations,[6] which examines chronologically every step of the production of statistics, following the data life cycle.

36.   As for the country assessment, the Template for a Generic National Quality Assurance Framework (NQAF)[7] is designed to provide a structure within which countries can formulate and operationalize national quality frameworks of their own or further enhance existing ones.

III. Conclusions and recommendations

A. Conclusions

37.   This document sets out guidelines for instituting a DQF for the UNCCD, premised on international principles and standards on quality reporting. This document should be considered a first step in the development of a broader data quality strategy that will encompass also the definition of processes and institutions for quality monitoring and quality improvements, which have been alluded to throughout.

38.   Towards these goals, the CRIC may consider adopting the following principle and standards for reporting under the PRAIS:

B. Principles

39.   Quality shall be considered a multidimensional concept. Each quality dimension shall be measured to the greatest extent possible with quantitative indicators, complemented by qualitative descriptions.

40.   Information on data quality shall be attached to data at all stages of the statistical process.

41.   Data quality reporting shall follow the Fundamental Principles of Official Statistics (as referred to in paragraph 15) and the Principles Governing International Statistical Activities set out in the Economic Commission for Europe's Decision C (47) (as referred to in paragraph 11).

42.   The UNCCD understanding of data quality shall be communicated to users, e.g. in a quality declaration.

43.   Information on data quality shall be made available to users together with the data set(s) to which they refer.

44.   Data quality reporting shall be designed to enable:

        (a)   Producers to identify the needs for further improvements in the statistical process and to track the main bottlenecks in that process;

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   6 See document SA/2009/12/Add.2. Committee for the Coordination of Statistical Activities, Fourteenth Session (18 November 2009). Revised International Statistical Processes Assessment Checklist.
   7 See document E/CN.3/2012/13. United Nations Economic and Social Council, Statistical Commission. 16 December 2011. National quality assurance frameworks, Annex I. Available at: <http://unstats.un.org/unsd/statcom/doc12/2012-13-NQAF-E.pdf>.

(b) Users to understand the strengths and limits of the published statistics and to know how to properly use the data.

45. The needs of users concerning information on quality shall be taken into consideration in the further development of the data quality framework.

C. Standards

46. Data quality reporting shall address the quality dimensions developed for the European Statistical System. These are:

(a) Relevance: the degree to which statistics meet current and potential user needs;

(b) Accuracy: the closeness of computations or estimates to the corresponding true value;

(c) Timeliness: the length of time between the availability of an information and the event or phenomenon it describes;

(d) Accessibility: the existence of physical conditions which enable users obtaining the data easily and quickly;

(e) Clarity: the degree to which the data are accompanied with appropriate documentation and metadata;

(f) Comparability: the absence of effects on data caused by differences in statistical concepts, measurement tools or procedures (across geographical units, across data sets and over time), which ensures that statistics on the same theme can be reliably combined in different ways and for various uses;

(g) Credibility: the trust in the objectivity of the data, implying that the data are perceived to be produced professionally in accordance with appropriate statistical standards, and that policies and practices are transparent.

D. General recommendations

47. The following preliminary recommendations may be considered by Parties at the eleventh session of the CRIC, with a view to initiating early consultations on draft decisions to be forwarded to the COP for consideration at its eleventh session:

(a) The secretariat is requested to conduct a data quality assessments (including self-assessment) and submit a report to the twelfth session of the CRIC, including a brief summary of quality problems and a prioritised list of possible improvements and an assessment of additional resources required for their implementation;

(b) The secretariat is requested to develop standard quality indicators for each quality dimension;

(c) The secretariat should develop a sufficient information base for data quality reporting:

(i) Detailed inventory and documentation of the statistical processes, applied methodologies and concepts should be compiled; and

(ii) The information required to evaluate the quality of the statistical output should be collected.

(d)   The secretariat should assess the relevance of reporting indicators and conduct a user satisfaction surveys as required;

(e)   Subsidiary bodies and Convention institutions are requested to include consideration of these recommendations in their respective work programmes and plans to be proposed at COP 11, with a view to providing the required assistance to affected country Parties in meeting their reporting obligations under the Convention.

Annex I

Examples for quality indicators

Dimension	*Indicator*
Relevance	• Number of data accesses by users [a]
	• Number of publications disseminated and sold [a]
	• User satisfaction index [a] (see annex II)
	• Number of quotations in scientific journals relevant to the domain
	• Number of quotations in the press and media
	• Coverage rate [b] (see annex II)
Accuracy	• Expected variation of survey estimates resulting from random sampling (coefficient of variation) [a] (see annex II)
	• Response rate [a] (see annex II)
	• Proportion of imputed data points [b]
	• Ratio of the value of imputations [b]
	• Estimated root mean squared error of the imputed data
	• Proportion of statistical discrepancy in the related totals
	• Average relative size of revisions [a,b] (see annex II)
	• Proportion of rejected source data
Timeliness and punctuality	• Time lag between the end of the reference period and the dissemination of provisional data [a]
	• Time lag between the end of the reference period and the dissemination of the final data [a]
	• Time lag between scheduled and actual date of the dissemination of the data [a]
	• Proportion of data points for which final data could not be provided on schedule
	• Proportion of data points for which final data could not be provided within a (predefined) acceptable delay
Accessibility and clarity	• Rate of completeness of metadata information for disseminated statistics [a]
	• Indicators of users' perception about the accessibility of the released statistics obtained from user satisfaction surveys
	• Indicators of users' perception about the clarity of the released statistics
Comparability	• Average length of time series which are comparable across geographical units, with reference to the common standard
	• Proportion of time series which are comparable across geographical units, with reference to the common standard
	• Average length of time series not interrupted by a methodological break

Dimension	Indicator
Coherence	• Difference between data on the same theme disseminated from different sources [c]

[a] Indicator is based on a proposal from the statistical office of the European Union (Eurostat) (see Eurostat, 2007, Handbook on Data Quality Assessment Methods and Tools, Wiesbaden).

[b] Indicator is based on a proposal from the Food and Agriculture Organization of the United Nations (FAO).

[c] A similar indicator is used by the Office for National Statistics of the United Kingdom of Great Britain and Northern Ireland (see ONS, 2007, Guidelines for measuring statistical quality, <http://unstats.un.org/unsd/dnss/docViewer.aspx?docID=1795>).

Annex II

Proposed formulas for selected quality indicators

User satisfaction index: The user satisfaction index measures the degree to which interviewed users feel that the statistics satisfies their needs.

Calculation:

$$J = \frac{1}{N} \sum_{i=1}^{N} X_i$$

where N is the number of users interviewed in a user satisfaction survey, and X is a variable, or a composite index derived from other variables (y_1, y_2, ... y_m), indicating the extent to which the statistics meets the needs if the interviewed user. X can be calculated as

$$X_i = \sum_{j=1}^{M} w_j y_{ji}$$

where w_j is the weight given to the variable y_j. and i is the identifier of the respondent participating in the user satisfaction survey.

Coverage rate: The coverage rate measures the degree to which the provided statistics is complete, in the sense that the foreseen values are not missing.

Calculation:

$$Q = \frac{X - M - Z + I + E}{N},$$

where N is the number of data points foreseen in the statistics; X is the number of data points for which the underlying values have been attempted to be collected; M is the number of data points for which the underlying values have not been obtained; Z is the number of data points for which the underlying values have been obtained but were rejected due to concerns about their plausibility; and I is the number of data points for which the values have been imputed (in cases of non-response or rejected data). See the following diagram for an illustration of the different sets of data points.

Decomposition of the disseminated statistics by data availability status

Total statistics (N)		Estimated (E)
		Missing, not collected
	Data collec-tion (X)	Collected and accepted
		Collected and rejected (Z)
		Imputed (I)
		Non-response (M)

Response rate: The response rate measures the extent to which valid data have been obtained in the data collection.

Calculation:

$$J = \frac{X - M}{X},$$

where M and X are defined as above (see the subsection "Coverage rate").

Expected variation of survey estimates resulting from random sampling (coefficient of variation): This indicator measures the expected extent to which a survey-based estimator would be different if it had been calculated from a different population sample than the population sample actually used.

Calculation:

Theoretically, the coefficient of variation of the estimator is given by the formula

$$CV = \frac{\sigma_{\hat{X}}}{E(\hat{X})}, \text{ where } \sigma_{\hat{X}} = \sqrt{E\left(\left(\hat{X} - E(\hat{X})\right)^2\right)}$$

In practice, the standard deviation ($\sigma_{\hat{x}}$) and expected value $E(\hat{X})$ of the estimator are unknown. The estimator is usually assumed to be unbiased, so that $E(\hat{X}) = \hat{X}$. There are different approaches to calculate an estimate for the standard deviation, $\sigma_{\hat{x}}$, depending on the survey design and the asymptotic properties of the estimated indicator. When $\hat{X}$ is the population mean ($\bar{x}$) of an individual characteristic, x, and the survey is based on simple random sampling with the sample size n, a common approach is to use the formula

$$\hat{\sigma}_{\bar{x}} = \frac{\sigma_x}{\sqrt{n}}, \text{ with } \sigma_x = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{x})^2}.$$

Average relative size of revisions: This indicator measures the extent to which data have been changed in response to revisions.

Calculation:

$$J = \sum_{i=1}^{N} \frac{|x_i' - x_i|}{\bar{x}}$$

where x is the disseminated value of a data point before the revision; $\bar{x}$ is the average of those values calculated over all N data points with non-missing values included in the given dataset (their quantity is usually given by X-M-Z+I+E in diagram A2.1 above); x' is the disseminated value of a data point after the revision; and i is the identifier of a data point with a non-missing value.